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AcademicYearIntro

This schedule contains the dates prescribed by the University Senate for academic activities. Dates relating to fee payment, cancellation of course selections, late charges, and other fees or charges will be published in the Important Dates and Deadlines section of the Registration Website (carleton.ca/registration).

The academic year is divided into three terms:

Summer term: May - August

Fall term: September - December

Winter term: January - April

Courses are offered in the following patterns:

Early summer: May - June

Late summer: July - August

Full summer: May - August

Fall term: September - December

Winter term: January - April

Fall/winter: September - April

Courses are offered during the day and in the evening.

The Academic Year (Graduate and Undergraduate Studies)

This schedule contains the dates prescribed by the University Senate for academic activities. Dates relating to fee payment, cancellation of course selections, late charges, and other fees or charges will be published in the Important Dates and Deadlines section of the Registration Website (carleton.ca/registration).

The academic year is divided into three terms:

Summer term: May - August

Fall term: September - December

Winter term: January - April

Courses are offered in the following patterns:

Early summer: May - June

Late summer: July - August

Full summer: May - August

Fall term: September - December

Winter term: January - April

Fall/winter: September - April

Courses are offered during the day and in the evening.

Date	Activity
SUMMER TERM 2021	
March 1, 2021	Last day for receipt of applications for admission to an undergraduate degree program for the summer term.
April 29, 2021	Deadline for course outlines to be made available to students registered in early- and full-summer courses.
May 1, 2021	Last day for receipt of applications for undergraduate degree program transfers for the summer term.
May 6, 2021	Early summer and full summer classes begin.
May 13, 2021	Last day for registration and course changes (including auditing) for early summer courses.
May 14, 2021	Graduate students who have not electronically submitted their final thesis copy to the Faculty of Graduate and Postdoctoral Affairs will not be eligible to graduate in spring 2021 and must register for the summer 2021 term.

May 20, 2021	Last day for registration and course changes (including auditing) for full summer courses.
May 21, 2021	Last day to withdraw from early summer and full summer courses with a full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.
May 14-26, 2021	Fall/winter and winter term deferred final examinations will be held.
May 24, 2021	Statutory holiday. University closed.
May 28, 2021	Last day to request Formal Examination Accommodation Forms for June examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
June 11, 2021	Last day for summative tests or examinations - or for formative and/ or practical tests or examinations totaling more than 15% of the final grade - for early summer courses before the official examination period (see Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar).
June 18, 2021	Last day of early summer classes. (NOTE: full summer classes resume July 2.)
	Last day for take-home examinations to be assigned, with the exception of those conforming to the Examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
	Classes will follow a Monday schedule.
	Last day for academic withdrawal from early summer courses.

	Last day for handing in term assignments, subject to any earlier course deadline.	August 9, 2021	Last day for summative tests or examinations - or for formative and/or practical tests or examinations totaling more than 15% of the final grade - before the official examination period (see Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar).
June 19-20, 2021	No classes or examinations take place.	August 16, 2021	Last day of late summer and full summer classes.
June 21-27, 2021	Final examinations in early summer courses and mid-term examinations in full summer courses may be held. Examinations are normally held all seven days of the week.		Last day for take-home examinations to be assigned, with the exception of those conforming to the Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
June 25, 2021	Deadline for course outlines to be made available to students registered in late-summer courses.		Last day for academic withdrawal from late summer and full summer courses.
June 27, 2021	All take-home examinations are due on this day, with the exception of those conforming to the Examinations regulations in the Academic Regulations University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.		Last day for handing in term assignments, subject to any earlier course deadline.
July 1, 2021	Statutory holiday. University closed.	August 17-18, 2021	No classes or examinations take place.
July 2, 2021	Late summer classes begin. Full summer classes resume.	August 19-25, 2021	Final examinations in late summer and full summer courses may be held. Examinations are normally held all seven days of the week.
July 9, 2021	Last day for registration and course changes (including auditing) for late summer courses.	August 25, 2021	All take-home examinations are due on this day, with the exception of those conforming to the Examinations regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
July 16-18, 2021	Early summer term deferred final examinations to be held.	September 17-19, 2021	Full and late summer term deferred final examinations to be held.
July 23, 2021	Last day to withdraw from late summer courses with a full fee adjustment.		
	Last day for graduate students to submit their supervisor-approved thesis in examinable form to the department.		
July 30, 2021	Last day to request Formal Examination Accommodation Forms for August examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.		
August 2, 2021	Statutory holiday. University closed.		
		Date	Activity
		FALL TERM 2021	
		September 1, 2021	Last day for receipt of applications from potential fall (November) graduates.

	Deadline for course outlines to be made available to students registered in fall and fall/winter term courses.	October 15, 2021	Last day for receipt of applications for admission to an undergraduate degree program for the winter term from applicants whose documents originate from outside Canada or the United States.
September 6, 2021	Statutory holiday. University closed.		
September 7, 2021	Academic orientation (undergraduate and graduate students).	October 25-29, 2021	Fall break, no classes.
	Orientation for new Teaching Assistants.	November 12, 2021	Last day to request Formal Examination Accommodation Forms for December examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.
	All new students are expected to be on campus. Class and laboratory preparations, departmental introductions for students and other academic preparation activities will be held.		
September 8, 2021	Fall term begins. Fall and fall/winter classes begin.	November 15, 2021	Last day for receipt of applications for admission to an undergraduate degree program for the winter term.
September 17-19, 2021	Full and late summer term deferred final examinations to be held.		
September 22, 2021	Last day of registration for fall term and fall/winter courses.	November 26, 2021	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade before the official examination period (see examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar).
	Last day to change courses or sections (including auditing) for fall term and fall/winter courses.		
	Graduate students who have not electronically submitted their final thesis copy to the Faculty of Graduate and Postdoctoral Affairs will not be eligible to graduate in fall 2021 and must register for the fall 2021 term.	December 1, 2021	Last day for receipt of applications from potential winter (February) graduates.
September 30, 2021	Last day to withdraw from fall term and fall/winter courses with a full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.		Last day for graduate students to submit their supervisor-approved thesis, in examinable form to the department.
		December 10, 2021	Fall term ends.
October 8, 2021	December examination schedule (fall term final and fall/winter mid-terms) available online.		Last day of fall term classes. Classes follow a Monday schedule.
October 11, 2021	Statutory holiday. University closed.		Last day for take home examinations to be assigned, with the exception of those conforming to the examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.

	Last day for academic withdrawal from fall term courses.
	Last day for handing in term work and the last day that can be specified by a course instructor as a due date for term work for fall term courses.
	Last day for receipt of applications for undergraduate degree program transfers for winter term.
December 11-23, 2021	Final examinations in fall term courses and mid-term examinations in fall/winter courses may be held. Examinations are normally held all seven days of the week.
December 23, 2021	All take home examinations are due on this day, with the exception of those conforming to the examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
December 25, 2021 through January 1, 2022 inclusive	University closed.
Date	Activity
WINTER TERM 2022	
January 3, 2022	Deadline for course outlines to be made available to students registered in winter term courses
January 5, 2022	University reopens.
January 10, 2022	Winter term classes begin.
January 24, 2022	Last day for registration for winter term courses.
	Last day to change courses or sections (including auditing) for winter term courses.
	Graduate students who have not electronically submitted their final thesis copy to the Faculty of Graduate and Postdoctoral Affairs will not be eligible to graduate in winter 2022 and must register for the winter 2022 term.
January 21-23, 28-30, 2022	Fall term deferred final examinations will be held.

January 31, 2022	Last day for withdrawal from winter term and winter portion of fall/winter courses with full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.
February 18, 2022	April examination schedule available online.
February 21, 2022	Statutory holiday. University closed.
February 22-25, 2022	Winter Break, no classes.
March 1, 2022	Last day for graduate students to submit their supervisor-approved thesis, in examinable form to the department.
	Last day for receipt of applications to Bachelor of Architecture, Bachelor of Industrial Design, Bachelor of Information Technology (Interactive Multimedia and Design), Bachelor of Music and the Bachelor of Social Work degree programs for the fall/winter session.
	Last day for receipt of applications for admission to an undergraduate program for the summer term.
	Last day for receipt of applications for admission from candidates who wish to be guaranteed consideration for financial assistance (including Carleton fellowships, scholarships and teaching assistantships) administered by Carleton University. Candidates whose applications are received after the March 1 deadline may be considered for the award of a fellowship, scholarship or teaching assistantship (Graduate students only).
March 16, 2022	Last day to request Formal Examination Accommodation Forms for April examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.

March 29, 2022	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade, in winter term or fall/winter courses before the official examination period (see Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar).	April 28, 2022	All take home examinations are due on this day, with the exception of those conforming to the Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
April 1, 2022	Last day for receipt of applications for admission to an undergraduate program for the fall/winter session, from candidates whose documents originate outside Canada or the United States, except for applications due February 1 or March 1.	May 1, 2022	Last day for receipt of applications for undergraduate internal degree transfers to allow for registration for the summer session.
	Last day for receipt of applications from potential spring (June) graduates.	May 13, 2022	Graduate students who have not electronically submitted their final thesis copy to the Faculty of Graduate and Postdoctoral Affairs will not be eligible to graduate in spring 2022 and must register for the summer 2022 term.
April 12, 2022	Winter term ends.	May 20- June 1, 2022	Fall/winter and winter term deferred final examinations will be held.
	Last day of fall/winter and winter term classes.	June 1, 2022	Last day for receipt of applications for admission to an undergraduate program for the fall/winter session except for applications due February 1 or March 1 or April 1.
	Last day for take home examinations to be assigned, with the exception of those conforming to the Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.	June 15, 2022	Last day for receipt of applications for undergraduate degree program transfers for the fall term.
	Last day for academic withdrawal from fall/winter and winter term courses.		
	Last day for handing in term work and the last day that can be specified by a course instructor as a due date for term work for fall/winter and winter term courses.	Date	Activity
April 13, 2022	No classes or examinations take place.	SUMMER TERM 2022	
April 14-28, 2022	Final examinations in winter term and fall/winter courses may be held. Examinations are normally held all seven days of the week.	March 1, 2022	Last day for receipt of applications for admission to an undergraduate degree program for the summer term.
April 15, 2022	Statutory holiday. University closed	April 28, 2022	Deadline for course outlines to be made available to students registered in early and full summer courses.
		May 1, 2022	Last day for receipt of applications for undergraduate degree program transfers for the summer term.
		May 5, 2022	Early summer and full summer classes begin.

May 12, 2022	Last day for registration and course changes (including auditing) for early summer courses.	Last day for take home examinations to be assigned, with the exception of those conforming to the Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
May 13, 2022	Graduate students who have not electronically submitted their final thesis copy to the Faculty of Graduate and Postdoctoral Affairs will not be eligible to graduate in spring 2022 and must register for the summer 2022 term.	Classes will follow a Monday schedule.
May 19, 2022	Last day for registration and course changes (including auditing) for full summer courses.	Last day for academic withdrawal from early summer courses.
May 20, 2022	Last day to withdraw from early summer and full summer courses with a full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.	Last day for handing in term assignments, subject to any earlier course deadline.
May 20-June 1, 2022	Fall/winter and winter term deferred final examinations will be held.	June 18-19, 2022 No classes or examinations take place.
May 23, 2022	Statutory holiday. University closed.	June 20-26, 2022 Final examinations in early summer courses and mid-term examinations in full summer courses may be held. Examinations are normally held all seven days of the week.
May 27, 2022	Last day to request Formal Examination Accommodation Forms for June examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.	June 26, 2022 All take home examinations are due on this day, with the exception of those conforming to the Examination regulations in the Academic Regulations University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
June 10, 2022	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade, for early summer courses before the official examination period (see Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar).	June 27, 2022 Deadline for course outlines to be made available to students registered in late-summer courses.
June 17, 2022	Last day of early summer classes. (NOTE: full summer classes resume July 4.)	July 1, 2022 Statutory holiday. University closed.
		July 4, 2022 Late summer classes begin. Full summer classes resume.
		July 11, 2022 Last day for registration and course changes (including auditing) for late summer courses.
		July 22, 2022 Last day to withdraw from late summer courses with a full fee adjustment.
		July 22-24, 2022 Early summer term deferred final examinations to be held.

July 25, 2022	Last day for graduate students to submit their supervisor-approved thesis, in examinable form to the department.	August 25, 2022	All take home examinations are due on this day, with the exception of those conforming to the Examination regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.
July 29, 2022	Last day to request Formal Examination Accommodation Forms for August examinations to the Paul Menton Centre for Students with Disabilities. Note that it may not be possible to fulfil accommodation requests received after the specified deadlines.	September 23-25, 2022	Full and late summer term deferred final examinations to be held.
August 1, 2022	Statutory holiday. University closed.		
August 9, 2022	Last day for summative tests or examinations, or formative tests or examinations totaling more than 15% of the final grade, before the official examination period (see Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar).		
August 16, 2022	Last day of late summer and full summer classes. Last day for take home examinations to be assigned, with the exception of those conforming to the Examination Regulations in the Academic Regulations of the University section of the Undergraduate Calendar/ General Regulations of the Graduate Calendar.		
	Last day for academic withdrawal from late summer and full summer courses and any other courses that end this term. Last day for handing in term assignments, subject to any earlier course deadline.		
August 17-18, 2022	No classes or examinations take place.		
August 19-25, 2022	Final examinations in late summer and full summer courses may be held. Examinations are normally held all seven days of the week.		

Accreditation of the University

Accreditation

Carleton University, a founding member of the Council of Ontario Universities, enjoys full accreditation by the Ministry of Advanced Education and Skills Development of the Province of Ontario.

All programs of study leading to a Bachelor of Engineering degree are accredited by the Canadian Engineering Accreditation Board of Engineers Canada.

The Bachelor of Architecture degree offered by the School of Architecture is recognized by the Canadian Architectural Certification Board as a prerequisite to apply for certification of academic qualifications for registration to practice as an architect in a provincial association.

The Bachelor's, Master's and Doctoral programs offered by the Sprott School of Business are accredited by the Association to Advance Collegiate Schools of Business (AACSB International) and by the Network of International Business Schools (NIBS).

The Bachelor of Computer Science Honours Degree Program is accredited by the Accreditation Council of the Canadian Information Processing Society.

The B.Sc. Honours Chemistry and B.Sc. Honours Chemistry with Concentration in Nanotechnology are accredited by the Canadian Society for Chemistry.

The School of Industrial Design was established at Carleton on the recommendation of a study prepared by the Association of Canadian Industrial Designers. Initial funding for the school was supplied by Design Canada, Ministry of Industry, Trade and Commerce.

The Bachelor of Mathematics Honours Degree Program in Statistics is accredited by the Statistical Society of Canada (SSC).

The Bachelor of Social Work and Master of Social Work degree programs have been fully accredited by the Canadian Association of Social Work Education.

Carleton University participates in the Ontario Student Assistance Program, other provincial assistance programs and the Canada Student Loans Program, and is recognized for the Quebec Loans and Bursaries Program.

Carleton University's degree programs are recognized in the United States by the William D. Ford Federal Direct Loan (Direct Loan) Program and by the U.S. Department of Veterans Affairs.

Copyright Compliance

Carleton University is committed to compliance in all copyright matters. Noncompliance is a violation of the Canadian Copyright Act. In addition to any actions that might be taken by any copyright owner or its licensing agent, the University will take steps against any breach of this policy. See <http://www.library.carleton.ca/copyright/> for guidelines on copyright compliance.

Disclaimer

Disclaimer

The Carleton University Undergraduate and Graduate Calendars are published several months in advance of the beginning of the academic year and are intended to assist readers to understand the academic and administrative structure, policies and procedures of the University, and to describe the academic programs offered. By the act of registration each student becomes bound by the policies and regulations of Carleton University. Students are responsible for familiarizing themselves with the general information, rules, and regulations of Carleton University, as well as the specific requirements of each program, degree, diploma or certificate sought. It is the student's responsibility to ensure that the courses chosen are appropriate to the program requirements.

Carleton University reserves the right to make changes in the information contained in the University Calendars without prior notice. Not every course listed in the Undergraduate or Graduate Calendar will necessarily be offered in any academic year. Carleton reserves the right to limit the number of students who enrol in any program or course. While reasonable efforts will be made to offer courses as required within programs, admission to a program does not guarantee admission to any given course. If there is an inconsistency between the Undergraduate or Graduate Calendars and such regulations and policies as established by resolution of Senate, the version of such material as it is established by Senate will prevail.

Carleton University does not accept, and hereby expressly disclaims, any and or all responsibility or liability to any person, persons or group, either direct or indirect, consequential or otherwise, arising out of any one or more of such changes and, specifically, the University hereby disclaims liability to any person who may suffer loss as a result of reliance upon any information contained in the University Calendars. Additions and corrections will be posted at the Updates page.

Carleton University disclaims all responsibility and liability for loss or damage suffered or incurred by any student or other party as a result of delays in or termination of its services, courses or classes for any reason whatsoever including but not limited to by reason of force majeure, fire, flood, riots, war, strikes, lock#outs, damage to University property, financial exigency or other events beyond the reasonable control of the University. Carleton University also disclaims any and all liability for damages arising as a result of errors, interruptions or disruptions to operations or connected with its operations or its campuses, arising out of computer failure or non#compliance of its computing systems.

General Regulations (Graduate)

1. Administration of the Regulations
2. Admission Requirements and Eligibility
3. Application for Admission
4. Admissions Procedure
5. Program Requirements
6. Transfer of Credit
7. Registration and Course Selection
8. Continuous Registration
9. Examinations
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11. Academic Standing
12. Thesis Requirements
13. Time Limits for Program Completion
14. Co-operative Education Policy
15. Grade Review
16. Program Review
17. Records Retention Policy
18. Use of Student Work in Program Assessment
19. Academic Integrity
20. Offences of Conduct
21. Appeals and Petitions
22. Graduation

General Regulations

1. Administration of the Regulations

1.1 General Administration

The following regulations apply to all graduate degree and graduate diploma programs administered by the Faculty of Graduate and Postdoctoral Affairs.

1.2 Student Responsibility

1. It is the student's responsibility to remain informed of all rules, regulations and procedures required by their program and by the Faculty of Graduate and Postdoctoral Affairs. Ignorance of regulations will not be accepted as a justification for waiving such regulations and procedures.

Any exceptions to the rules, regulations and procedures must be approved in writing by the Dean of the Faculty of Graduate and Postdoctoral Affairs.

Students are responsible for establishing and maintaining contact with their departmental graduate supervisor/associate chair (graduate affairs) and, if appropriate, thesis/research supervisor.
2. To receive their degree or graduate diploma students must fulfil:
 - a. all the requirements of the department, school, or institute in which he or she is registered, including completion of an application for graduation;

- b. all regulations of the Faculty of Graduate and Postdoctoral Affairs;
- c. all University regulations;
- d. all financial obligations to the University.

2. Admission Requirements and Eligibility

2.1 General Requirements

Graduates of recognized universities will be considered for admission to the Faculty of Graduate and Postdoctoral Affairs. The University's general policy on admission is outlined below, but all applicants should refer to the departmental websites for details concerning the specific or additional requirements of each department, institute, or school.

2.2 Eligibility

The eligibility of a candidate for admission into one of the graduate programs is based upon:

- the performance of the candidate and the assessment provided by his/her referees as a measure of the likelihood that the candidate can successfully complete the course of study and research defined by the Senate of the University for the given degree;
- the capacity of the graduate department, institute, or school to provide a program of study and research that would meet the expectations of the candidate as defined in his/her statement of academic interests and ambitions;
- the availability of a faculty member competent to supervise the candidate's academic program of study and research.

2.3 Qualifying-Year Program

Applicants who do not qualify for direct admission to the master's program may be admitted to a qualifying-year program.

Admission to the qualifying-year program does not imply automatic admission to the master's program. At the end of the qualifying-year program the student will be required to apply for entry into the master's program, at which time the department will determine the student's eligibility to enter the program. If successful, the student will be informed of this decision by the Dean of the Faculty of Graduate and Postdoctoral Affairs.

Applicants who require 3.0 credits or more of additional requirements to enter the master's program must complete a qualifying year.

Credits taken to fulfil the requirements of the qualifying-year program may not be used for credit for the master's degree. Courses taken extra to the program requirements of the qualifying year and which have been successfully completed may be considered for credit towards the master's degree.

2.4 Master's Program

For admission to the master's program, applicants must hold an honours bachelor's degree, or the equivalent, with, normally, B+ or better in the honours subject and B- or better overall. Applicants must also be recommended

by the department in which they plan to undertake their studies.

2.5 Doctoral Program

For admission to the Ph.D. program, applicants must ordinarily hold a master's degree, or the equivalent, from a recognized university, normally with an average of B+ or better in courses (including thesis where applicable) and normally with no grade below B-.

2.6 Restriction on Degrees

Carleton University does not restrict the number of degrees (bachelor's, master's, Ph.D.) that may be taken in any one discipline at Carleton University, but some departments, institutes or schools may restrict the number to two.

2.7 Graduate Diploma Programs

For admission to the diploma programs, applicants are advised to consult with the individual departments, institutes or school offering the diploma.

3. Application for Admission

3.1 Accommodation Policy for Students with Disabilities

Carleton University has a Senate-approved policy on academic accommodation for students with disabilities. For more information, consult the Paul Menton Centre for Students with Disabilities at <http://www.carleton.ca/pmc>.

3.2 Application Forms

Applications for admission to the Faculty of Graduate and Postdoctoral Affairs should be made through the online applications available at <https://gsapplications.carleton.ca>.

To cover administrative costs, a non-refundable application fee (CDN or US funds) is required with each application.

3.3 Deadlines

Normally, students are admitted to commence study in the fall term. However, some departments, institutes or schools may consider applicants to commence in the winter term or the spring/summer term.

For information on the specific deadlines for applications (with or without financial assistance), please visit the online application site by selecting the "Online Application Account" link from the Faculty of Graduate and Postdoctoral Affairs website at <https://gsapplications.carleton.ca>. In the online application site, application deadlines can be found on the left-hand navigation panel under "Program Deadlines."

Students applying to joint programs with the University of Ottawa should note that application procedures, especially deadlines, are different in the two institutions, and they should contact the individual institution for information.

3.4 Transcripts

Official transcripts of the applicant's entire university record must be sent to the Faculty of Graduate and Postdoctoral Affairs. All foreign documents, e.g., transcripts, must be translated into English and be notarized.

3.5 Letters of Reference

All applications must be supported by a minimum of two confidential letters of recommendation. The total number of referees required for your application depends on the program to which you are applying. A suitable referee is an individual who is fully knowledgeable and aware of your education and abilities. Referees should be academic in nature where possible. Professional referees will only be accepted in situations where the applicant's professional experience is most relevant. You will need to supply the names of your referees, and their email address, in the online application.

3.6 Proficiency in English

Proficiency in English is necessary to pursue graduate studies at Carleton University. All applicants whose first language is not English must satisfy this requirement in one of the following ways:

1. To present an official overall score of 70 on the Canadian Academic English Language (CAEL) Assessment with a minimum score of 60 in each band; or
2. To present an official Test of English as a Foreign Language (TOEFL) score of 580 on the paper-based test (PBT), or an overall score of 86 on the internet-based test (IBT) with a minimum score in each component of: writing-22; speaking-22; reading-20; and listening-20; or
3. To present an official overall International English Language Testing System (IELTS) score of 6.5, with a minimum of 6.0 in each band score; or
4. To present an official minimum score of 60 on the Pearson Test of English (Academic); or
5. To have completed ESLA 1900 or ESLA 1905 at Carleton University with a final grade of B- or higher; or
6. To present official certification (transcripts) to indicate that they have completed an undergraduate or graduate degree within the past three years in a university in Canada, the United States, the United Kingdom or any other country in which the primary language is English, and where the language of instruction in the relevant educational institution was exclusively English.

FGPA reserves the right to require further documentation or additional testing if they feel it necessary to demonstrate the required level of English language proficiency.

Note that some programs demand higher levels of competence in English, as specified in their Admissions Requirements in this Calendar.

Applicants whose first language is not English and who do not meet the requirements stated above may be offered admission to a graduate degree program with an English as a Second Language Requirement (ESLR) and/or will be required to take prescribed remedial course work as a condition of continuing in their program.

4. Admissions Procedure

4.1 General Procedure

All applicants for admission will be examined and evaluated by the department, institute, school or program in which the applicant wishes to study. All supporting documents (transcripts, letters of reference, etc.) must be received before any application can receive formal consideration.

Recommendations for admission will be forwarded to the Dean of the Faculty of Graduate and Postdoctoral Affairs for consideration. The official offer of admission comes from the Dean of the Faculty of Graduate and Postdoctoral Affairs. Any correspondence from departments, institutes, schools or programs with regard to acceptance is not official.

4.2 Admission Validity for New Students

The Statement of Standing on Admission is valid **only** for the term stipulated on the form. If the applicant fails to register for this term, his/her admission and registration eligibility will lapse automatically and he/she must re-apply for admission.

4.3 Revocation of Admission or Registration

Applications for admission or registration will be revoked if the University determines that the applicant has provided incomplete or misleading information.

5. Program Requirements

5.1 General Information

Program Descriptions and Details of Courses can be found in subsequent sections of this Calendar. Prospective applicants should note particularly the admission requirements, the fields in which advanced study and research may be undertaken, and the program requirements, in addition to the general regulations of the Faculty of Graduate and Postdoctoral Affairs, which are detailed in this section.

5.2 Qualifying-Year Program

Students in the qualifying year will ordinarily register in 5.0 credits at the senior undergraduate level. Of these 5.0 credits, normally no more than 1.0 credit at the 2000-level and no more than 2.0 credits at the 5000-level may be taken. Credits taken to fulfill the requirements of the qualifying-year program may not be used for credit towards the master's degree.

5.3 Master's Program

The normal requirement for the master's degree is 5.0 credits (including the thesis where applicable).

In the case of a master's degree in the range of 5.0-9.0 credits, 1.0 credit may be selected from those offered at the senior undergraduate level, that is, at the 4000-level, with the approval of the program.

In the case of a 10.0 or more-credit master's degree, with program approval, 2.0 credits may be selected from those offered at the senior undergraduate level, that is, at the 4000-level.

5.4 Doctoral Program

Ordinarily, all courses taken for credit towards the Ph.D. degree must be at the 5000- or 6000-level.

5.5 Language Requirements

Some graduate programs require a reading knowledge of one or more languages other than English. Language requirements will be prescribed by programs according to their regulations and the needs of their students. Language requirements must be completed within the time limit allowed for the completion of the student's program.

6. Transfer of Credit

6.1 Transfer of Credit on Admission

Graduate courses completed at another institution or at Carleton University that have not been used to fulfil the requirements of another degree program may be accepted in partial fulfilment of Carleton's degree requirements. Credit for such work will be determined in each case by the Faculty of Graduate and Postdoctoral Affairs on the recommendation of the program concerned.

Master's candidates will be permitted to transfer the equivalent of up to 40 per cent of their coursework credit requirements on admission. In addition, if a master's candidate is granted transfer of credit for 40 per cent of their coursework credit requirements, his/her remaining credits at Carleton must be at the 5000 level.

Doctoral candidates may be given advanced standing for work completed at other universities, but must normally register for a minimum of one year of full-time studies thereafter at Carleton and fulfill the thesis and comprehensive examination requirements. Students admitted with transfer of credits in a Ph.D. program may be required to pass a qualifying examination upon entry.

A candidate who has completed credits as a special student will only be permitted to transfer such credits for degree credit in the Faculty of Graduate and Postdoctoral Affairs with the permission of the Dean.

Special students enrolled in a graduate level course are subject to the special student regulations outlined in the Undergraduate Calendar at <http://calendar.carleton.ca/undergrad/>.

Up to 1.0 credit of Carleton courses at the 5000 level or higher, completed by a student registered in the final year of study at a Carleton University undergraduate honours degree or equivalent may be considered for advanced standing in a Carleton University Master's degree, if the latter offers an Accelerated Pathway.

Students who are considered to participate in an Accelerated Pathway must obtain authorization from the academic unit offering this Master's program. All courses taken as part of the Accelerated Pathway must be at the 5000 level or higher. Details are specified in the corresponding "About the Program" section of the Calendar.

6.2 Transfer of Credit After Admission

A student admitted to and eligible to register in a graduate program is not permitted to register at Carleton University

at the same time in any other graduate program or as an undergraduate or special student.

7. Registration and Course Selection

7.1 The Calendar Year

The Faculty of Graduate and Postdoctoral Affairs divides the calendar year into three terms; each term comprises about thirteen weeks of lectures or seminars. The first term of the academic year is designated as the fall term; the second term of the academic year is designated as the winter term; and the third term of the calendar year is designated as the spring/summer term. The precise dates of registration for the fall, winter, and spring/summer terms are specified in the Academic Schedule section of this Calendar.

7.2 Course/Program Approval

Initial course/program registration and any subsequent course changes must be approved by the program's graduate supervisor/associate chair (graduate affairs). This approval is also required for any undergraduate student who wishes to register in a graduate-level course.

Credit will be granted only for those courses and research activities for which the candidate is formally registered. An unregistered student is not entitled to attend lectures, tutorials, or seminars, and is not entitled to thesis supervision, examination privileges, or access to research facilities. Students will receive no credit for any work completed during a term in which they were not registered.

7.3 Student Records Information

Names

The University is committed to the integrity of its student records. Students are required to provide on their application for admission their complete legal name. Any requests to change a name, by means of alteration, deletion, substitution, or addition, must be accompanied by appropriate supporting documentation. Upon making application for graduation, students may be asked to provide proof of their name.

Addresses

Incorrect address information will delay the receipt of awards and student information. Students must update the following address information at <https://central.carleton.ca>:

- permanent or mailing address (used for registration information)
- mailing address (used for all mail during the academic session)
- telephone number for permanent address and for mailing address

Disclosure of Information

Carleton University is required to disclose personal information such as Ontario Education Numbers, student characteristics and educational outcomes to the Ministry of Advanced Education and Skills Development under s. 15 of the Ministry of Training, Colleges and Universities Act, R.S.O. 1990, Chapter M. 19, as amended. The ministry collects this data for purposes such as planning, allocating and administering public funding to colleges,

universities and other post-secondary educational and training institutions and to conduct research and analysis, including longitudinal studies, and statistical activities conducted by or on behalf of the ministry for purposes that relate to post-secondary education and training. Further information on how the Minister of Training, Colleges and Universities uses this personal information is available on the ministry's website.

Further information on the collection and use of student-level enrolment-related data can be obtained from the Ministry of Advanced Education and Skills Development website: <https://www.ontario.ca/page/ministry-advanced-education-and-skills-development>.

In accordance with the Freedom of Information and Protection of Privacy Act (FIPPA), all personal and academic information is considered confidential and will not be disclosed to a third party without the authorization of the person to whom the information pertains. In addition, the University will disclose at the time of collection of personal information the purpose for which that information will be used. For further information, please see <http://carleton.ca/privacy/fippa-at-carleton-university>.

Electronic Communication

The University provides each student with an email address and uses this as an official channel of communication with the student. A message sent to a student's university-provided email address constitutes an official communication to the student. Students are responsible for monitoring their University email address on a regular basis for as long as they are active in the academic affairs of the university. Requests from students regarding academic or administrative issues must be sent from the student's university-provided email address.

7.4 Course Selection

Students proceeding to a graduate degree or diploma must arrange their program according to the regulations of the Faculty of Graduate and Postdoctoral Affairs and their program.

The course and thesis requirements of each graduate program are organized or defined in units of credits: 1.0 credit is typically made up of three hours of lectures or seminars a week for two terms, or the equivalent; 0.5 credit is typically made up of three hours of lectures or seminars a week for one term, or the equivalent; 0.25 credit is typically made up of three hours of lectures or seminars a week for six weeks, or the equivalent.

7.5 Evaluation

To gain standing in a course, a student must meet the course requirements for attendance, term work, and examinations. Instructors will inform their classes by distributing written notices, before the last day for late registration, of the elements and their weighting that will contribute to the final grade, including (where applicable) attendance, class participation, essays, tests, laboratories, studio-workshops, other course-related work assignments, and final examinations.

7.6 Tutorial or Reading Courses

Tutorial or Reading Courses are arranged to allow students to take full advantage of all the resources of the University in areas or fields of a very highly specialized nature. Such arrangements are subject to the approval of the departmental graduate supervisor/associate chair (graduate affairs).

7.7 Audit Course

Graduate students must have approval from the course instructor and their program graduate supervisor/associate chair (graduate affairs) to audit a course.

- Full-time students are not charged an additional fee.
- Part-time students may only take 1.25 credits per term.

The student should discuss with the instructor the conditions and expectations under which as an auditing student they may be permitted to participate, including attendance and participation in class discussions and group work, and the submission of any material.

A request to change course registration from audit to credit status, or credit to audit, must be received by the Faculty of Graduate and Postdoctoral Affairs no later than the last day to add a course (of that duration) in the term. Students must satisfy all registration requirements to register in the course for academic credit. Students may not retroactively appeal to change the registration status from audit to credit, but may subsequently re-register in the course for credit. Graduate students are limited to a maximum of 1.0 course-weight audit registration per program.

7.8 Course Numbering System

Each course is designated by an eight-character alphanumeric code. The first four letters indicate the department, institute, school or committee under whose auspices the course is offered. The four numerical digits identify the specific course. The credit value is indicated in square brackets following the course number.

7.9 Status

Full- or part-time status is established at the time of admission to a program. Graduate students admitted and registered as full-time students will be required to continue in and complete their program as full-time students, and will be assessed full-time fees for the duration of their program. Graduate students admitted and registered as part-time students will be required to continue and complete their program as part-time students, and will be assessed part-time fees for the duration of their program.

A part-time graduate student will not register in more than 1.25 credits per term, including audit courses.

Students who are unsure of their status should contact the office of the Faculty of Graduate and Postdoctoral Affairs for assistance at 613-520-2525.

7.10 Change of Status from Full- Time to Part-Time

Students who have valid reasons for changing status from full-time to part-time prior to registration for a term may apply for permission by:

- writing to the Dean of the Faculty of Graduate and Postdoctoral Affairs stating the reason(s) for seeking exemption from the full-time registration requirements stated in 7.9
- by completing a Change of Registration Status Form, accompanied by a statement from the departmental graduate supervisor/associate chair (graduate affairs) - and the thesis supervisor, if applicable - in support of their request.

It is understood that such a status change will be granted only in exceptional cases (e.g., for medical reasons.)

Exemptions are normally granted for a term.

7.11 Off-Campus Research

Graduate students may arrange to undertake full-time studies or research at another institution or in the field. Such activity may apply to only a part of the total program. The off-campus period may not normally exceed twelve months.

Requests for permission to undertake full-time off-campus study or research must be submitted to the Dean of the Faculty of Graduate and Postdoctoral Affairs with the approval of the department graduate supervisor/associate chair (graduate affairs). Such requests should include the following information:

- a detailed statement of the research proposal or program of studies, and the specific arrangements that are proposed for the supervision and direction of the work;
- an explanation of the reasons why the work cannot be satisfactorily undertaken while on campus at Carleton University;
- a description of the studies and/or research facilities that are available at the proposed off-campus location;
- a written statement from a responsible official (for example, the on-site supervisor or director) of the external institution confirming that the proposed arrangements are satisfactory and that the candidate will be able to undertake research or studies;
- a time schedule for the proposed studies or research work;
- a statement of the candidate's expected sources of financial support.

Once the Faculty of Graduate and Postdoctoral Affairs grants approval, the student is expected to register prior to departure.

7.12 Cotutelle

Doctoral students may arrange to undertake a cotutelle in which they will complete the requirements of a Ph.D. program in both their home university and a partner university in another country.

Under such an arrangement, doctoral students conduct their dissertation research collaboratively, sequentially, and for roughly equal amounts of time in both universities. They are supervised in their dissertation research by a faculty member from each of the universities. The

dissertation is then examined by a committee whose members are drawn from both institutions.

Students who undertake a cotutelle are not subject to general regulation 7.11.

Requests for permission to undertake a cotutelle must be made in accordance with Carleton University's Cotutelle Policy. More information can be found in the official Carleton University Cotutelle Policy.

7.13 Dual Master's Degree

Master's students may undertake a Dual Master's Degree pathway in which they would complete the requirements of a master's program in both their home university and a partner university.

Students who undertake a Dual Master's Degree pathway are not subject to general regulation 7.11.

Requests for permission to undertake a Dual Master's Degree pathway must be made in accordance with Carleton University's Dual Master's Degree Policy. More information can be found in the official Carleton University Dual Master's Degree Policy.

7.14 Inter-University Cooperation in Graduate Instruction

Under certain circumstances, it is permissible for a student admitted to a graduate degree program and registered at one university to follow an approved graduate-level credit course at another university. All interested students should consult the chair/director of their department, institute or school prior to registration in order to obtain further information on procedures and conditions of eligibility. In order for this procedure to be valid, students must be officially registered at their home institution.

7.15 University of Ottawa

Carleton University and the University of Ottawa have developed a number of joint programs at the graduate level. Where formal joint programs do not exist, a graduate student may be permitted to follow up to 2.0 credits at the 5000- or 6000-level at the University of Ottawa. Reciprocal arrangements exist among departments, institutes and schools at both universities. All interested students should consult their program graduate supervisor/associate chair (graduate affairs), prior to registration, in order to obtain further information on particular departmental conditions of eligibility and procedures. Students must be officially registered at their home institution.

8. Continuous Registration

8.1 Loss of Status

Any student who remains unregistered in his/her degree program for three continuous terms (twelve months) will lose his/her graduate status.

8.2 Continuous Registration in Thesis, Research Essay, or Independent Research Project

Any student (full-time or part-time), after initial registration in a thesis, research essay or independent research project, must maintain this registration in all successive terms (including the term in which the student is examined) until his/her thesis, research essay or

independent research project is completed. Completion means submission of a final grade to the Faculty of Graduate and Postdoctoral Affairs after modifications/revisions. Students should note that approval to register in the thesis, etc, is given on the understanding that the student will be in regular contact with his/her supervisor, and that thesis research will be actively pursued in each term of registration.

8.3 Deposit of Thesis

In the case of a thesis, registration must be maintained until the thesis is electronically deposited with the office of the Faculty of Graduate and Postdoctoral Affairs. Should thesis not be deposited with the office of the Faculty of Graduate and Postdoctoral Affairs by the last day for late registration in a given term, the student will be required to register for that term.

8.4 Reinstatement

Students whose files have been closed as a result of failure to observe continuous registration requirements or who have lost their status for non-registration for three continuous terms must apply for reinstatement within the term they lose their status if they wish to continue their studies. If reinstated, students must pay a reinstatement charge plus the equivalent of 1.0 credit tuition fees for each term in which they failed to register, as well as for the current term of registration.

8.5 Exemption from Registration

Students who have valid reasons for not registering for a term may apply for permission to remain unregistered by:

- Writing to the Dean of the Faculty of Graduate and Postdoctoral Affairs prior to the registration period stating the reasons for seeking exemption from registration;
- by completing an Exemption from Registration form accompanied by a statement from the program graduate supervisor/associate chair (graduate affairs) - and from their thesis supervisor, if applicable - confirming that they will not be on campus for the term, will not use any University facilities (that is, library, laboratories, computer centre, etc.), or receive any supervision, including supervision through correspondence;
- While exempt from registration, students will not be registered with the Faculty of Graduate and Postdoctoral Affairs, neither will they be required to pay fees for this period. They will not be eligible to receive awards administered by Carleton University. In the case of external awards, the regulations of the particular granting agency will apply.

It is understood that such an exemption from registration will be granted only in exceptional cases (for example, medical reasons).

Exemptions are normally granted for one term.

When exemption from registration for a term or terms has been approved by the Dean of the Faculty of Graduate and Postdoctoral Affairs, this period will be exempt from the overall time limit for completion of the program.

An administrative fee per term for an exemption will be charged to the student's account.

8.6 Off-Campus Registration

Students who have been permitted to study off campus while registered full-time at Carleton must register using Carleton Central Web Registration at <http://carleton.ca/registrar/registration/>.

8.7 Course Changes

A course change is defined as the addition or deletion of one or more individual courses by a registered graduate student. This is the acceptable procedure for revising or correcting a graduate student's registration. Some course changes must be approved by the student's program graduate supervisor/associate chair (graduate affairs).

The deadline dates for course changes are stipulated in the academic schedule of this Calendar.

8.8 Withdrawal

Graduate students wishing to terminate their registration in a graduate program (that is, drop all courses) must notify their department in writing of their intent to withdraw.

Withdrawal Credit

When a student officially withdraws, a full refund will be issued if notification is received within the refund period. Students are encouraged to examine the financial and award implications of withdrawal. Refund deadline information is available at the Business Office and online at <http://carleton.ca/fees>.

Mid-Term Transfer of Program

There is no procedure at Carleton University for direct "mid-term" transfer from one graduate program to another. Similarly, there can be no direct transfer to or from undergraduate or special student status. Any candidate who elects to change programs after registration (before the last day of late registration) will be required to withdraw from the first program and then register in the second.

9. Examinations

9.1 General Remarks

Final examinations in courses will be held at the times indicated in the academic schedule. Graduate students must obtain grades that meet the standards outlined in Section 11, Academic Standing, and that satisfy the specific requirements of the program concerned.

9.2 Examination Regulations

Students writing tests and examinations should be aware of the rules governing examination conduct. These rules include those listed in the Academic Integrity section of this Calendar and information about policy and procedures for writing examinations distributed at the final examination.

For examinations scheduled during the official examination period, it may be necessary to schedule examinations during the day for classes held in the evening and vice versa, or on Saturday and Sunday.

All tests and examinations are subject to the following rules:

1. Tests or examinations given in class may not exceed the time allotted for the class.
2. The schedule for any term tests or examinations to be held outside class time must be communicated in the course outline. Students who are unable to write during this scheduled time must be accommodated before the last day of classes.
3. If there is a final examination in the summer term, it will be held during the official examination period;
4. If there is a final examination or an end-of-term examination in a multi-term course, this examination will be held in the official examination period;
5. No summative tests or final examinations may be held during the last two weeks of fall or winter terms, or during the last week of each half of the summer term;
6. Formative tests or examinations may be held during the last two weeks of classes of fall or winter terms, or during the last week of each half of the summer term, provided they do not total more than 15% of the final grade. The purpose of formative tests or examinations is to provide feedback to students on a component of the course content.
7. No tests or examinations may be held between the end of classes in a term and the beginning of formally scheduled examinations;
8. Normally, final take-home examinations in any term will be assigned on or before the last day of classes and are due on the last day of the official examination period. Final take-home examinations not set according to this normal practice must be formally scheduled by Scheduling and Examination Services and are subject to overload rules. In all cases the rules for take-home examinations must be well communicated to students by course instructors.
9. Students are not required to write with an exam conflict (defined as two examinations scheduled at the same time) nor in an exam overload, defined as (i) 3 or more examinations scheduled in 3 consecutive time slots, (ii) 4 or more examinations scheduled in 5 consecutive time slots, or (iii) 5 or more examinations scheduled in 7 consecutive time slots, where a time slot refers to the morning, afternoon, or evening time slot on an exam day.

9.3 Special/Deferred Final Examinations

In some situations, students are unable to complete term work because of illness or other circumstances beyond their control, which forces them to delay submission of the work.

1. Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Normally, any deferred term work will be completed by the last day of term. In all cases,

formative evaluations providing feedback to the student should be replaced with formative evaluations. In the event the altered due date must extend beyond the last day of classes in the term, the instructor will assign a grade of zero for the work not submitted and submit the student's earned grade accordingly; the instructor may submit a change of grade at a later date. Term work cannot be deferred by the Registrar.

2. In cases where a student is not able to complete term work due to illness or injury for a significant period of time/or long term, the instructor and/or student may elect to consult with the Registrar's Office (undergraduate courses) Graduate Registrar (graduate courses) to determine appropriate action.
3. If a student is concerned the instructor did not respond to the request for academic accommodation or did not provide reasonable accommodation, the student should consult with the department/ school/institute chair/director. If a mutually agreeable accommodation to complete course requirements prior to the course grade submission deadline cannot be achieved, the Associate Dean will become involved. If academic accommodation is not granted, and the student receives word **after** the academic withdrawal deadline, the student may submit a petition to the Registrar's Office (undergraduate courses)/Graduate Registrar (graduate courses) for a final grade of WDN (Withdrawn) in the course(s). If academic accommodation is not granted, and the student receives word **prior** to the academic withdrawal deadline, the student may elect to withdraw from the course(s).
4. Furthermore, if academic accommodation is granted, but the student is unable to complete the accommodation according to the terms set out by the instructor as a result of further illness, injury or extraordinary circumstances beyond their control, the student may submit a petition to the Registrar's Office (undergraduate courses)/Graduate Registrar (graduate courses).

9.4 Master's Examinations

In addition to any examination which may be required in individual courses, or comprehensive examinations in required fields of specialisation, a master's candidate who is writing a thesis will be expected to undertake an oral defence of the thesis. When the degree is taken by course work, a comprehensive examination may be required. It is important to note that individual programs may have specific requirements.

9.5 Doctoral Examinations

Doctoral candidates may be asked to pass a qualifying examination at the beginning of their residency at Carleton University.

A comprehensive examination covering prescribed fields will normally be undertaken at least one year prior to the thesis defence. This examination (oral or written, or both) may include any material considered fundamental to a proper comprehension of the field of study.

After the thesis has been received and accepted for examination, a final oral examination on the subject of the thesis and related fields will be held.

The thesis examination must be conducted according to the principles and practices prescribed by the Faculty of Graduate and Postdoctoral Affairs at <http://www5.carleton.ca/fgpa/thesis-requirements/>.

9.6 Unsatisfactory Comprehensive Grades

If the comprehensive examination is graded Unsatisfactory, the program may permit the candidate to repeat the examination. If the comprehensive examination is graded Unsatisfactory for a second time, students must make an appeal to remain in their program through their program graduate supervisor/associate chair (graduate affairs) to the Faculty of Graduate and Postdoctoral Affairs.

10. Grading System

10.1 Letter Grades

Standing in a course is determined by the course instructor, subject to the approval of the faculty Dean. Standing in courses will be shown by alphabetical grades. The system of grades used, with corresponding grade points and the percentage conversion is below. Grade points indicated are for courses with 1.0 credit value. Where the course credit is greater or less than one credit, the grade points are adjusted proportionately.

Grade	Point Equivalence	Percentage Conversion
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	less than 50

In cases where the final examination is not written and was not explicitly a requirement to successfully complete the course, the cumulative grade earned on term work without the missing examination will be assigned.

If the grade conversion deviates from the percentage conversion presented above, the faculty member must notify the class in the course outline.

10.2 Other Grading Notations

Other grades and notations in current use by the university are as follows:

Notation	Description
AUD	AUD. No Academic Credit, no impact on CGPA. Audit indicates the course was taken for interest and not for academic credit.
CEX	Current International Exchange. An interim notation.
CLP	Current Letter of Permission. An interim notation.
CTN	Continuing. No academic credit and no impact on the CGPA. Assigned by the Registrar's Office to the first half of a course taught consecutively over two terms.
CUR	Current registration. An interim notation assigned by the Registrar's Office to indicate the student is currently registered in the course.
DEF	Deferred Final Examination and/or final course work. An interim notation administratively assigned by the Registrar's Office upon approval of a request to write a deferred final examination or defer submission of final course work. DEF must be replaced by a final grade within the prescribed time or be replaced with F.
F	Failure. The grade of F is assigned when the student has failed to meet the conditions of "satisfactory performance" defined in the Course Outline. F carries 0.0 grade points.
GNA	Grade not available. An interim notation administratively assigned by the Faculty when a grade is not available, and must be replaced with a final grade.
IP	In Progress – a notation (IP) assigned to a course by a faculty member when: At the undergraduate level, an undergraduate thesis or course has not been completed by the end of the period of registration. At the graduate level, a graduate thesis, research essay, independent research project or comprehensive examination has not been completed by the end of the period of registration. The IP notation may also be used at the graduate level when a research seminar has not been completed by the end of the period of registration provided the research seminar has been approved by Graduate Faculty Board as being eligible for the use of this notation. In the case of re-registration in any of the above courses, the IP notation will remain; a final grade will normally be assigned in the final period of registration. Where there is no re-registration in any of the above courses, the IP notation must be replaced with an appropriate notation or grade within the prescribed time period, or be replaced by a notation of WDN.
SAT	Satisfactory performance in an ungraded program requirement, option or course taken on Letter of Permission or International Exchange. SAT has no impact on the CGPA calculation.
UNS	Unsatisfactory performance in an ungraded program requirement, option or course taken on a Letter of Permission or International Exchange. UNS has no impact on the CGPA calculation.

WDN Withdrawn. No academic credit, no impact on the CGPA. WDN is a permanent notation that appears on the official transcript for students who withdraw after the full fee adjustment date in each term (noted in the Academic Year section of the Calendar each term). Students may withdraw on or before the last day of classes.

10.3 Release of Grades

Students may access grades through the Carleton Central Student registration system at <http://carleton.ca/registrar/> registration as soon as the grades are available after the end of the fall and winter terms of the fall/winter session and after the end of the spring/summer session.

10.4 Change of Grade

Final grades are posted after grades are approved. Once posted, final grades may only be changed through informal or formal appeals of grade processes (see General Regulation 15 of the Graduate calendar).

Any instructor-initiated changes beyond the formal and informal appeal process must be completed by the instructor and approved by the faculty dean, or designate within 6 months of the last day of the exam period.

Any changes beyond this 6 month period must be initiated after consultation with the faculty dean or designate.

Unless an appeal has been initiated prior to the awarding of a degree, grades that have been used towards the awarding of a degree are not eligible for a change of grade.

10.5 Transcripts

Students are advised that no official transcripts will be released by the University until all outstanding accounts have been paid.

11. Academic Standing

11.1 Qualifying-Year Program

Students should note that admission to the master's program from qualifying year is governed by the admission requirements in Section 2, Admission Requirements and Eligibility.

11.2 Master's Program

A grade of B- or better must normally be obtained in each course credited towards the master's degree. A candidate may, with the support of the departmental graduate supervisor/associate chair (graduate affairs) and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed a grade of C+ in 1.0 credit. Some programs do not permit the C+ option and apply a B- minimum rule.

Full-Time Continuation

Full-time master's students who fail to achieve a weighted GPA of 7.0 after two terms of study, or to maintain it subsequently, will be required to withdraw from the program. In the event of special or extenuating circumstances, the student may apply through the program graduate supervisor/associate chair (graduate affairs) to the Dean of the Faculty of Graduate and

Postdoctoral Affairs for permission to continue in the program.

Part-Time Continuation

Part-time master's students who fail to achieve or maintain a weighted GPA of 7.0 after completing 2.0 credits, or to maintain it subsequently, will be required to withdraw from the program. In the event of special or extenuating circumstances, the student may apply through the program graduate supervisor/associate chair (graduate affairs) to the Dean of the Faculty of Graduate and Postdoctoral Affairs for permission to continue in the program.

11.3 Doctoral Program

Doctoral students must obtain a grade of B- or better in each course credited towards the degree.

11.4 Doctoral Progress Reporting

Doctoral students must make consistent progress in their studies and must document their progress by completing an annual progress report that details the previous year's achievements and the objectives for the following year. Students must complete their progress report in consultation with their supervisor and committee. Reports must be submitted to the program graduate chair/director or equivalent for review and approval.

In the event that progress is deemed unsatisfactory, the program director or equivalent may recommend to the Dean of the Faculty of Graduate and Postdoctoral Affairs that the student be required to withdraw.

11.5 Religious Accommodation

Carleton University accommodates students who, by reason of religious obligation, must miss an examination, test, assignment deadline, laboratory, or other compulsory event.

Accommodation will be worked out directly and on an individual basis between the student and the instructor(s) involved. Students should make a formal request to the instructor(s) in writing for alternative dates and/or means of satisfying requirements. Such requests should be made during the first two weeks of any given academic term, or as soon as possible after a need for accommodation is known to exist. Instructors will make reasonable accommodation in a way that shall avoid academic disadvantage to the student.

Students unable to reach a satisfactory arrangement with their instructor(s) should contact the Office of Equity Services at <http://www.carleton.ca/equity/>.

Instructors who have questions or wish to verify the nature of the religious event or practice involved should also contact this office.

12. Thesis Requirements

Guidelines for the preparation of graduate theses [<http://carleton.ca/fgpa/thesis-requirements/>] and information on the procedures for examination of graduate theses are available on the Faculty of Graduate and Postdoctoral Affairs website.

12.1 General Remarks

The thesis is a major requirement of many master's and all doctoral programs and, in conjunction with the research for it, makes up at least one half of the time normally required for the program. The thesis must be expressed in a satisfactory literary form, consistent with the discipline concerned, and must display a scholarly approach to the subject and thorough knowledge of it. A critical review of previous work related to the subject should usually be provided.

Students will not be permitted to submit a thesis for which they have previously received a degree; however, with the permission of the Dean of the Faculty of Graduate and Postdoctoral Affairs, they may incorporate into the thesis material that was included in a previous thesis.

12.2 Master's Thesis

The master's thesis should exhibit a competence in the research process by applying an existing body of knowledge in the critical analysis of a new question or of a specific problem or issue in a new setting. On the basis of that conceptual understanding and methodological competence, it should demonstrate at least one of the following:

1. the development and support of a sustained argument in written form
2. originality in the application of knowledge

Oral Examinations

Students are required to undertake an oral examination of the thesis. Please refer to Thesis Specifications, Section 12.5, Master's, for submission deadlines. The master's thesis will be examined by a board consisting of at least four members, including the thesis supervisor, the chair of the department concerned, an examiner from a department other than that of the candidate, and one additional member from the department concerned. The chair of the department concerned will announce the constitution of the examination board. See Thesis Examination Policy at <http://carleton.ca/fgpa/thesis-requirements/>.

Thesis Weight

Thesis weight must be identified at the time of admission. A change in the thesis weight at a later date requires the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs.

12.3 Doctoral Thesis

The doctoral dissertation must report, in an organized and scholarly fashion, the results of original research. The thesis must be a contribution to knowledge, and must demonstrate the ability to conceptualize, design and implement research for the generation of new knowledge, applications, or understanding at the forefront of the discipline, and to adjust the research design or methodology in the light of unforeseen problems.

Oral Examinations

The thesis must be defended successfully at an oral examination. Please refer to Thesis Specifications, Section 12.5, Doctoral, for submission deadlines. The doctoral

thesis will be examined by a board consisting of at least five members, including the thesis supervisor, an examiner from a department other than that of the candidate, the members of the candidate's advisory committee, and an external examiner who is a recognized authority on the subject of the thesis. The Dean of the Faculty of Graduate and Postdoctoral Affairs, the Dean of the candidate's Faculty, and the chair/director of the candidate's department, institute or school are ex officio members of the board. The Dean of the Faculty of Graduate and Postdoctoral Affairs appoints an independent chair of the board, who is not from the candidate's department, institute or school.

The Dean of the Faculty of Graduate and Postdoctoral Affairs will announce the constitution of the examination board; both it and the thesis examination process are defined by the Thesis Examination Policy found at [<http://carleton.ca/fgpa/thesis-requirements/>].

Thesis Weight

Thesis weight must be identified at the time of admission. A change in the thesis weight at a later date requires the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs. The work of each Ph.D. candidate will be assisted by an advisory committee of faculty members who will aid the candidate in their preparation for the final comprehensive examination, and assist in the evaluation of the thesis and its oral examination.

12.4 Integrated Thesis Policy

Many disciplines, especially in engineering and the sciences, accept a thesis consisting of student work based on published papers, conference proceedings, or papers awaiting publication. Known as the 'integrated article,' 'manuscript,' 'sandwich,' or 'chapter' thesis, this type of thesis contrasts with the monograph thesis traditionally offered for examination. However, the same quality and ethical standards apply to each thesis type and the authority of the Thesis Examination Committee remains the same for both. Each individual academic unit decides the thesis format(s) suitable for its discipline.

A. Criteria for Integrated Article Thesis

The integrated article thesis is acceptable under the following conditions:

- The integrated thesis must consist of a coherent account of a unified research project. It is not a collection of loosely connected papers. The student will provide a document that locates a body of work within the context of existing theoretical and methodological debates in the literature, identifies the contributions of the thesis research to that literature and indicates potential directions for further research based upon knowledge gained through the thesis research.
- The thesis must be original and present the student's own work completed during the program of study for which the thesis is being submitted. The student should be the sole author or principal author of any included materials. The student must have played a major or sole role in setting up and conducting the research, obtaining data and analyzing results, as well as preparing and writing the documents submitted for

examination. In the case where co-authored articles are included, the rules and procedures itemized in "Section D" below must be adhered to.

- The thesis must contain a statement from the thesis supervisor verifying the student's contribution to the originality of the material presented in the thesis and clarifying in what way the included materials became part of the thesis.

B. Integrated Article Thesis Format

Published articles which do not follow the traditional thesis formatting rules may be included as thesis chapters.

The body of an integrated article thesis should contain the following chapters:

- **Abstract**
The abstract includes a brief description of the subject matter and summarizes the main themes presented in the thesis.
- **Preface**
The preface must provide full bibliographical details for each article included in the thesis, as well as whether the article is reproduced in whole or in part. In the case of a partially reproduced article, the preface must include a description of the changes that have been made to the published version. Use of copyrighted material must be acknowledged in the preface and tables and figures must have "Reprinted with permission of..." in their captions. See below "Section C" on copyrighted material. Students must also indicate how others are to cite material from this thesis. In the case where the thesis includes co-authored material, see rules and procedures for co-authored material in "Section D", below.
- **Introductory Chapter /Literature Review**
The introductory chapter provides a comprehensive review of the literature that establishes the student's familiarity with relevant work in the field; sets out the objectives of the thesis; places the research into the larger context of the candidate's discipline; and provides an overall thematic cohesiveness of the chapters (research papers) to the reader.
- **Methods Chapter**
The methods chapter should include an overview of the methodological approach used in the thesis and the common methodological assumptions or techniques that link the data chapters into a cohesive entity. A crucial feature of the scientific method is repeatability. The thesis must thus contain detailed descriptions of the experimental procedures followed to obtain results, so as to ensure that readers may be able to test the validity of research outcomes. In cases where such detailed descriptions do not appear in the integrated chapters, they must be included in the Methods Chapter. It is also acceptable to include this information in an Appendix, if the explanation is so protracted and tedious that it detracts from the readability of the main body of the text.
- **Data (Research Paper) Chapters**
Normally, 3 or 4 articles form the body of the thesis and are divided into separate chapters. This work

must be smoothly integrated into the flow of the thesis to produce a unified and appropriately sequenced argument. To do so may require some additions, deletions or re-writing of the original material. In cases where a published article is directly reproduced as a chapter without reformatting, additional pages at the beginning and the end of the chapter should be added to ensure logical and coherent transition between chapters.

- **Conclusion**

The conclusion chapter summarizes and critiques the research topic as a whole, offers an analysis of the limitations existing in the study and suggests potential areas of future research based on the thesis findings.

- **Bibliography and References and Citations**

Bibliographic format should be appropriate to the discipline. Methods of handling and listing references in the text vary. Because the body of the thesis contains chapters representing a separate piece of published work, each chapter may contain its own bibliography. Depending upon the situation, the literature review and/or summary chapter may also contain bibliographies to reflect individual citations made in those sections. Tables and figures should be included in appropriate chapters and numbered consecutively using the chapter number e.g. Chapter 2 would be numbered Table 2-1, 2-2 and so on. This practice avoids the table number repetition that may occur if separate published article material is used.

- **Appendices**

Appendices are optional. Normally, appendices are included to provide information that detracts from the readability of the main body of the text or to present data or information used in the thesis but not directly obtained by the thesis author. For example, lengthy tables, detailed explanation of laboratory procedures, and computer programs may be included in the appendices.

Texts from Prior Theses

A prior graduate thesis or sections of a prior graduate thesis cannot be included as an article in the Ph.D. thesis. The goal is to present a coherent body of research rather than a collation of every piece of work that the student has produced. In the case where doctoral research is closely related to work already completed at the master's level, students will be requested to include a statement attesting to the fact that no text in the thesis has appeared in another thesis.

C. Copyrighted Materials and Permissions

Use of copyrighted material must be acknowledged in the Preface and tables and figures must have "reprinted with permission of..." in their captions.

If the student wishes the work to include text that has already been published as a journal article or book chapter, the student must obtain permission from the publisher and include it along with the thesis as a separate document. Note that Library and Archives Canada request that permissions be submitted separately with the thesis.

In a case where a thesis includes papers co-authored by the student and others, the thesis must state explicitly who contributed to such work and the nature and extent of that contribution. The candidate must obtain permission from the co-authors to use this work and provide a statement of permission along with the thesis as a separate document. Each co-author must include in the statement of permission the extent of her/his contribution to the article(s) included in the thesis. See Section D below.

D. Rules and Procedures for Integrated Theses which Include Co-Authored Material

Co-authored publications are a common practice in many disciplines. The thesis, however, must represent the work of the student submitting it for credit. It is thus imperative that rules and procedures be followed to ensure that a student submitting an integrated thesis which includes co-authored article(s) be examined and evaluated on their own contribution to the collective publication(s).

Preface and additional documents

The preface must include a statement from the supervisor and the student indicating that the student was fully involved in setting up and conducting the research, obtaining data and analyzing results, as well as preparing and writing the material presented in the co-authored article(s) integrated in the thesis. There must also be a statement that clearly distinguishes the specific contributions of the student from those of all other collaborators or co-authors. The supervisor must include a statement which confirms the information provided by the student in the preface. Additionally, each co-author must confirm in a signed statement the extent of her/his contribution to the co-authored article(s) included in the thesis. These statements must be provided along with the thesis as separate documents. The objective of this requirement is to assure examiners that there has been full disclosure of collaborative activity. In providing these statements, all parties involved must take into consideration the rules and regulations of Carleton University's Academic Integrity policy.

Multiple use of the same co-authored article(s)

As a general rule, the same text from a co-authored published article should not be used in more than one thesis. In the case of students who have worked collaboratively on projects leading to a published article which comprises different sections of text with different single-author attribution, the relevant section(s) of the article may be included in different theses. In the case of a wholly collaborative article where individual contributions cannot be determined, the same article may be used in more than one thesis, but to a maximum of three theses. In cases where the same article appears in more than one thesis, each thesis must include a statement from all students and all supervisors involved confirming that all students collaborated equally in the production of the article(s). These statements must be provided along with the thesis as separate documents.

Issues of copyright must be addressed by the student as outlined in the copyright section above. The candidate

must obtain permission from the co-authors to use this work and include a statement of permission along with the thesis as a separate document. Each co-author must include in the statement of permission the extent of her/his contribution to the article(s) included in the thesis.

E. Integrated Article Thesis Examinations

Article publication or acceptance of publication does not supercede the authority or responsibility of the Thesis Examination Committee to evaluate the thesis during the examination process and to recommend or require changes.

Thesis examination rules/policies and procedures are not changed to accommodate the integrated article thesis.

The oral examination concentrates on testing the candidate's knowledge as much as on questioning the written document.

12.5 Deadlines

Master's Thesis

Master's students expecting to graduate at the Spring Convocation must submit their supervisor-approved thesis, in examinable form, to the department by March 1. Master's students expecting to graduate at the Fall Convocation must submit their thesis by August 1. Master's students expecting to graduate at the Winter Graduation must submit their thesis by December 1. If the department requires further approvals, these must be obtained prior to the submission deadline.

Doctoral Thesis

Ph.D. students expecting to graduate at the Spring Convocation must submit their supervisor-approved thesis, in examinable form, to the department by March 1. Ph.D. students expecting to graduate at the Fall Convocation must submit their thesis by August 1. Ph.D. students expecting to graduate at the Winter Graduation must submit their thesis by December 1. If the department requires further approvals, these must be obtained prior to the submission deadline.

12.6 Specifications

- Prior to the examination, the candidate must submit the examinable version of the thesis, which must comply with the departmental requirements governing the form of the thesis, including methods of bibliographical entry and the use of diagrams and tables.
- The examinable version of the thesis must be accompanied by a suitable abstract. The abstract of a master's thesis should not exceed 150 words, while the abstract of a doctoral thesis may be up to 350 words in length.
- Regulations regarding style, pagination, certification, acceptance, abstracts, reproduction, electronic dissemination, and the constitution of the examining board will be prescribed by the Faculty of Graduate and Postdoctoral Affairs.

Master's Thesis

Students are expected to notify their supervisor and the chair of the department at least two weeks in advance of the date on which they intend to submit the completed thesis. The examinable thesis must be submitted to the department at least four weeks in advance of the intended date of examination. The thesis examination and defense will then be scheduled and the date will be announced at least two weeks in advance.

Doctoral Thesis

The candidate is expected to notify their supervisor and the chair of the department at least two weeks in advance of the date on which they intend to submit the completed thesis. The candidate is then expected to submit the examinable thesis to the department at least six weeks in advance of the intended date of examination. The thesis examination and defense will then be scheduled and the date will be announced by the Dean of the Faculty of Graduate and Postdoctoral Affairs at least four weeks in advance. The department, institute or school must forward the examinable thesis to the office of the Faculty of Graduate and Postdoctoral Affairs at least four weeks in advance of the actual date for the examination and defense.

12.7 Licence to the University and to Library and Archives Canada

In the interest of facilitating research by members of the Carleton community and by interested outsiders, and in consideration of their having been accepted as a graduate student at Carleton, the author of a thesis or dissertation submitted in partial fulfillment of the requirements for an advanced degree shall grant to the University a license to disseminate the thesis electronically, solely for the purpose of private study and research.

Students wishing to deposit their thesis with Library and Archives Canada and participate in electronic distribution of their research are advised to review the revised procedures available online <http://www.collectionscanada.gc.ca/thesescanada/>

It is understood that the author retains other publication rights, and that neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

12.8 Withholding of Thesis Deposition

If, at the time of submitting their thesis, students elect to protect any rights to immediate commercial publication, or to obtain a patent which may arise from their research, or to keep their thesis out of circulation, they may apply in writing to the Dean of the Faculty of Graduate and Postdoctoral Affairs requesting that the thesis be withheld from deposit in the library:

- for an additional period of three months, without reason;
- for each additional period of six months, with reason (total period of restriction not to exceed two years).

A request for extension of the restriction must be submitted one month prior to the termination of the

approved s period. Justification for extension of the restriction is required.

12.9 Degree Completion

A registered candidate who completes their degree requirements by depositing the thesis prior to the last day for withdrawal in any term (as specified in the academic schedule) is required to request formal withdrawal for refund purposes if they anticipate any refund of fees.

This applies to thesis or research essay registration.

13. Time Limits for Program Completion

13.1 General Remarks

There are maximum time limits for the completion of programs. Students may also be subject to time constraints prescribed by individual programs to ensure orderly and timely progress through their programs.

13.2 Master's Program

Full-time

All master's students admitted as full-time students must normally complete their degree requirements within two calendar years after the date of initial registration, unless their program states otherwise and regardless of any subsequent change of status to part-time. Terms of non-registration are equated to full-time registration terms when calculating the overall time to program completion.

Part-time

All master's students admitted as part-time students must normally complete their degree requirements within six calendar years after the date of initial registration, unless their program states otherwise. Terms of non-registration are equated to part-time registration terms when calculating the overall time to program completion. A change of a student's status from part-time to full-time status will result in a pro-rated reduction in the required time to completion for each subsequent term of full-time study.

Failure to complete the program within the prescribed time lines or failure to maintain continuous registration will require reevaluation of the student's entire program and may result in termination.

13.3 Doctoral Program

Full-time

All Ph.D. students admitted as full-time students and admitted on the basis of a master's degree must complete the Ph.D. degree requirements within six calendar years after the date of initial Ph.D. registration unless their specific program provides for a different time limit. Terms of non-registration are equated to full-time registration terms when calculating the overall time to program completion.

Part-time

All Ph.D. students admitted as part-time students must complete the degree requirements within nine calendar years after the date of initial Ph.D. registration. Terms of non-registration are equated to part-time registration terms

when calculating the overall time to program completion. A change of a student's status from part-time to full-time status will result in a pro-rated reduction in the required time to completion for each subsequent term of full-time study.

Failure to complete the program within the prescribed time lines or failure to maintain continuous registration will require reevaluation of the student's entire program and may result in termination.

13.4 Exemption from Time Limit

When exemption from registration for a term or terms has been approved by the Dean of the Faculty of Graduate and Postdoctoral Affairs, this period will be exempt from the overall time limit allowed for completion of the program.

For Exemption from Time Limit procedure/forms please visit <http://gradstudents.carleton.ca/forms-policies/>

13.5 Extension of Time Limit

Requests for an extension of time limits are given only in exceptional circumstances and are determined within the academic department. A detailed report on the student's progress and a recommendation from the supervisor must accompany each request. Extensions are usually given for a maximum of one year.

A complete request for an extension must be submitted at least one month before the student's deadline to complete their program. The request must include the following elements:

1. A completed "Request for extension of the time limit to complete the requirements of a graduate degree" form must be submitted. The requested extension must be realistic, taking into account the remaining research to be done. It can be for one to three terms.
2. A letter from the student giving the reasons for the requested extension must be attached to the request. This letter must also indicate when the thesis proposal was accepted.
3. A letter from the thesis supervisor supporting the request for an extension, with a realistic time schedule to complete the remaining research activities. This time schedule must be approved by all members of the thesis committee. Letters or email messages from committee members indicating their approval of the proposed schedule must also be attached to the service request.

14.0 Co-operative Education Policy

Co-operative Education is based on the principle that academic study combined with work periods is an effective method of professional preparation. Work periods at various points in the academic program allow students to acquire experience within their discipline. The Co-operative Education program is a complement to the graduate students' academic studies. Students that are accepted into the co-op option must prepare a work-term report that meets the expectations of each individual discipline.

Application Requirements

Graduate students have their first opportunity to apply to the co-op program once they have begun the first term in their Master's level program. The application must be completed via the Co-op and Career Services website before the end of the first term after beginning one of the degree programs which offers the co-op option. Students may also delay their participation until later in their degree, provided that they have a suitable number of credits remaining to complete their degree. These applications are reviewed and decisions made on a case-by-case basis.

Participation Requirements

Co-op Agreement

All graduate students must adhere to the policies which outline the requirements for participation in the Co-op Agreement. The Agreement can be located in the Co-op Resources section of MyCareer.

Communication with the Co-op Office

Graduate students must maintain regular contact with the co-op office during their job search and while on a work term. All email communication will be conducted via the students' Carleton email account.

Graduation with the Co-op Designation

In order to graduate with the co-op designation, graduate students must satisfy all requirements of the degree program in addition to co-op program requirements (successful completion of two work terms). An optional third work term may be approved under exceptional circumstances and/or when a student has been offered an extension with their current employer. Under no circumstances will a student be permitted to do more than three work terms.

Employment

Although every effort is made to ensure a sufficient number of job postings for all students enrolled in the co-op option of their degree program, no guarantee of employment can be made. Carleton's co-op program operates a competitive job search process and is dependent upon current market conditions. Academic performance, skills, motivation, maturity, attitude and potential will determine whether a student is offered a job. It is the student's responsibility to actively conduct a job search in addition to participation in the job search process operated by the co-op office. Students that do not successfully obtain a co-op work term are expected to continue with their academic studies. The summer term is the exception to this rule. Students should also note that hiring priority is given to Canadian citizens for co-op positions in the Federal Government of Canada.

Work Term Assessment and Evaluation

To obtain a Satisfactory grade for the co-op work term students must have:

1. A satisfactory work term evaluation by the co-op employer;
2. A satisfactory grade on the work term report.

Graduate students must submit a work term report at the completion of each four-month work term. Reports are due on the 16th of April, August, and December and students are notified of due dates through their Carleton email account.

Workplace performance will be assessed by the workplace supervisor. Should a student receive an unsatisfactory rating from their co-op employer, an investigation by the co-op program manager will be undertaken. An unsatisfactory employer evaluation does not preclude a student from achieving an overall satisfactory rating for the work term.

Voluntary Withdrawal from the Co-op Option

Graduate students may withdraw from the co-op option of their degree program during a study term ONLY. Students at work may not withdraw from the work term or the co-op option until s/he has completed the requirements of the work term.

Students are eligible to continue in their regular academic program provided that they meet the academic standards required for continuation.

Involuntary or Required Withdrawal from the Co-op Option

Graduate students may be required to withdraw from the co-op option of their degree program for one or any of the following reasons:

1. Failure to pay all co-op related fees;
2. Failure to actively participate in the job search process;
3. Failure to attend all interviews for positions to which the student has applied;
4. Declining more than one job offer during the job search process;
5. Continuing a job search after accepting a co-op position;
6. Failure to be registered in the Co-op Work Term course;
7. Dismissal from a work term by the co-op employer;
8. Leaving a work term without approval by the Co-op Manager;
9. Receipt of an unsatisfactory work term evaluation;
10. Submission of an unsatisfactory work term report;

Standing and Appeals

The Co-op and Career Services office administers the regulations and procedures that are applicable to the all co-op program options. All instances of a student's failure during a work term or other issues directly related to their participation in the co-op option will be reported to the academic department.

While at Work

Graduate students will be registered in a Co-op Work Term course while at work.

Graduate students must be registered as full-time before they begin their co-op job search.

The student is permitted to register in 0.5 credit in addition to the Co-op Work Term course while on a work term. This course must be taken outside of working hours. If the course is only offered during work hours the student may request that the co-op office make an exception. Students must obtain the approval of the employer prior to submission and must be willing to make up the hours of work missed. At this time the department/student may request an exemption from continuous registration in their thesis.

Graduate Students are not permitted to hold a Teaching Assistantship while on a co-op work term. Where eligible, Teaching Assistantships will be deferred to a later term.

If the student is in receipt of an internal scholarship, this award remains active if the student registers in an additional 0.5 credit course, and is deferred to a later term otherwise.

Please note that external awards/scholarships will be issued/deferred based on the external agency criteria.

Graduate students may be permitted to finish their degree on a co-op work term provided they only have 0.5 credits remaining. The student must complete a request to the co-op office for consideration of approval.

International Students

All Graduate International Students are required to possess a Co-op Work Permit issued by Immigration, Refugees and Citizenship Canada before they can begin working. It is illegal to work in Canada without the proper authorization. Students will be provided with a letter of support to accompany their application. Students must submit their application for their permit before being permitted to accept a work term position. Confirmation of a position will not be approved until a student can confirm they have received their permit and the expiry date. Students are advised to discuss the application process and requirements with the International Student Services Office.

Co-op Fees

Graduate students participating in the co-op option of their degree program are required to pay the co-op fees. For full details on how the co-op fees are assessed please review the Graduate Fees section of the Co-op and Career Services website: <http://www1.carleton.ca/co-op/fees/graduate-fees/>

15.0 Grade Review

Within one month of the release of grades or the announcement of examination by committee (comprehensive examination, research essay or thesis) results, a graduate student may request, through the Faculty of Graduate and Postdoctoral Affairs, that one or more of their grades or results be reviewed. The results of examination by committee (including comprehensive, research essay or thesis examinations) will only be reviewed on procedural grounds. Grades for other courses will be reviewed through the submission of all or part of the written coursework to two re-readers. The identity of the student will remain confidential. The

average grade of the re-readers will replace the original of the reviewed work. Parts of grades based on non-written work (e.g., participation) will not be reviewed. The administration fee must accompany the review request. The process for the conduct of reviews can be found at <http://gradstudents.carleton.ca/wp-content/uploads/Grade-Appeal-Procedures.pdf>

Note: The review process will not take place if the fee is not remitted. If the grade is raised, the administration fee is refundable.

16.0 Program Review

A graduate student has the right to request a review of decisions made concerning their status or any other ruling relating to their program. All such requests are to be made in writing to the Dean of the Faculty of Graduate and Postdoctoral Affairs.

17.0 Records Retention Policy

Since 2005 the University has implemented a records retention policy which provides for the destruction of student file folders and their contents after a period of five years has elapsed since the last registration. This policy applies to those students who are formally admitted and registered in degree programs. Further information on this policy can be obtained by contacting the Faculty of Graduate and Postdoctoral Affairs.

18. Use of Student Work in Program Assessment

All academic programs at Carleton University are reviewed cyclically under the mandate of the Ontario Universities Council on Quality Assurance. Several programs at Carleton University are also accredited by professional bodies and must undergo review for continuing accreditation.

Student records and student work such as portfolios, exams, assignments, and theses may be used in the review and evaluation of academic programs. Appropriate steps will be taken to ensure that information and material used in the evaluation of a program is kept confidential and that the processes comply with applicable privacy regulations. These reviews may involve bodies external to the University, for example, in complying with reviews required by the government or professional accreditation bodies.

19.0 Academic Integrity

The complete policy is available at: <https://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy-2021.pdf>

20. Offenses of Conduct

20.1 Discrimination and Harassment

The University has in place policies and procedures to deal with allegations of discrimination and harassment, including sexual harassment. These are outlined in detail in the Carleton University Human Rights Policies and Procedures, effective May 1, 2001 and which can be found on the Carleton Web site under Equity Services.

Unacceptable conduct is outlined in the policy and includes discrimination or harassment based on race, ancestry, place of origin, colour, ethnic origin, citizenship, creed, political affiliation or belief, sex, sexual orientation, gender identity, age, marital status, family status, or disability/handicap within the meaning of the Ontario Human Rights Code. Unacceptable conduct also includes threatening, stalking and unwelcome communication either in person or through electronic or other means. For the three policy sections below, the definition of prohibited behaviour is described in the italicized section that follows.

From the *Anti-Racism and Ethnocultural Relations Policy*

1. The University prohibits discrimination and harassment, including conduct on the basis of race, ancestry, place of origin, colour, ethnic origin and citizenship that:"

From the *Gender Equality Policy*

1. The University prohibits discrimination and harassment, including conduct on the basis of sex, gender or gender identity that:"

From the *Sexual Orientation Equality Policy*

1. The University prohibits discrimination and harassment, including conduct on the basis of sexual orientation or perceived sexual orientation that:
 - 5.1 Is abusive, demeaning or threatening including behaviour such as name calling; derogatory remarks, gestures and physical attacks; or display of derogatory or belittling pictures and graffiti; or
 - 5.2 Biases administrative and appointment decisions, employment and workplace practices, tenure, promotion, appointment, leave and salary determinations; or
 - 5.3 Biases academic decisions such as admissions, grading, the application of Regulations and scheduling of academic activities; or
 - 5.4 Misuses power, authority or influence; or
 - 5.5 Discriminates in the provision of goods and services, or access to premises, accommodation and other facilities."

From the *Sexual Harassment Prevention Policy*

1. Sexual harassment occurs when an individual engages in sexually harassing behaviour or inappropriate conduct of a sexual nature that is known, or ought reasonably be known, to be unwelcome, and that:
 - 6.1 Interferes with the academic or employment performance or participation in a University-related activity for the person harassed; and/or
 - 6.2 Is associated with an expressed or implied promise of employment-related or academic-related consequence for the person harassed (including reward, reprisal or condition of study or employment); and/or
 - 6.3 Provides a basis for academic or employment decisions affecting the person harassed; and/or

6.4 Creates an abusive, demeaning, or threatening study, work or living environment for the person harassed; and/or

6.5 Excludes the person harassed from rights and/or privileges to which they are entitled.

2. Sexually harassing behaviour may be physical, verbal or psychological. It may be conveyed directly or by telephone, writing or electronic means. Examples of inappropriate sexual conduct include:

7.1 Unwelcome sexual solicitations, flirtations or advances; sexually suggestive comments, gestures, threats or verbal abuse;

7.2 Unwarranted touching or physical contact of a sexual nature, coerced consent to sexual contact, or sexual assault;

7.3 Inappropriate display or transmission of sexually suggestive or explicit pictures, posters, objects or graffiti;

7.4 Leering, compromising invitations, or demands for sexual favours;

7.5 Degrading, demeaning or insulting sexual comment or content, including unwelcome remarks, taunting, jokes or innuendo about a person's body, sexuality, sexual orientation or sexual conduct;

7.6 Misuse of position or authority to secure sexual favours;

7.7 Persistent, unwanted attention or requests for sexual contact after a consensual relationship has ended; or

7.8 A course of sexualized comment or conduct that interferes with the dignity or privacy of an individual or group."

From the *Sexual Harassment Prevention Policy*. Sexual harassment occurs when an individual engages in sexually harassing behaviour or inappropriate conduct of a sexual nature that is known, or ought reasonably be known, to be unwelcome, and that:

1. Interferes with the academic or employment performance or participation in a University-related activity for the person harassed; and/or
2. Is associated with an expressed or implied promise of employment-related or academic-related consequence for the person harassed (including reward, reprisal or condition of study or employment); and/or
3. Provides a basis for academic or employment decisions affecting the person harassed; and/or
4. Creates an abusive, demeaning, or threatening study, work or living environment for the person harassed; and/or
5. Excludes the person harassed from rights and/or privileges to which they are entitled.

Sexually harassing behaviour may be physical, verbal or psychological. It may be conveyed directly or by telephone, writing or electronic means. Examples of inappropriate sexual conduct include:

1. Unwelcome sexual solicitations, flirtations or advances; sexually suggestive comments, gestures, threats or verbal abuse;
2. Unwarranted touching or physical contact of a sexual nature, coerced consent to sexual contact, or sexual assault;
3. Inappropriate display or transmission of sexually suggestive or explicit pictures, posters, objects or graffiti;
4. Leering, compromising invitations, or demands for sexual favours;
5. Degrading, demeaning or insulting sexual comment or content, including unwelcome remarks, taunting, jokes or innuendo about a person's body, sexuality, sexual orientation or sexual conduct;
6. Misuse of position or authority to secure sexual favours;
7. Persistent, unwanted attention or requests for sexual contact after a consensual relationship has ended; or
8. A course of sexualized comment or conduct that interferes with the dignity or privacy of an individual or group.'

Enforcement of this policy is carried out according to the procedures established in the policy. The procedures include the provision of advice and information to complainants and respondents and allow for various methods of informal resolution, including mediation.

Students with concerns regarding discrimination, harassment, stalking, sexist or racist behaviour, or any other prohibited action as outlined in the Human Rights Policy, should call or meet with a member of Equity Services for advice and guidance on how to handle the situation. This service is confidential and does not compel the student to take any further action.

Formal complaints must be made in writing and directed to the Dean or Vice President responsible for the area where the complaint took place. Staff in Equity Services are available to assist with the preparation of a formal complaint. Complaints must be made within 12 months after the last alleged incident of discrimination or harassment unless exceptional circumstances apply in which case the University Secretary may grant an extension of up to an additional 12 months.

The procedure for formal complaints is outlined below:

1. An allegation shall be made in writing to the Dean of the Faculty in which the program to which the respondent has been admitted belongs or, in the circumstances where the respondent has not been admitted to a program, to the Dean of the Faculty where the majority of courses in which the respondent has registered are administered. An allegation against a student in residence when made by another student in residence which involves the complainant's enjoyment of her/his accommodation shall be made to the Vice-President (Academic). The Dean, or the Vice-President (Academic), as the case may be, shall cause to have an investigation conducted and, upon receipt of the report of the investigation, shall either

- a. dismiss the allegation on the grounds of insufficient evidence or lack of jurisdiction by the University, or
- b. accept that the allegation is founded and seek the agreement of the respondent to a remedy, or
- c. refer the matter to the President. A Dean's dismissal of the allegation may be appealed, within ten working days, to the Vice-President (Academic) who may, in turn, either
 - i. again dismiss the allegation, or
 - ii. accept that the allegation is founded and propose a remedy to the respondent, or
 - iii. refer the matter to the President. In the case of students in residence, where the original allegation has been made to the Vice-President (Academic) and is dismissed, appeal shall be directly to the President who may either
 1. again dismiss the allegation, or
 2. accept that the allegation is founded and propose a remedy to the respondent, or
 3. refer the matter to a tribunal appointed by the Senate.
2. In the instance where the matter has been referred to the President, the latter shall decide whether or not the University shall conduct a hearing before a tribunal appointed by the Senate.

If the allegation is proven, the tribunal shall decide upon one of the following sanctions:

The student may be:

- a. expelled;
- b. suspended for a period of time from all studies at the University;
- c. restricted in his/her use of University facilities; and/or
orgiven a reprimand.

Should the President decide not to conduct a hearing before a tribunal, the allegation shall be deemed to have been dismissed, but the President shall give written reasons for such a decision, and these reasons shall be communicated to the parties involved.

3. In the instance where the complainant wants redress from the University without the involvement of the respondent, or where the respondent is unknown or is not a member of the University community, and/or where there is a claim that the University has failed or has been negligent in providing a safe, non-hostile environment, the allegation of an offence shall be made in writing to the President, who shall cause an investigation to be conducted. Upon receipt of the report of the investigation, the President may order any relief he/she deems fit, and shall give written reasons for the decision; which reasons shall be communicated to the complainant.

Information about procedure governing tribunals is available from the Clerk of Senate.

21. Appeals and Petitions

21.1 Criteria and Procedures

Assuming that a graduate student has exhausted all avenues of appeal and petition with the Dean of the Faculty of Graduate and Postdoctoral Affairs (questions regarding the appeals process can be directed to the Office of the Dean at 613-520-2518), a graduate student may appeal the decision of the University to deny the award of degree or the required withdrawal of the student to the Senate upon certain specific grounds.

Such grounds are the allegation by the student that the student has been denied a degree or forced to withdraw because of some mistake, error, or improper conduct by the University, its officers, or employees.

A graduate student may petition the Senate to grant a degree or to stay a decision of required withdrawal on compassionate grounds.

Such appeals and petitions must be submitted in writing, within ninety days of receipt by the student of the decision which is to be appealed or petitioned, to the Clerk of Senate.

22. Graduation

22.1 Conferring of Degrees

On the recommendation of the Faculty of Graduate and Postdoctoral Affairs and with the approval of the Senate of the University, degrees are conferred by the Chancellor in the spring and fall of each year.

22.2 Application Deadlines

Candidates may have their degrees certified in February each year; they must apply by December 1. Students expecting to graduate at the Spring Convocation must apply for graduation in the Graduate and Postdoctoral Affairs office by April 1. Those expecting to graduate at the Fall Convocation must apply by September 1.

Glossary

Glossary

The following glossary of definitions is intended to provide explanations of how certain important terms are used throughout the Calendar. In rare cases where a discrepancy may occur between the definition provided in this Glossary and the use of the term in the remainder of the Calendar, the term as used in the remainder of the Calendar takes precedence.

The Glossary is not intended to be exhaustive; students should refer to Carleton's web site for other important information (e.g., carleton.ca/registrar; gradstudents.carleton.ca).

Except where noted, all definitions apply to undergraduate and graduate students.

| A | B | C | D | E | F | G | H | I | J | K | L | M |
| N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

Notation Description

A

Academic Performance Evaluation (APE) The APE is the annual assessment of student academic standing in undergraduate degree programs and special studies. The possible outcomes of an APE are *Good Standing*, *Academic Warning*, *Suspension*, *Continue in Alternate*, *Continue in General*, *Dismissed from Program*, or *Debarment*.

Auditing Student A student who attends a course for interest and not for credit. Formal registration is required.

B

Bachelor's Program An undergraduate, non-honours academic program of study requiring a minimum of 15.0 credits.

C

Calendar The official publication of academic regulations, academic programs and course descriptions as approved by the Senate.

Certificate An undergraduate certificate is a stand-alone Credential that may be taken concurrently with a bachelor's program or independently. It is normally constituted by a structured set of at least four credits of sequential courses of different levels in a particular discipline or area of study that introduces students to, or extends their knowledge of, that discipline or area of study.

Challenge for Credit Undergraduate academic course credit gained through examination based on a student's prior learning experience gained through professional or work experience. A successful challenge for credit is noted in the student's record as CH. (An unsuccessful challenge for credit is noted as UCH). A CH is neither included in the CGPA calculation nor used to satisfy the degree program residency requirement. Challenge for Credit is not available in all courses.

Collaborative Specialization At the graduate level the term "collaborative specialization" refers to an Option added to a degree program that provides an experience in a discipline or intellectual area in addition to that provided in the student's home program and meets the requirements identified by the Quality Council's corresponding definition.

Concentration A program Element recorded on the transcript and diploma constituted by at least 3.5 credits of required courses at the undergraduate level and 1.5 credits of required courses at the Master's level that concentrates on a particular area of study within the program and provides the student with specific expertise, knowledge and/or practice. At the Doctoral level, a concentration is constituted by at least three curricular academic requirements, excluding the dissertation, residency and language requirements, that form a distinctive area of study related to the concentration.

Co-operative Education An undergraduate or graduate Option comprising work periods combined with academic study to acquire work-related experience; the co-op option is intended to complement the student's academic study.

Core A course or group of courses that are a subset of the courses that constitute a major in an undergraduate program. These are courses of special importance to undergraduate programs and are subject to specific CGPA requirements.

Cotutelle An Option in any Ph.D. program. Doctoral students undertake to complete the requirements of a Ph.D. program in both their home university and a partner university in another country.

Course A course is a unit of teaching that may count as credit towards a Credential. Courses typically last one academic term and focus on one subject area with a prescribed sequence of units of study (lectures, seminars, tutorials, workshops, laboratories, assignments, essays, tests, examinations and so on). Courses are delivered by one or more instructors and have a fixed roster of students.

Courses have unique eight-character alphanumeric course codes, titles and descriptions. The credit value is indicated in square brackets following the course number.

Course Number The first number in a course designation (e.g. 0000, 1000, 2000, 3000, 4000) indicates the knowledge level of a course and not the year of registration or year standing one requires to enroll in it. One can enroll in any course provided one meets the prerequisites. Prerequisites come in many forms and combinations such as but not limited to year standing, completion of other courses, registration in a specific program, permission of the Department, and specific CGPA requirements. 0000-level courses are those that may be required to satisfy prerequisites. 1000-level courses are typically introductory or foundation level courses. 2000-level and 3000-level courses are typically intermediate to upper-intermediate level courses. 4000-level courses are typically advanced level courses. 5000 and 6000-level are graduate level courses.

Course Outline Instructors are required to provide students in each course a written Course Outline (distributed in class or electronically), on or before the first teaching day for undergraduate courses, and before the last date for late registration for graduate courses. The course outline must specify all the elements that will contribute to the final grade, as well as the overall grade breakdown for the course.

Courses Set Aside Courses that do not contribute to the fulfilment of graduation requirements within the student's program:

- 1. Extra to the Degree (ETD): Passed credits that are in excess of the required credits;
- 2. No Credit for Degree (NCD): Passed credits that are ineligible for credit in the student's program;
- 3. Forfeit: Repeated courses, course equivalencies, preclusions, and courses placed in this category by an academic standing committee or an appeal committee.

Credential An academic qualification awarded by the University Senate upon successful completion of an academic program. All credentials are either degrees (bachelors, masters, or doctoral), diplomas, or certificates.

Credit The academic value of a course (for example, 0.0, 0.5, 1.0, et cetera).

Credits Not in the Major Credits Not in the Major are credits that must be taken in programs that require Credits Not in the Major from disciplines and intellectual areas other than those which constitute the discipline, disciplines or intellectual area of the major in such programs. Credits Not in the Major constitute one form of restricted electives.

Cumulative Grade Point Average (CGPA) The key assessment tool for undergraduate Academic Performance Evaluation, and graduate and undergraduate graduation requirements and distinctions. The CGPA may be used in assessments for scholarships, medals and other milestones. The CGPA is the average of

grade points earned on all courses required for and counting towards graduation from the student's current program (overall CGPA), or the average of grade points earned on a subset of such courses (for example, those constituting the Major or a Minor) at the time the CGPA is calculated.

D
Degree A Credential at the Bachelor, Master or Doctoral level awarded by the University Senate upon the successful completion of a prescribed set and sequence of program requirements at a specified standard of performance.

Diploma **Post-baccalaureate Diploma:** a stand-alone undergraduate credential for candidates already possessing a bachelor's degree intended to: (a) qualify candidates for consideration for entry into a Master's program; (b) bring a candidate who already possesses a bachelor's degree up to a level of a bachelor's degree of 20.0 credits or more in another discipline; (c) provide a candidate who already possesses a twenty-credit bachelor's degree in the same discipline the opportunity to bring their previous studies to current equivalents and/or to examine alternative areas; or, (d) provide a candidate with a professional undergraduate credential for which the prior completion of an undergraduate degree program is appropriate.

Post-baccalaureate diplomas are normally constituted by at least three and a maximum of five credits of advanced undergraduate courses.

Graduate Diploma:
 Type 1: Awarded when a candidate admitted to a master's program leaves the program after completing a certain proportion of the requirements. Students are not admitted directly to a Type 1 Diploma.

Type 2: Offered concurrently with a master's or doctoral degree, the admission to which requires that the candidate be already admitted to the master's or doctoral degree program. A Type 2 Diploma represents an additional, usually interdisciplinary, qualification of 2 to 3 credits.

Type 3: A stand-alone, direct-entry program of 2 to 3 credits, generally developed by a unit already offering a related master's (and sometimes doctoral) degree, and designed to meet the needs of a particular clientele or market.

Dual Degree A Dual Degree program is a joint partnership at the undergraduate or Master's level where a co-enrolment agreement exists between Carleton and another post-secondary institution. Students simultaneously complete a program at both institutions, receiving two diplomas. Students must meet the admission criteria and must fulfill all the program requirements of both institutions within the normal time to completion.

E

Element Elements are: (i) Undergraduate: majors, minors, concentrations, and specializations; there are a maximum number of elements that may be taken in conjunction with a program at the undergraduate level; (ii) Graduate: concentrations.
Elements are recorded on the transcript and the diploma.

Equivalent Courses Courses that are of equal credit value and which are considered to be similar enough that they always preclude one another and may serve interchangeably for the other in terms of prerequisites, co-requisites, and program requirements. These will be identified in the calendar as 'Also Listed As', and are commonly referred to as 'cross-listed courses'.

Experiential Learning Experiential learning is the application of theory and academic content to real-world experiences within the classroom, the community, or the workplace. It may be undertaken independently or in teams. It advances learning outcomes and encourages reflection and application of skills and knowledge in contexts that prepare students for the workplace and civil society.

F

Field A Field occurs only at the graduate level, and is defined as an identifiable area of research activity undertaken by a group of faculty of sufficient number.

Flex Term Flex Term refers to the timing of delivery of 'asynchronous' on-line courses that are currently restricted to special students and in which they may register at any time. Special students may engage with the material of these courses at their own pace. The delivery of 'asynchronous' on-line courses does not therefore conform to the usual beginning and end of Carleton University terms.

Formative Assessment Formative assessments are those assessments of a student's work carried out during the course that act to provide feedback and guidance to the student in addition to assessing the student's performance.

Free Elective Free electives are any approved credit course normally at the 1000-level or higher – including courses from the discipline, disciplines or intellectual areas that identify the major of the degree program in question – that may be taken to make up the number of credits required for the degree program in question.

H

Honours Program An undergraduate Bachelor's program requiring a minimum of 20.0 credits that may demand a higher academic standard than a non-honours program. Pathways to completion may be constituted by a thesis, research essay, capstone project, or other significant project.

I

Internship An internship is constituted through a course or sequence of courses that provides students with work experience directly related to the subject matter of their degree program. There are two types of undergraduate internships:

1. Program Internship: an Option constituted by a structured sequence of at least 4.0 credits of courses of different levels in an honours bachelors program taken in a work environment off-campus. A program internship provides students with extensive professional work experience directly related to the subject matter of their program.

2. Course Internship: an individual course within a degree program taken in a work environment either on- or off-campus that provides students with professional work experience directly related to the subject matter of their program.

L

Learning Outcomes Learning outcomes are discipline-specific statements that describe the observable skills or abilities associated with the essential knowledge, behaviours, and/or values all students are expected to acquire by the end of a course or program of study.

Letter of Permission A formal document issued by the University Registrar approving a student to register in a course at another institution in lieu of a Carleton course in the student's academic program. The Letter of Permission must be issued before the student takes the course for credit in a Carleton program at another institution.

M

Major A program Element recorded on the transcript and diploma. The major is constituted by the required course credits in one or more defined disciplines or intellectual areas that define the principle focus of a student's undergraduate program and constitute the basis for the calculation of the Major CGPA.

Major CGPA The Major CGPA is calculated as the average grade points earned on the courses that constitute the major.

Mention Francais An undergraduate Option noted on the transcript denoting specified courses taken in French, which may be used to fulfil program requirements.

Minor A program Element at the undergraduate level recorded on the transcript and diploma. A minor is a structured set of credits that form a distinct subset of a program or intellectual area. Each Minor requires at least 4.0 and at most 5.0 credits. Access to minors may be restricted. A minor introduces a student to, or extends their knowledge of, a discipline or intellectual area.

O

Option An optional addition to or component of a program with requirements distinct from those of an Element: (i) Undergraduate: co-operative education, study abroad, Mention Francais, program internship; (ii) Graduate: co-operative education, Cotutelle (in Ph.D. programs), Dual Master's Degree (in master's programs), collaborative specialization. Options may be taken in addition to elements and are recorded on the transcript and the diploma.

P

Pathway A pathway through a program is a route to completion such as: stream, thesis, research essay, research project, or course only. Pathways may be chosen in addition to Elements and Options, and are not recorded on the diploma but are recorded on the transcript.

Practical Assessments Practical assessments are those assessments, such as exams or term work, of a student's work where the tasks and conditions are similar to what they would experience in a work environment and are designed to complement their academic skills and competencies.

Prerequisite A required course or courses that must be completed successfully before registering in the course that requires the prerequisite.

Prerequisite courses Courses that contain sufficient content in common that credit may not be earned for more than one of the courses. Courses that preclude one another are not necessarily considered equivalent and may or may not be interchangeable to fulfil program or specific element requirements.

Program A specified combination of academic requirements in a discipline or intellectual area of study which leads to a credential (for example, B.A. in Philosophy, Ph.D. in History, M.Sc. in Chemistry, Graduate Diploma in Public Policy and Program Evaluation, Certificate in the Teaching of English as a Second Language).

There are five types of programs at the undergraduate level:

1. **Single-Discipline Program:** A Single-Discipline program is a program of at least 15.0 credits in which the courses that constitute the program's major are drawn overwhelmingly from one discipline or intellectual area.

2. **Thematic Program:** A Thematic program is an interdisciplinary program of at least 15.0 credits that concentrates on a particular interdisciplinary intellectual area or theme, and draws on courses within its major from at least three disciplines or intellectual areas.

3. **Single-Discipline Honours Program:** A Single-Discipline Honours program is a program of at least 20.0 credits in which the courses that constitute the program's major are drawn overwhelmingly from one discipline or intellectual

area. Pathways to completion constituted by a thesis, research essay or significant project may demand a higher academic standard than a course-based pathway.

4. **Combined Honours Program:** A Combined Honours program is a program of at least 20.0 credits in which a student fulfils the requirements for combined honours majors in two such majors from two different programs. Pathways to completion constituted by a thesis, research essay or significant project may demand a higher academic standard than a course-based pathway.

5. **Thematic Honours Program:** A Thematic Honours program is an interdisciplinary program of at least 20.0 credits that concentrates on a particular interdisciplinary intellectual area or theme, and draws on courses within its major from at least three disciplines or intellectual areas. Pathways to completion constituted by a thesis, research essay or significant project may demand a higher academic standard than a course-based pathway.

R

Restricted Elective Restricted electives are courses required to fulfil elective requirements in an undergraduate program that are not free electives. The courses that may fulfil restricted elective requirements in any program are in other words prescribed by the program.

Students should refer to individual program descriptions to determine the courses that may fulfil restricted elective requirements for a program.

S

Specialization At the graduate level only collaborative specializations exist. See definition for 'collaborative specialization'.

At the undergraduate level, the term 'specialization' is reserved for specific areas of concentration in programs in which the courses constituting the program's specializations are delivered overwhelmingly by academic units other than the academic unit administering the program.

Special Students Students not admitted to a program or a degree leading to a Credential.

Status Full-time status for tuition fee purposes:

1. Undergraduate students are full-time when registered in a 60% course load per term as defined by the student's academic program: for example, registered in at least 1.5 credits per term in a 2.5 credit normal term course load. Undergraduate students should consult the website of the Academic Advising Centre to determine their eligibility for various Provincial and University services according to the number of credits taken each term.
2. Graduate students are normally admitted and must stay continuously registered as full-time. Students may apply to the Dean of Graduate and Postdoctoral Affairs for exemption from full-time status in exceptional circumstances (for example, medical circumstances); exemptions are normally granted for one term.

Part-time status for tuition fee purposes:

1. Undergraduate students are part-time when registered in less than a 60% course load per term as defined by the student's academic program (for example, registered in less than 1.5 credits per term).
2. Graduate students may be admitted as part-time students and will be required to continue and complete their program as part-time; a part-time student is not eligible to register in more than 1.25 credits per term, including audit courses.

Stream A Pathway within an undergraduate program normally constituted by at least 1.5 credits of courses that facilitate concentration on a particular area of study within the program. Streams are not recorded on the diploma but are recorded on the transcript.

Summative Assessment Summative assessments are those assessments of a student's work carried out at the end of a course or the end of specific components of a course whose sole purpose is to constitute a judgement on a student's performance in the course or a specific component of the course.

T

Transfer Credit Academic credit granted for individual courses successfully completed at another institution, either upon admission (admitted with advanced standing from secondary school, or transfer from college or university) or while registered with a Letter of Permission or on exchange.

Transcript The official record of a student's academic registration and accomplishments at Carleton University.

U

Undeclared Students Undergraduate students admitted to a degree who have not chosen a program ('declared a major') within that degree; normally, students are required to choose a program ('declare a major') before reaching second-year standing.

W

Withdrawal A formal process for discontinuing studies in a course or a program.

Undergraduate students who wish to drop all courses and terminate their registration in the academic program must follow the procedure available through the Registrar's Office. Students who have been away from the University for nine or more consecutive terms will be withdrawn and must re-apply for admission.

Graduate students who wish to drop all courses and terminate their registration in the academic program must notify their department in writing of their intention to withdraw. Students who do not register for three consecutive terms or do not register continuously in their thesis, research essay, or independent research project will be withdrawn and must re-apply for admission.

Graduate Programs

Accounting
 African Studies (Specialization)
 Anthropology
 Applied Linguistics and Discourse Studies
 Architecture
 Art and Architectural History
 Biochemistry
 Bioinformatics (Specialization)
 Biology
 Biomedical Engineering
 Biostatistics (Collaborative Specialization)
 Business
 Canadian Studies
 Chemical and Environmental Toxicology (Specialization)
 Chemistry
 Civil Engineering
 Climate Change (Collaborative Specialization)
 Cognitive Science
 Communication
 Computer Science
 Conflict Resolution (Graduate Diploma)
 Cultural Mediations
 Curatorial Studies
 Data Science (Specialization)
 Design
 Digital Humanities (Specialization)
 Earth Sciences
 Economics
 Electrical and Computer Engineering
 English
 Environmental Engineering
 Ethics and Public Affairs
 European, Russian and Eurasian Studies
 Film Studies
 French and Francophone Studies
 Geography
 Health Sciences
 History
 Human-Computer Interaction
 Indigenous Policy and Administration
 Information Technology
 Infrastructure Protection and International Security
 International Affairs
 Journalism
 Latin American and Caribbean Studies (Collaborative Specialization)
 Legal Studies
 Linguistics
 Management
 Mathematics and Statistics
 Mechanical and Aerospace Engineering
 Migration and Diaspora Studies
 Music and Culture

Neuroscience
 Northern Studies
 Philanthropy and Nonprofit Leadership
 Philosophy
 Physics
 Political Economy
 Political Management
 Political Science
 Psychology
 Public Policy and Administration
 Religion and Public Life
 Social Work
 Sociology
 Sustainable Energy
 Technology Innovation Management
 Women's and Gender Studies
 Work and Labour

Accounting

This section presents the requirements for programs in:

- Master of Accounting

Program Requirements

Master of Accounting (6.0 credits)

Requirements:

1. 5.0 credits in compulsory courses:	5.0
ACCT 5120 [0.5] Advanced Concepts	
ACCT 5121 [0.5] Advanced Concepts II	
ACCT 5123 [0.5] Advanced Taxation	
ACCT 5124 [0.25] Data Analytics for Professional Accountants	
ACCT 5125 [0.5] Advanced Assurance	
ACCT 5128 [0.25] Strategy for Professional Accountants	
ACCT 5129 [0.25] Professional Accounting Cases I	
ACCT 5130 [0.5] Advanced Finance	
ACCT 5131 [0.5] Performance Management	
ACCT 5134 [0.5] Advanced Integration I	
ACCT 5136 [0.5] Advanced Integration II	
ACCT 5137 [0.25] Professional Accounting Cases II	
2. 1.0 credit in:	1.0
ACCT 5199 [1.0] Internship	
Total Credits	6.0

Regulations - M.Acct.

See the General Regulations section of this Calendar.

Guidelines for Completion

Students admitted as full-time students must normally complete their degree requirements within four terms after the date of initial registration.

Academic Standing

A grade of B- or better is normally required in each credit counted towards the degree. However, a candidate may, with the recommendation of the School and the approval

of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed to count a grade of C+ in 0.75 credits.

Withdrawal from the program will be required if an M.Acc. student:

- Receives a grade of lower than B- in 1.25 credits or more, or
- Fails to achieve a weighted GPA of 7.0 after completing 2.0 credits of study, or to maintain it, or
- Receives a grade lower than C+ in the same course more than once.

M. Accounting

Applicants are expected to hold an honours bachelor's degree or equivalent, with a minimum overall average of B-; demonstrated coverage of the CPA Competency Map at the 'Entry' level, and a minimum grade of C- in each of the prerequisite courses (courses that meet the Entry level requirements of the CPA Competency Map) with a minimum overall average of B+ in the prerequisite courses.

Students who hold a CPA, CMA designation and who have completed the Strategic Leadership Program, Case Examination and Board Report, may be exempted from the course ACCT 5133 Advanced Integration I, with the approval of the M.Acc. Director.

Proficiency in English is necessary to pursue graduate studies at Carleton University. See Section 3.6 of the General Regulations of this Calendar for English proficiency rules.

Accounting (ACCT) Courses

ACCT 5001 [0.25 credit]

Financial Accounting

Fundamentals of financial accounting. Techniques used to measure business transactions, preparation of financial statements, recording and valuation of assets, liabilities and equities.

Precludes additional credit for BUSI 5004 (no longer offered).

ACCT 5002 [0.25 credit]

Managerial Accounting

Fundamentals of managerial accounting and control. Techniques for management decision-making, planning, and control including cost-volume-profit analysis, product costing, variance analysis, relevant costing, transfer pricing and the balanced scorecard.

Precludes additional credit for BUSI 5005 (no longer offered).

Prerequisite(s): ACCT 5001.

ACCT 5011 [0.25 credit]

Financial Statement Analysis

A user-oriented approach to the study of financial statements. The role of the financial statements and the annual report in the financial reporting process, using ratio analysis to analyze firm performance and make forecasts of future performance.

Precludes additional credit for BUSI 5000 (no longer offered).

Prerequisite(s): ACCT 5002.

ACCT 5012 [0.25 credit]

Performance Measurement and Control

Efficacy and efficiency of corporate strategies. Design and use of performance measurement systems from an organizational integrated systems view. Balanced scorecard, activity-based management, and other performance measurement and control systems.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5000 (no longer offered).

Prerequisite(s): ACCT 5002.

ACCT 5013 [0.25 credit]

Financial Reporting and Control in Public Organizations

Public sector accounting principles, practices, and unique financial reporting requirements. Comparison with private sector financial reporting, control, and performance evaluation.

Prerequisite(s): ACCT 5002.

ACCT 5014 [0.25 credit]

Governance and Accountability

Corporate governance functions including management and controllership, boards of directors, auditors, security commissions and the control of enterprise-wide risk management. Historical development and evaluation of current practices, including Sarbanes Oxley and its implications.

ACCT 5120 [0.5 credit]

Advanced Concepts

An in-depth exploration of selected topics in financial accounting, assurance and taxation.

Includes: Experiential Learning Activity

ACCT 5121 [0.5 credit]

Advanced Concepts II

An in-depth exploration of selected topics in management accounting, finance and corporate governance.

ACCT 5122 [0.25 credit]

Issues in Taxation

This course will provide students additional knowledge in Canadian Federal Taxation required in the MAcc program. Emphasis on corporate income tax and some specialized topics.

Prerequisite(s): permission of the M.Acc. office.

ACCT 5123 [0.5 credit]**Advanced Taxation**

Canadian taxation planning issues regarding personal and business decisions involving individuals, corporations, partnerships and trusts.

Includes: Experiential Learning Activity

ACCT 5124 [0.25 credit]**Data Analytics for Professional Accountants**

Data and information analysis with application to professional accounting.

ACCT 5125 [0.5 credit]**Advanced Assurance**

Assurance concepts are applied to a range of assurance and auditing engagements, including auditing financial statements and non-financial statement assurance engagements. Current trends in assurance are also explored.

Includes: Experiential Learning Activity

ACCT 5128 [0.25 credit]**Strategy for Professional Accountants**

Overview of the strategy process required of professional accountants. Case-based course with accounting focus, exploring the development of a company's situation analysis, identification and analysis of strategic and operational issues.

Includes: Experiential Learning Activity

ACCT 5129 [0.25 credit]**Professional Accounting Cases I**

An introduction to approaching, planning and writing accounting cases, including integration across multiple disciplines.

Includes: Experiential Learning Activity

ACCT 5130 [0.5 credit]**Advanced Finance**

The impact of the financing decision upon the value of the firm, firm valuation, investing and risk management.

ACCT 5131 [0.5 credit]**Performance Management**

Exploration of performance management in evaluating organizational performance, management decision making, effective problem solving skills and making recommendations for improvements to organizational operations.

Includes: Experiential Learning Activity

ACCT 5134 [0.5 credit]**Advanced Integration I**

Discussion, analysis and integration with an emphasis on the application of strategic management to various accounting and finance issues.

Includes: Experiential Learning Activity

Precludes additional credit for ACCT 5133 (no longer offered).

Prerequisite(s): ACCT 5128. Completion of a minimum of 2.0 credits in the Master of Accounting program with a minimum average grade of B-.

ACCT 5136 [0.5 credit]**Advanced Integration II**

Discussion, analysis and integration of issues involving financial reporting, assurance, finance, management accounting, taxation and/or strategy.

Includes: Experiential Learning Activity

Precludes additional credit for ACCT 5135 (no longer offered).

Prerequisite(s): ACCT 5134.

ACCT 5137 [0.25 credit]**Professional Accounting Cases II**

A continued development and honing of problem solving abilities when placed in real-life, business situations.

Case-writing skills will be finessed, with focus on analysis and integration, while keeping the big picture in mind.

Includes: Experiential Learning Activity

Prerequisite(s): ACCT 5120 and ACCT 5121.

ACCT 5199 [1.0 credit]**Internship**

Application of M.Acc. course knowledge and building management skills in a professional environment.

Minimum 480 hours. Graded Sat/Uns.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the M.Acc. office.

African Studies

This section presents the requirements for programs in:

- M.A. Anthropology with Specialization in African Studies
- M.A. Applied Linguistics and Discourse Studies with Specialization in African Studies
- M.B.A. with Specialization in African Studies
- M.A. Communication with Specialization in African Studies
- M.A. Economics with Specialization in African Studies
- M.A. English with Specialization in African Studies
- M.A. French and Francophone Studies with Specialization in African Studies
- M.A. Film Studies with Specialization in African Studies
- M.A. Geography with Specialization in African Studies
- M.A. History with Specialization in African Studies
- M.A. International Affairs with Specialization in African Studies
- M. Journalism with Specialization in African Studies
- M.A. Legal Studies with Specialization in African Studies
- M.A. Music and Culture with Specialization in African Studies
- M.A. Political Economy with Specialization in African Studies
- M.A. Political Science with Specialization in African Studies
- M.A. Sociology with Specialization in African Studies
- M.A. Women's and Gender Studies with Specialization in African Studies

Program Requirements

M.A. Anthropology with Specialization in African Studies (5.0 credits)

Requirements - Thesis option (5.0 credits):

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit in:		0.5
ANTH 5401 [0.5]	Theories and Methods I	
4. 0.5 credit in:		0.5
ANTH 5402 [0.5]	Theories and Methods II	
5. 1.5 credits in electives (see Note, below)		1.5
6. 2.0 credits in:		2.0
ANTH 5909 [2.0]	M.A. Thesis	
Total Credits		5.0

Requirements - Research Essay option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit in:		0.5
ANTH 5401 [0.5]	Theories and Methods I	
4. 0.5 credit in:		0.5
ANTH 5402 [0.5]	Theories and Methods II	
5. 2.5 credits in electives (see Note, below)		2.5
6. 1.0 credit in:		1.0
ANTH 5908 [1.0]	M.A. Research Essay	
Total Credits		5.0

Requirements - Coursework option(5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit in:		0.5
ANTH 5401 [0.5]	Theories and Methods I (Normally to be taken in the first fall term after admission to the program.)	
4. 0.5 credit in:		0.5
ANTH 5402 [0.5]	Theories and Methods II	
5. 0.5 credit from:		0.5
ANTH 5109 [0.5]	Ethnography, Gender and Globalization	
ANTH 5202 [0.5]	The Anthropology of Underdevelopment	
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa	
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment	

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies	
- or an approved course in ANTH or SOCI approved by the Graduate Coordinator of the Institute of African Studies		

6. 3.0 credits in electives, including 0.5 credit in a course designated as having sufficient African Studies content 3.0

Total Credits 5.0

M.A. Applied Linguistics and Discourse Studies with Specialization in African Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies	
4. 1.5 credits from any 5000-level ALDS course (in consultation with their advisor, students may take up to 1.0 credit in graduate courses from other programs at Carleton University or the University of Ottawa; up to 1.0 credit can be taken at the 4000 level; up to 1.5 credits can be taken in piggybacked courses)		1.5
5. 2.0 credits in:		2.0
ALDS 5909 [2.0]	M.A. Thesis	
Total Credits		5.0

Requirements - Research Essay pathway (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies	
4. 2.5 credits from any 5000-level ALDS course (in consultation with their advisor, students may take up to 1.0 credit in graduate courses from other programs at Carleton University or the University of Ottawa; up to 1.0 credit can be taken at the 4000 level; up to 1.5 credits can be taken in piggybacked courses)		2.5
5. 1.0 credit in:		1.0
ALDS 5908 [1.0]	Research Essay	
Total Credits		5.0

M.B.A. with Specialization in African Studies (8.5 credits)

Requirements:

1. 0.75 credit in: 0.75

IBUS 5712 [0.25]	Business and Government in Emerging Economies	
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.5 credit in	elective specialization courses designated as having sufficient African Studies content, within the School of Business or elsewhere, with permission of African Studies and the School of Business.	1.5
4. 4.25 credits in	compulsory core courses	4.25
5. 1.0 credits in	elective courses	1.0
6. 1.0 credit in:		1.0
BUSI 5999 [1.0]	Internship ¹	
7. 0.0 credit in:		0.0
BUSI 5998 [0.0]	MBA Skills Workshop ²	
Total Credits		8.5

¹ Students with less than two (2) years of professional employment experience must successfully complete BUSI 5999 [1.0] Internship in order to graduate. Students with two or more years work experience may apply for an exemption.

² Non-credit required skills workshop.

M.A. Communication with Specialization in African Studies (5.0 credits)

Requirements - Research Essay program (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
COMS 5101 [1.0]	Foundations of Communication Studies	
4. 0.5 credit in:		0.5
COMS 5605 [0.5]	Approaches to Communication Research	
5. 1.0 credit in:		1.0
COMS 5908 [1.0]	Research Essay	
6. 2.0 credits	chosen from the list of optional courses.	2.0
Total Credits		5.0

Requirements - Thesis program (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
COMS 5101 [1.0]	Foundations of Communication Studies	
4. 0.5 credit in:		0.5
COMS 5605 [0.5]	Approaches to Communication Research	

5. 2.0 credits in:		2.0
COMS 5909 [2.0]	M.A. Thesis	
6. 1.0 credits from the list of optional courses.		1.0
Total Credits		5.0

M.A. Economics with Specialization in African Studies (4.0 credits)

Requirements - Coursework option (4.0 credits)

1. 1.5 credits in:		1.5
ECON 5020 [0.5]	Microeconomic Theory	
ECON 5021 [0.5]	Macroeconomic Theory	
ECON 5027 [0.5]	Econometrics I	
2. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
3. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
4. 0.5 credit in:		0.5
ECON 5029 [0.5]	Methods of Economic Research	
	including a research paper on an African Studies topic approved by the Graduate Committee of the Institute of African Studies	
5. 0.5 credit in	African Studies elective approved by the M.A. Supervisor of the Department of Economics	0.5
6. 1.0 credit in	ECON approved by the M.A. Supervisor of the Department of Economics, including at least 0.5 credit from ECON 5500, ECON 5504, ECON 5505	1.0
Total Credits		4.0

Requirements - Thesis option (4.0 credits)

1. 1.5 credits in:		1.5
ECON 5020 [0.5]	Microeconomic Theory	
ECON 5021 [0.5]	Macroeconomic Theory	
ECON 5027 [0.5]	Econometrics I	
2. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
3. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
4. 1.5 credit in:		1.5
ECON 5909 [1.5]	M.A. Thesis	
	on an African Studies topic approved by the Graduate Committee of the Institute of African Studies	
5. 0.5 credit from:		0.5
ECON 5500 [0.5]	Development Economics I	
ECON 5504 [0.5]	Development Economics II	
ECON 5505 [0.5]	Selected Topics in Development Economics	
Total Credits		4.0

M.A. English with Specialization in African Studies (4.5 credits)

Requirements - Coursework Option (4.5 credits)

1. 0.5 credit in:		0.5
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AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit from:		0.5
ENGL 5008 [0.5]	Studies in African Literature	
ENGL 5010 [0.5]	Studies in Caribbean Literature	
Or an ENGL course approved by the Graduate Coordinator of the Institute of African Studies		
4. 0.5 credit in:		0.5
ENGL 5005 [0.5]	M.A. Seminar	
5. 3.0 credits in ENGL at the 5000 level (excluding ENGL 5908 and ENGL 5909)		3.0
Total Credits		4.5

Requirements - Research Essay Option (4.5 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit from:		0.5
ENGL 5008 [0.5]	Studies in African Literature	
ENGL 5010 [0.5]	Studies in Caribbean Literature	
Or an ENGL course approved by the Graduate Coordinator of the Institute of African Studies		
4. 0.5 credit in:		0.5
ENGL 5005 [0.5]	M.A. Seminar	
5. 2.0 credits in ENGL at the 5000 level (excluding ENGL 5909)		2.0
6. 1.0 credit in:		1.0
ENGL 5908 [1.0]	Research Essay	
Total Credits		4.5

Requirements - Thesis Option (4.5 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit from:		0.5
ENGL 5008 [0.5]	Studies in African Literature	
ENGL 5010 [0.5]	Studies in Caribbean Literature	
Or an ENGL course approved by the Graduate Coordinator of the Institute of African Studies		
4. 0.5 credit in:		0.5
ENGL 5005 [0.5]	M.A. Seminar	
5. 1.0 credit in ENGL at the 5000 level (excluding ENGL 5908)		1.0
6. 2.0 credits in:		2.0
ENGL 5909 [2.0]	M.A. Thesis	
Total Credits		4.5

M.A. French and Francophone Studies with Specialization in African Studies (4.0 credits)

Note: FREN 5300 and FREN 5350 are mandatory for all students. Candidates select from one of two program options, chosen in consultation with an adviser from the Department, normally the Supervisor of Graduate Studies.

Requirements - Research Essay option (4.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
FREN 5908 [1.0]	Mémoire de recherche	
4. 0.5 credit in:		0.5
FREN 5300 [0.5]	Méthodologie de la recherche	
5. 0.0 credit in:		0.0
FREN 5350 [0.0]	Proposition de recherche	
6. 2.0 credits at the 5000 level		2.0
Total Credits		4.0

Requirements - Thesis option (4.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 2.0 credits in:		2.0
FREN 5909 [2.0]	M.A. Thesis	
4. 0.5 credit in:		0.5
FREN 5300 [0.5]	Méthodologie de la recherche	
5. 0.0 credit in:		0.0
FREN 5350 [0.0]	Proposition de recherche	
6. 1.0 credit at the 5000 level		1.0
Total Credits		4.0

M.A. Film Studies with Specialization in African Studies (4.0 credits)

Requirements - Thesis Stream (4.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
FILM 5010 [0.5]	Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
4. 1.0 credit in Film Studies graduate course work, excluding FILM 5801		1.0
5. 1.5 credits in:		1.5

FILM 5909 [1.5]	M.A. Thesis	
Total Credits		4.0
Requirements - Research Essay Stream (4.0 credits)		
1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
FILM 5010 [0.5]	Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
4. 1.5 credits in	Film Studies graduate course work, 0.5 credit of which can include:	1.5
FILM 5801 [0.5]	Graduate Internship	
5. 1.0 credit in:		1.0
FILM 5908 [1.0]	Research Essay	
Total Credits		4.0
Requirements - Coursework Stream (4.0 credits)		
1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
FILM 5010 [0.5]	Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
4. 1.5 credits in	Film Studies graduate course work, 0.5 credit of which can include:	1.5
FILM 5801 [0.5]	Graduate Internship	
5. 1.0 credit from:		1.0
AFRI 5050 [0.5]	Selected Topics in African Studies	
AFRI 5100 [0.5]	African Studies Abroad	
AFRI 5700 [0.5]	Directed Readings in African Studies	
Students may also take courses designated as having sufficient African Studies content, as approved by both the Graduate Supervisor in Film Studies and the Graduate Coordinator of the Institute of African Studies.		
Total Credits		4.0

Note: for Item 4 above, students may take a 0.5 credit Film Studies course at the 4000-level subject to the approval of the Graduate Supervisor

M.A. Geography with Specialization in African Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)		
1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0

AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
GEOG 5905 [0.5]	Masters Research Workshop	
4. 2.5 credits in:		2.5
GEOG 5909 [2.5]	M.A. Thesis (in the specialization and including oral examination of the thesis)	
5. 1.0 credit in	approved graduate-level electives	1.0
6. In addition to the formal requirements, MA students are required to attend the Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

M.A. History with Specialization in African Studies (4.5 credits)

Requirements - Research Essay pathway (4.5 credits)		
1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit in:		0.5
HIST 5003 [0.5]	Historical Theory and Method	
4. 1.0 credit in	HIST at the graduate level at Carleton	1.0
5. 1.0 credit in	graduate seminars with sufficient African Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with African Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.	1.0
6. 0.5 credit in:		0.5
HIST 5900 [0.5]	Directed Research	
7. 1.0 credit in:		1.0
HIST 5908 [1.0]	M.A. Research Essay	
Total Credits		4.5

Requirements - Thesis pathway (4.5 credits)		
1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit in:		0.5
HIST 5003 [0.5]	Historical Theory and Method	
4. 0.5 credit in	HIST at the graduate level at Carleton	0.5
5. 1.0 credit in	graduate seminars with sufficient African Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with African Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.	1.0
6. 2.0 credits in:		2.0
HIST 5909 [2.0]	M.A. Thesis	
Total Credits		4.5

M.A. International Affairs with Specialization in African Studies (5.0 credits)

Requirements - Thesis Pattern (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
2. 1.5 credit in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from (See Note 1, below):	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
4. 2.0 credits in:	2.0
INAF 5909 [2.0] M.A. Thesis (in the specialization)	
5. 0.5 credit in Field and Elective courses (see Note 2, below)	0.5
6. Successful completion of second language proficiency examination (See Note 3, below)	
Total Credits	5.0

Requirements - Research Essay Pattern (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
2. 1.5 credit in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5205 [0.5] Economics of Conflict	

INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
4. 1.0 credit in:	1.0
INAF 5908 [1.0] Research Essay (in the specialization)	
5. 1.5 credits in Field and Elective courses (See Note 2, below)	1.5
6. Successful completion of second language proficiency examination (see Note 3, below)	
Total Credits	5.0

Requirements - Course Work Pattern (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
2. 1.0 credit in:	1.0
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
4. 1.0 credit in courses accepted by the Institute of African Studies Graduate Coordinator as having sufficient African content and accepted by the NPSIA M.A. Program Supervisor or Associate Director as being relevant to the student's program of study. These courses would normally be drawn from the social science courses listed under the collaborative program. In years that it is offered, it is strongly suggested that NPSIA students include INAF 5603.	1.0
5. 2.0 credits in Field and Elective courses (See Note 2, below)	2.0
6. Successful completion of second language proficiency examination (see Note 3, below)	
Total Credits	5.0

- All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed.

- For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
- Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. Details of the language requirement are provided on the School website.

M. Journalism with Specialization in African Studies (10.0 credits)

Requirements:

First Year

Candidates admitted to Year One of the Master of Journalism program must complete the following courses before proceeding to the second year of study:

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 4.0 credits in:	4.0
JOUR 5000 [0.5] Journalism and Society I (see note below)	
JOUR 5200 [1.0] Introduction to Reporting	
JOUR 5202 [1.0] Broadcast Journalism Laboratory	
JOUR 5206 [0.5] Reporting Methods	
JOUR 5401 [0.5] Journalism Law	
JOUR 5706 [0.5] Professional Practices (see note below)	

4. 0.5 credit in approved African Studies elective 0.5

Year One M.J. candidates may be considered for advanced standing in certain of the required courses listed above, but in such cases will be required to replace waived courses with approved options.

Note: course deliverables for JOUR 5000 and JOUR 5706 must be on an approved African Studies theme.

Second Year

Students entering second year choose to complete their degree with an emphasis on either professional practice or journalism studies.

Second Year - Professional Practice Completion Option

Those choosing the professional practice completion option will each select a primary media area of interest. Those selecting a text-based option will take JOUR 5700, and those selecting audio or video will take JOUR 5702.

Students will complete a Master's Research Project (JOUR 5908) in a format consistent with their primary media area of interest and will enrol in a corresponding Advanced Journalism course. In addition, they will take one other Advanced Reporting course, two specialized "beat" journalism courses and 1.0 credits of approved electives. The course of studies is as follows:

3. 1.0 credit in:

JOUR 5908 [1.0] M.Journalism Research Project

4. 1.0 credit from:

JOUR 5700 [1.0] Advanced Writing

JOUR 5702 [1.0] Broadcast Journalism

5. 1.0 credit from:

JOUR 5003 [0.5] Advanced Journalism: Multimedia

JOUR 5004 [0.5] Advanced Journalism: Audio

JOUR 5005 [0.5] Advanced Journalism: Video

6. 1.0 credit from:

JOUR 5300 [0.5] Specialized Journalism: Special Topic

JOUR 5301 [0.5] Specialized Journalism: Business and the Markets

JOUR 5302 [0.5] Specialized Journalism: Business and Canadian Society

JOUR 5303 [0.5] Specialized Journalism: Health and Science

JOUR 5304 [0.5] Specialized Journalism: Environment and Science

JOUR 5306 [0.5] Specialized Journalism: Canada and the World

JOUR 5308 [0.5] Specialized Journalism: Sports and Sport Culture

JOUR 5309 [0.5] Specialized Journalism: Arts and Culture

JOUR 5310 [0.5] Specialized Journalism: Justice and the Law

JOUR 5311 [0.5] Specialized Journalism: Justice and The Supreme Court

JOUR 5315 [0.5] Specialized Journalism: Canada and the U.S.

7. 1.0 credit in electives related to the study of the media, chosen in consultation with the Supervisor of Graduate Studies.

Note: under special circumstances, and with the School's approval, a student could replace JOUR 5908 and 1.0 credit of approved courses with a 2.0-credit thesis, JOUR 5909.

Second Year - Journalism Studies Completion Option

Students choosing the journalism studies completion with specialization in African Studies must complete the following:

3. 0.5 credit in:

JOUR 5500 [0.5] Journalism and Society II

4. 2.5 credits in electives related to the study of the media, chosen in consultation with the Supervisor of Graduate Studies. JOUR 5000 Journalism and Society I required if admitted directly to Year Two. Students who completed this course in first year will substitute an approved Journalism replacement option.

5. 2.0 credits in:

JOUR 5909 [2.0] M.Journalism Thesis (in the specialization)

Total Credits

10.0

Note: As a condition for graduation, all students in both completion options are required to have a minimum of four months of practical experience in the media, and a working knowledge of a second language, preferably

French. For qualified applicants, the School may deem the requirement(s) to have been met.

M.A. Legal Studies with Specialization in African Studies (5.0 credits)

Requirements - Thesis option

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 1.0 credit in:	1.0
LAWS 5000 [0.5] Theories of Law and Social Transformation	
LAWS 5001 [0.5] Legal Method and Social Inquiry	
3. 0.0 credit in:	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
4. 1.5 credits in LAWS ¹	1.5
5. 2.0 credits in:	2.0
LAWS 5909 [2.0] M.A. Thesis (which includes an oral examination) ²	
Total Credits	5.0

Requirements - Research essay option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 1.0 credit in:	1.0
LAWS 5000 [0.5] Theories of Law and Social Transformation	
LAWS 5001 [0.5] Legal Method and Social Inquiry	
4. 2.5 credits in LAWS ¹	2.5
5. 1.0 credit in:	1.0
LAWS 5908 [1.0] M.A. Research Essay ²	
Total Credits	5.0

¹ Students are encouraged to take 0.5 credit in a related discipline, in consultation with the supervisor of graduate studies.

² Thesis/Research Essay: The thesis or research essay must represent the result of the candidate's independent research undertaken after being admitted into graduate studies in the Department of Law and Legal Studies. Previous work of the candidate may be used only as introductory or background material for the thesis or research essay. A student may carry on research work related to the thesis or research essay off campus if the work is approved in advance and supervision arrangements have been made with the supervisor of graduate studies.

M.A. Music and Culture with Specialization in African Studies (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 1.5 credits in:	1.5
MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories	

MUSI 5002 [0.5] Research Methods in Music and Culture	
MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates	
2. 1.0 credit in additional MUSI course work chosen from available electives	1.0
3. 2.0 credits in:	2.0
MUSI 5909 [2.0] M.A. Thesis	
4. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
Total Credits	5.0

Requirements - Research Essay program (5.0 credits)

1. 1.5 credits in:	1.5
MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5] Research Methods in Music and Culture	
MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates	
2. 2.0 credits in additional MUSI course work chosen from available elective courses	2.0
3. 1.0 credit in:	1.0
MUSI 5908 [1.0] Research Essay	
4. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
Total Credits	5.0

Requirements - Coursework program (5.0 credits)

1. 1.5 credits in:	1.5
MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5] Research Methods in Music and Culture	
MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates	
2. 2.0 credits in additional MUSI course work chosen from available elective courses	2.0
3. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
4. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
5. 1.0 credits from:	1.0
AFRI 5050 [0.5] Selected Topics in African Studies	
AFRI 5100 [0.5] African Studies Abroad	
AFRI 5700 [0.5] Directed Readings in African Studies	
AFRI 5900 [0.5] Placement	
ANTH 5109 [0.5] Ethnography, Gender and Globalization	

ANTH 5202 [0.5]	The Anthropology of Underdevelopment	
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa	
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment	
ENGL 5008 [0.5]	Studies in African Literature	
ENGL 5010 [0.5]	Studies in Caribbean Literature	
FREN 5212 [0.5]	Littératures francophones	
INAF 5603 [0.5]	Issues in Development in Africa	
LAWS 5007 [0.5]	Race, Ethnicity and the Law	
LAWS 5603 [0.5]	International Law: Theory and Practice	
PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa	
PSCI 5202 [0.5]	Development Theory and Issues	
PSCI 5203 [0.5]	Southern Africa After Apartheid	
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies	
WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II	
Total Credits		5.0

M.A. Political Economy with Specialization in African Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
PECO 5000 [0.5]	Theories of Political Economy	
PECO 5001 [0.5]	The Methodology of Political Economy	
4. 2.0 credits in thesis (and an oral examination of the thesis)		2.0
5. 1.5 credits in approved graduate level electives (see Selection of Courses, below) ¹		1.5
Total Credits		5.0

Requirements - Research essay option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
PECO 5000 [0.5]	Theories of Political Economy	
PECO 5001 [0.5]	The Methodology of Political Economy	
4. 1.0 credit in research essay		1.0
5. 2.5 credits in approved graduate level electives (see Selection of Courses, below) ¹		2.5
Total Credits		5.0

¹ Up to one (1.0) credit may be taken at the 4000 (honours undergraduate) level.

M.A. Political Science with Specialization in African Studies (5.0 credits)

Requirements - Coursework option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit from:		0.5
PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa	
PSCI 5203 [0.5]	Southern Africa After Apartheid	
4. 0.5 credit in course designated as having sufficient African Studies content, approved by both the Graduate Supervisor in Political Science and the Graduate Coordinator of the Institute of African Studies		0.5
5. 3.5 credits in approved courses		3.5
Total Credits		5.0

Requirements - Research Essay option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit from:		0.5
PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa	
PSCI 5203 [0.5]	Southern Africa After Apartheid	
4. 0.5 credit in course designated as having sufficient African Studies content, approved by both the Graduate Supervisor in Political Science and the Graduate Coordinator of the Institute of African Studies		0.5
5. 1.0 credit in:		1.0
PSCI 5908 [1.0]	M.A. Research Essay	
6. 2.5 credits in approved courses		2.5
Total Credits		5.0

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 0.5 credit from:		0.5
PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa	
PSCI 5203 [0.5]	Southern Africa After Apartheid	
4. 0.5 credit in course designated as having sufficient African Studies content, approved by both the Graduate Supervisor in Political Science and the Graduate Coordinator of the Institute of African Studies		0.5
5. 2.0 credits in:		2.0
PSCI 5909 [2.0]	M.A. Thesis	

6. 1.5 credits in approved courses 1.5

Total Credits 5.0

M.A. Sociology with Specialization in African Studies (5.0 credits)

Requirements - Thesis program (5.0 credits):

1. 1.0 credit in: 1.0

SOCI 5005 [0.5] Recurring Debates in Social Thought

SOCI 5809 [0.5] The Logic of the Research Process

2. 1.5 credits in courses. With departmental permission 1.5
0.5 credit may be selected from courses at the 4000-level.

3. 2.0 credits in: 2.0

SOCI 5909 [2.0] M.A. Thesis

4. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline:
Historical and Current Perspectives

5. 0.0 credit in:

AFRI 5800 [0.0] Scholarly Preparation in African Studies (5. 0.0 credit in:)

Total Credits 5.0

Requirements - Research Essay program (5.0 credits)

1. 1.0 credit in: 1.0

SOCI 5005 [0.5] Recurring Debates in Social Thought

SOCI 5809 [0.5] The Logic of the Research Process

2. 2.5 credits in courses. With departmental permission 2.5
0.5 credit may be selected from courses at the 4000-level.

3. 1.0 credit in: 1.0

SOCI 5908 [1.0] M.A. Research Essay

4. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline:
Historical and Current Perspectives

5. 0.0 credit in: 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

6. An oral examination on the candidate's research essay and program.

Total Credits 5.0

Requirements - Coursework program (5.0 credits)

1. 1.0 credit in: 1.0

SOCI 5005 [0.5] Recurring Debates in Social Thought

SOCI 5809 [0.5] The Logic of the Research Process

2. 2.5 credits in courses excluding SOCI 5905. With 2.5
departmental permission 0.5 credit may be selected from
courses at the 4000-level.

3. 1.0 credit in courses designated as having sufficient 1.0
African Studies content, including at least 0.5 credit in:

SOCI 5404 [0.5] Race, Ethnicity and Class in Contemporary Societies

ANTH 5109 [0.5] Ethnography, Gender and Globalization

ANTH 5202 [0.5] The Anthropology of Underdevelopment

ANTH 5209 [0.5] Special Topics in the Anthropology of Africa

ANTH 5809 [0.5] Selected Topics in the Anthropology of Development and Underdevelopment

Or, a Sociology or Anthropology course approved by the Graduate Coordinator of the Institute of African Studies.

4. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline:
Historical and Current Perspectives

5. 0.0 credit in:

AFRI 5800 [0.0] Scholarly Preparation in African Studies

Total Credits 5.0

M.A. Women's and Gender Studies with Specialization in African Studies (5.0 credit)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline:
Historical and Current Perspectives

2. 0.0 credit in: 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. 0.5 credit in: 0.5

WGST 5900 [0.5] Program Seminar

4. 0.5 credit in: 0.5

WGST 5906 [0.5] Feminist Theory

5. 0.5 credit in: 0.5

WGST 5907 [0.5] Researching Women's and Gender Issues

6. 1.0 credit in additional course work chosen from 1.0
available elective courses (see below)

7. 2.0 credits in: 2.0

WGST 5909 [2.0] M.A. Thesis

Total Credits 5.0

Requirements - Research essay pathway (5.0 credits)

1. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline:
Historical and Current Perspectives

2. 0.0 credit in: 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. 0.5 credit in: 0.5

WGST 5900 [0.5] Program Seminar

4. 0.5 credit in: 0.5

WGST 5906 [0.5] Feminist Theory

5. 0.5 credit in: 0.5

WGST 5907 [0.5] Researching Women's and Gender Issues

6. 2.0 credits in additional course work chosen from 2.0
available elective courses (see below)

7. 1.0 credit in: 1.0

WGST 5908 [1.0] Research Essay

Total Credits 5.0

Selection of Courses - African Studies

The courses listed below are relevant to students of African Studies and could, with the approval of the specific requirements of the units involved, be used as courses to help fulfil degree requirements. There are also often

graduate courses and 4000-level courses in a number of units at Carleton that are offered on an ad hoc basis that have significant content appropriate to African Studies. To have any such course count towards their degree requires approval of the Director of the Institute of African Studies when it is being offered.

African Studies

AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
AFRI 5050 [0.5]	Selected Topics in African Studies
AFRI 5100 [0.5]	African Studies Abroad
AFRI 5700 [0.5]	Directed Readings in African Studies
AFRI 5900 [0.5]	Placement
AFRI 5800 [0.0]	Scholarly Preparation in African Studies

Anthropology

ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment

English

ENGL 5008 [0.5]	Studies in African Literature
ENGL 5010 [0.5]	Studies in Caribbean Literature

French

FREN 5212 [0.5]	Littératures francophones
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International Affairs

INAF 5603 [0.5]	Issues in Development in Africa
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Law

LAWS 5007 [0.5]	Race, Ethnicity and the Law
LAWS 5603 [0.5]	International Law: Theory and Practice

Political Science

PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5203 [0.5]	Southern Africa After Apartheid

Sociology

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
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Women's and Gender Studies

WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II
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Regulations

See the General Regulations section of this Calendar and the regulations of the participating unit.

Admission

Admission to the collaborative master's program in African Studies is available to master's students who are admitted in one of the participating master's programs. To apply to one of the participating master's programs, please visit the Faculty of Graduate and Postdoctoral Affairs Admissions page.

African Studies (AFRI) Courses

AFRI 5000 [0.5 credit]

African Studies as a Discipline: Historical and Current Perspectives

This course examines the formation of African Studies as a discipline, including the historical and ongoing debates over its boundaries and genealogies and its changing research paradigms.

AFRI 5050 [0.5 credit]

Selected Topics in African Studies

A course on a selected topic in African Studies. Topic varies from year to year and will be announced in advance of registration period.

Also offered at the undergraduate level, with different requirements, as AFRI 4050, for which additional credit is precluded.

AFRI 5060 [0.5 credit]

African Feminisms

African feminisms as theoretical interventions and as political practice, and as diverse forms. Gender as a marker of power: status, hierarchy, social capability, and as a system of distribution of resources, responsibilities and solidarities.

Also offered at the undergraduate level, with different requirements, as AFRI 4060, for which additional credit is precluded.

AFRI 5100 [0.5 credit]

African Studies Abroad

Based at one of Carleton's partner universities in Africa, course will include lectures, seminars, guest speakers, field visits and group research projects to examine a topic in African studies, as selected by the instructor. Topic and location may change annually.

Includes: Experiential Learning Activity

AFRI 5700 [0.5 credit]

Directed Readings in African Studies

A Tutorial on a selected topic in African Studies in which seminars are not available.

AFRI 5800 [0.0 credit]

Scholarly Preparation in African Studies

This course will provide scholarly preparation in African Studies by requiring participation in public talks as both audience member and presenter.

Includes: Experiential Learning Activity

AFRI 5900 [0.5 credit]

Placement

Students spend up to one day a week participating in an organization that has an African focus, while carrying out tasks that have a scholarly content. Consult the Director of the Institute of African Studies.

Includes: Experiential Learning Activity

Anthropology

This section presents the requirements for programs in:

- M.A. Anthropology
- M.A. Anthropology with Collaborative Specialization in Climate Change
- M. A. Anthropology with Collaborative Specialization in Latin American and Caribbean Studies
- M.A. Anthropology with Specialization in African Studies
- M.A. Anthropology with Specialization in Digital Humanities
- Ph.D. Anthropology
- Ph.D. Anthropology with Specialization in Political Economy

Program Requirements

M.A. Anthropology (5.0 credits)

The Master of Arts program in Anthropology is a total of 5.0 credits, and each candidate is required to select, in consultation with the graduate adviser, one of the three program options.

Requirements - Thesis option (5.0 credits):

1. 0.5 credit in:	0.5
ANTH 5401 [0.5] Theories and Methods I (Normally to be taken in the first fall term after admission to the program)	
2. 0.5 credit in:	0.5
ANTH 5402 [0.5] Theories and Methods II	
3. 2.0 credits in electives	2.0
4. 2.0 credits in:	2.0
ANTH 5909 [2.0] M.A. Thesis	
Total Credits	5.0

Requirements - Research Essay option (5.0 credits):

1. 0.5 credit in:	0.5
ANTH 5401 [0.5] Theories and Methods I (Normally to be taken in the first fall term after admission to the program.)	
2. 0.5 credit in:	0.5
ANTH 5402 [0.5] Theories and Methods II	
3. 3.0 credits in electives	3.0
4. 1.0 credit in:	1.0
ANTH 5908 [1.0] M.A. Research Essay	
Total Credits	5.0

Requirements - Coursework option (5.0 credits):

1. 0.5 credit in:	0.5
ANTH 5401 [0.5] Theories and Methods I	

(Normally to be taken in the first fall term after admission to the program.)

2. 0.5 credit in:	0.5
ANTH 5402 [0.5] Theories and Methods II	
3. 4.0 credits in electives	4.0
Total Credits	5.0

Electives may be chosen, in consultation with the student's adviser, from the following courses:

- anthropology graduate course offerings;
- sociology graduate courses (especially in theory and methods, or in areas which relate to the student's thesis research interests);
- 4000-level courses offered in the sociology and anthropology undergraduate program;
- or a combination of the above. (Normally no more than 1.0 credit may be chosen from course offerings in other departments.)

M.A. Anthropology with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Thesis pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
ANTH 5401 [0.5] Theories and Methods I	
ANTH 5402 [0.5] Theories and Methods II	
4. 1.0 credit in approved electives, chosen in consultation with the student's advisor	1.0
5. 2.0 credits in:	2.0
ANTH 5909 [2.0] M.A. Thesis (in the specialization)	
Total Credits	5.0

Requirements - Research essay pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
ANTH 5401 [0.5] Theories and Methods I	
ANTH 5402 [0.5] Theories and Methods II	
4. 2.0 credit in approved electives, chosen in consultation with the student's advisor	2.0
5. 1.0 credit in:	1.0
ANTH 5908 [1.0] M.A. Research Essay (in the specialization)	
Total Credits	5.0

M. A. Anthropology with Collaborative Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	

2. 0.0 credit in:	
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in:	1.0
ANTH 5401 [0.5]	Theories and Methods I
ANTH 5402 [0.5]	Theories and Methods II
4. 1.5 credits in electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.5
5. 2.0 credits in:	2.0
ANTH 5909 [2.0]	M.A. Thesis (on an approved topic with significant content related to Latin American and Caribbean Studies.)

Total Credits 5.0

Requirements - Research essay pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in:	1.0
ANTH 5401 [0.5]	Theories and Methods I
ANTH 5402 [0.5]	Theories and Methods II
4. 2.5 credits in electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	2.5
5. 1.0 credit in:	1.0
ANTH 5908 [1.0]	M.A. Research Essay (on an approved topic with significant content related to Latin American and Caribbean Studies)

Total Credits 5.0

Requirements - Coursework pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in:	1.0
ANTH 5401 [0.5]	Theories and Methods I
ANTH 5402 [0.5]	Theories and Methods II
4. 0.5 credit from:	0.5
ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5208 [0.5]	Anthropology of Indigeneity
ANTH 5210 [0.5]	Special Topics in Indigenous Studies
ANTH 5355 [0.5]	Anthropology of Natural Resources

ANTH 5560 [0.5]	Economic Anthropology	
ANTH 5570 [0.5]	Political Anthropology	
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment	
5. 3.0 credits in electives including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies.		3.0

Total Credits 5.0

M.A. Anthropology with Specialization in African Studies (5.0 credits)

Requirements - Thesis option (5.0 credits):

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I
4. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
5. 1.5 credits in electives (see Note, below)	1.5
6. 2.0 credits in:	2.0
ANTH 5909 [2.0]	M.A. Thesis

Total Credits 5.0

Requirements - Research Essay option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I
4. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
5. 2.5 credits in electives (see Note, below)	2.5
6. 1.0 credit in:	1.0
ANTH 5908 [1.0]	M.A. Research Essay

Total Credits 5.0

Requirements - Coursework option(5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I
(Normally to be taken in the first fall term after admission to the program.)	
4. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II

5. 0.5 credit from:	0.5
ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
- or an approved course in ANTH or SOCI approved by the Graduate Coordinator of the Institute of African Studies	

6. 3.0 credits in electives, including 0.5 credit in a course designated as having sufficient African Studies content **3.0**

Total Credits **5.0**

Selection of Courses - African Studies

The courses listed below are relevant to students of African Studies and could, with the approval of the specific requirements of the units involved, be used as courses to help fulfil degree requirements. There are also often graduate courses and 4000-level courses in a number of units at Carleton that are offered on an ad hoc basis that have significant content appropriate to African Studies. To have any such course count towards their degree requires approval of the Director of the Institute of African Studies when it is being offered.

African Studies

AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
AFRI 5050 [0.5]	Selected Topics in African Studies
AFRI 5100 [0.5]	African Studies Abroad
AFRI 5700 [0.5]	Directed Readings in African Studies
AFRI 5900 [0.5]	Placement
AFRI 5800 [0.0]	Scholarly Preparation in African Studies

Anthropology

ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment

English

ENGL 5008 [0.5]	Studies in African Literature
ENGL 5010 [0.5]	Studies in Caribbean Literature

French

FREN 5212 [0.5]	Littératures francophones
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International Affairs

INAF 5603 [0.5]	Issues in Development in Africa
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Law

LAWS 5007 [0.5]	Race, Ethnicity and the Law
LAWS 5603 [0.5]	International Law: Theory and Practice

Political Science

PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5203 [0.5]	Southern Africa After Apartheid

Sociology

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
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Women's and Gender Studies

WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II
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M.A. Anthropology with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I
2. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
3. 1.0 credit in electives	1.0
4. 2.0 credits in:	2.0
ANTH 5909 [2.0]	M.A. Thesis
5. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
6. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually-listed DIGH course)	0.5
7. 0.0 credit in:	0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development

Total Credits **5.0**

Requirements - Research Essay program (5.0 credits)

1. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I (normally to be taken in the first fall term after admission to the program)
2. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
3. 2.0 credits in electives	2.0
4. 1.0 credit in:	1.0
ANTH 5908 [1.0]	M.A. Research Essay
5. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
6. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
7. 0.0 credit in DIGH 5800	0.0

Total Credits **5.0**

Requirements - Coursework program (5.0 credits)

1. 0.5 credit in:	0.5
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ANTH 5401 [0.5]	Theories and Methods I (normally to be taken in the first fall term after admission to the program)	
2. 0.5 credit in:		0.5
ANTH 5402 [0.5]	Theories and Methods II	
3. 2.5 credits in	electives	2.5
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	DIGH (DIGH 5011, DIGH 5012, or annually-listed DIGH course)	0.5
6. 0.5 credit in	5000-level ANTH course with a digital humanities focus	0.5
7. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
Total Credits		5.0

Ph.D. Anthropology (3.0 credits)

Requirements:

1. 1.0 credit in:		1.0
ANTH 6000 [1.0]	Doctoral Seminar: Theory and Method in Contemporary Anthropology	
2. 0.5 credit in:		0.5
ANTH 6002 [0.5]	Research Design	
Two terms satisfactory participation in:		0.0
ANTH 6100 [0.0]	Thesis Writing Seminar	
3. 1.5 credits in	SOCI or ANTH courses at the 5000- or 6000-level or, with the permission of the graduate supervisor, up to 1.0 credit of graduate level courses from another unit at Carleton	1.5
4. A satisfactory research preparation portfolio		
5. A satisfactory thesis proposal and (when required) Research Ethics Board clearance to undertake thesis research		
6. Satisfactory thesis research		
7. 0.0 credit in:		0.0
ANTH 6909 [0.0]	Ph.D. Thesis (including successful oral defence)	
Total Credits		3.0

Residence requirements: Ph.D. candidates must normally be registered full-time in a minimum of six terms to satisfy the residence requirement. If a candidate is registered part-time the minimum residence requirement is eight terms.

Ph.D. Anthropology with Specialization in Political Economy (3.0 credits)

Requirements:

1. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
2. 0.5 credit in	relevant political economy course from the approved list	0.5
3. 1.0 credit in:		1.0
ANTH 6000 [1.0]	Doctoral Seminar: Theory and Method in Contemporary Anthropology	
4. 0.5 credit in:		0.5
ANTH 6002 [0.5]	Research Design	

ANTH 6100 [0.0]	Thesis Writing Seminar	
5. 0.0 credit in	(two terms satisfactory participation in):	0.0
ANTH 6100 [0.0]	Thesis Writing Seminar	
3. 0.5 credits in	SOCI or ANTH courses at the 5000 or 6000 level.	0.5
4. A satisfactory research preparation portfolio		
5. A satisfactory thesis proposal and (when required) Research Ethics Board clearance to undertake thesis research		
6. Satisfactory thesis research		
7. 0.0 credit in:		0.0
ANTH 6909 [0.0]	Ph.D. Thesis (including successful oral defence)	
Total Credits		3.0

Regulations

See the General Regulations section of this Calendar.

Minimum Grade Requirement

A grade of B- or better is required in each credit counted toward the master's degree. With the recommendation of the department, and permission of the Dean of the Faculty of Graduate and Postdoctoral Affairs, a candidate may be allowed a grade of C+ in 1.0 credit or each of two 0.5-credits.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.A. Anthropology is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Transfer from One M.A. Option to Another M.A. Option

Students who choose to change from one program option to another (i.e., from/to the thesis, research essay, or course work option), are required to do so before registering for a third term after initial, full-time registration, or before registering for a fifth term after initial part-time registration.

Regulations

See the General Regulations section of this Calendar.

Candidates must obtain a grade of B- or higher in each course and Satisfactory on the Ph.D. thesis and its oral defence.

Admission

M.A. Anthropology

The requirement for admission into the master's program is a B.A. Honours (or the equivalent) with at least high honours standing in anthropology or a closely-related field. Where relevant, previous professional experience will be taken into account in determining an applicant's standing on admission.

Qualifying-Year Program

Applicants with general (three-year) bachelor's degrees may be admitted into a qualifying-year program designed to raise their standing to honours status. Students earning at least high honours standing in their qualifying-year courses will be considered for admission into the master's program. Refer to the General Regulations section of

this Calendar for details of the regulations governing the qualifying year.

Accelerated Pathway

The accelerated pathway in Anthropology is a flexible and individualized plan of graduate study for students in their final year of a Carleton B.A. Honours degree in Anthropology.

Students in their third or early#fourth year of study in the B.A. Honours degree in Anthropology should consult with the Graduate Co-ordinator to determine if the accelerated pathway is appropriate for them.

Accelerated Pathway Requirements

1. ANTH courses at the 5000#level or higher with a grade of A- or higher, excluding ANTH 5900.
2. Minimum GPA in Anthropology of A-

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion for the M.A. degree. The final decision on whether or not advanced standing will be granted will be made at the time of admission. Students should indicate the desire to be considered for advanced standing in their application for admission to the M.A.

Admission

Ph.D. Anthropology

The Ph.D. Anthropology normally will be undertaken on a full-time basis, however the department will consider admission on a part-time basis. Full-time students are expected to complete the program in four years, and part-time students are expected to complete the program in eight years.

The normal requirement for admission to the Ph.D. program is a master's degree (or equivalent) in anthropology, normally with a minimum average of A-, and with no grade below B.

A student already enrolled in the Carleton M.A. program in Anthropology who shows outstanding academic performance and research promise may be permitted to transfer to the Ph.D. program upon completion of the M.A. course work and upon the recommendation of the Anthropology graduate committee.

Applicants whose academic preparation has deficiencies in certain areas may be admitted to the Ph.D. program, but will normally be required to complete additional course work.

Applicants whose first language is not English must demonstrate a fluent knowledge of English. Please see sections 3.6 in the General Regulations section of this calendar.

Anthropology (ANTH) Courses

ANTH 5004 [0.5 credit]

Ecological Anthropology

Theoretical and ethnographic approaches to the production of nature across disciplinary categories and natural-cultural configurations. Specific topics considered may include ecological crisis, indigenous rights and posthuman ethnography.

ANTH 5005 [0.5 credit]

Visual Anthropology as a Research Method: Dilemmas and Debates

Anthropological theories, debates, and dilemmas related to visual anthropology as part of ethnographic practice in historical and contemporary contexts. Topics may include ethics, analysis of images, film, symbols; the use of visual materials in ethnographic writing.

ANTH 5106 [0.5 credit]

North American Indigenous Peoples

Selected issues in North American Indian, Inuit, and Métis ethnographic studies. Debates over social change, cultural autonomy, native rights, and government policy.

ANTH 5107 [0.5 credit]

Issues in North American Ethnohistory

Methodological and substantive problems in the history of North American indigenous peoples. Controversies concerning the impact of European penetration and colonial policies on inter-tribal relations, cultural identity, and other aspects of native life.

ANTH 5109 [0.5 credit]

Ethnography, Gender and Globalization

Intersections of gender and globalization; ethnographic focus on how the movements of people, goods, ideas, and capital are transforming existing formations of gender and sexualities. Topics and approaches may vary from year to year.

Also offered at the undergraduate level, with different requirements, as ANTH 4109, for which additional credit is precluded.

ANTH 5202 [0.5 credit]

The Anthropology of Underdevelopment

Analysis of theoretical and historically concrete issues in the study of variable economic systems ranging from domestic subsistence and peasant production to slavery and capital-dominated markets.

ANTH 5208 [0.5 credit]

Anthropology of Indigeneity

An international exploration of what it means to claim indigeness within a variety of contexts. The cultural politics of indigenous status in relation to such issues as primitivism, memory and revivalism in modern nation-states and diasporic communities.

ANTH 5209 [0.5 credit]

Special Topics in the Anthropology of Africa

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5210 [0.5 credit]**Special Topics in Indigenous Studies**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5305 [0.5 credit]**Special Topics in Ethnography**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5355 [0.5 credit]**Anthropology of Natural Resources**

Anthropology of natural resources. Topics may include the economies, ecologies, cultural and social dynamics of fishing, forestry, lands, mining, oil, wildlife, at varying analytical scales, including a critical examination of the term "natural resource" itself.

Also offered at the undergraduate level, with different requirements, as ANTH 4355, for which additional credit is precluded.

Seminar and discussion three hours per week.

ANTH 5401 [0.5 credit]**Theories and Methods I**

Theoretical and methodological debates in contemporary anthropology.

ANTH 5402 [0.5 credit]**Theories and Methods II**

Theoretical and methodological debates in contemporary anthropology.

Prerequisite(s): ANTH 5401 or permission of the Department.

ANTH 5403 [0.5 credit]**Interpreting Symbols**

Theoretical and methodological approaches to the anthropology of signs and symbols, including the internal workings of symbolic systems, and their relationship to other aspects of social life.

ANTH 5501 [0.5 credit]**Phenomenology for Anthropologists and Sociologists**

This seminar builds theoretical and methodological bridges between phenomenology and anthropology/sociology. Students read key texts from, among others, Husserl, Heidegger, Merleau-Ponty, Plessner, Schultz, and Waldenfels and learn to apply concepts in research. Topics include body and senses, intersubjectivity and life-world, selfhood and otherness.

Also listed as SOCI 5501.
seminar

ANTH 5505 [0.5 credit]**Anthropology of Performance**

The seminar introduces students to the anthropological concept of performance and its foundations in speech act theory, practice theory, semiotics and phenomenology. Topics range from the cross-cultural study of diverse performance genres to reflections on the performative nature of social life and cultural reality.

ANTH 5560 [0.5 credit]**Economic Anthropology**

Anthropology's holistic, comparative and critical contribution to the study of livelihood. How practices and understandings of production, circulation, consumption, and property vary cross-culturally. Relevant theoretical debates including those among formalist (neo-classical), substantivist, Marxist, and interpretive approaches over the applicability of capitalist thinking.

Also offered at the undergraduate level, with different requirements, as ANTH 4560, for which additional credit is precluded.

Seminar three hours a week.

ANTH 5570 [0.5 credit]**Political Anthropology**

Can anthropology help us understand politics? Can ethnographic encounters help us approach political theory and political action differently? This seminar will focus on concepts (power, authority, equality) and practices (resistance, subjection, solidarity) through which anthropologists invite us to rethink the way we live together.

Also offered at the undergraduate level, with different requirements, as ANTH 4570, for which additional credit is precluded.

ANTH 5701 [0.5 credit]**Anthropology of Religion**

Anthropological literature and theories on religion in light of current debates in anthropology.

ANTH 5704 [0.5 credit]**Anthropology of the Body, Health, Illness and Healing**

Issues and applications in medical anthropology. Topics may include the sociocultural meanings inscribed on the body; cultural perceptions of the prevention, causes and treatment of illness; social dimensions of the illness experience; and the political economy of health.

ANTH 5706 [0.5 credit]**Contemporary Material Cultures**

The study of material culture and its potential for addressing contemporary social and cultural conditions in a variety of local and transcultural contexts.

ANTH 5708 [0.5 credit]**Special Topics in Anthropology**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5807 [0.5 credit]**Special Topics in Symbolism and Culture**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5808 [0.5 credit]**Selected Topics in North American Native Studies**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

ANTH 5809 [0.5 credit]**Selected Topics in the Anthropology of Development and Underdevelopment**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

ANTH 5812 [0.5 credit]**Research Design**

Design and methods of anthropological enquiry.

Includes: Experiential Learning Activity

ANTH 5900 [0.5 credit]**Tutorial****ANTH 5906 [0.5 credit]****Fieldwork**

Directed field research.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ANTH 5907 [0.5 credit]**Placement in Anthropology**

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in museums, government departments, non-governmental organizations, or other professional research settings. Placement research must be related to the preparation of the master's thesis.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ANTH 5908 [1.0 credit]**M.A. Research Essay**

Students will normally enrol in this course for a maximum of three consecutive terms of study, including one summer term. Students must normally enrol in this course not later than the beginning of the second full year of study.

Includes: Experiential Learning Activity

ANTH 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

ANTH 6000 [1.0 credit]**Doctoral Seminar: Theory and Method in Contemporary Anthropology**

An in-depth exploration of theory and method in contemporary socio-cultural anthropology with special emphasis on engaged anthropology. This course is required of all first year doctoral students in anthropology.

ANTH 6001 [0.5 credit]**Selected Topics in Anthropology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

ANTH 6002 [0.5 credit]**Research Design**

Issues in the design and methods of anthropological inquiry, including proposal-writing, research ethics, and research funding. Required of all first-year Ph.D. Anthropology students.

Includes: Experiential Learning Activity

ANTH 6100 [0.0 credit]**Thesis Writing Seminar**

This seminar will meet on a regular basis for students who are writing their doctoral theses to present draft chapters for constructive critical discussion. Normally required for all Ph.D. Anthropology students who have completed their doctoral research, until the completion of their theses.

ANTH 6900 [0.5 credit]**Tutorial**

A tutorial is designed to permit students to pursue individual research on a relevant topic. Topics will be chosen in consultation with at least one faculty member, the student's supervisor, and the Anthropology graduate coordinator.

ANTH 6907 [0.5 credit]**Placement in Anthropology**

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in museums, government departments, nongovernmental organizations, or other professional research settings. Placement research must be related to the preparation of the doctoral research.

Includes: Experiential Learning Activity

ANTH 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Applied Linguistics and Discourse Studies

This section presents the requirements for programs in:

- M.A. Applied Linguistics and Discourse Studies
- M.A. Applied Linguistics and Discourse Studies with Specialization in African Studies
- M.A. Applied Linguistics with Specialization in Digital Humanities
- Ph.D. Applied Linguistics and Discourse Studies

Program Requirements**M.A. Applied Linguistics and Discourse Studies (5.0 credits)**

Students will establish their programs in consultation with the School's supervisor of graduate studies. Each candidate will select one of the following program paths:

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in:		1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies	
2. 1.0 credit in ALDS at the 5000 level		1.0
3. 1.0 credit in ALDS or LING at the 5000 level		1.0
4. 2.0 credits in:		2.0
ALDS 5909 [2.0]	M.A. Thesis	

Total Credits **5.0**

Requirements - Research Essay pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies
2. 2.0 credits in ALDS at the 5000 level	2.0
3. 1.0 credit in ALDS or LING at the 5000 level	1.0
4. 1.0 credit in:	1.0
ALDS 5908 [1.0]	Research Essay
Total Credits	5.0

Requirements - Coursework pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies
2. 3.0 credits in ALDS at the 5000 level	3.0
3. 1.0 credit in ALDS or LING at the 5000 level	1.0
Total Credits	5.0

The choice of thesis, research essay, or credit program path will be made by the student, with the advice of the Supervisor. Relevant factors will include the student's academic goals, professional goals, and background knowledge.

ALDS 5001 is normally to be taken in the first fall term after admission to the program.

Permission may be granted for enrollment in 1.0 credit offered in another department.

Graduate students may take courses at the senior undergraduate (4th year) level up to a maximum of 1.0 credit. Permission of the School's graduate supervisor is required. Students may take a combination of senior undergraduate courses and 'piggybacked' courses (fourth-year courses also offered, with different requirements, at the graduate level) up to a maximum of 1.5 credits.

It is expected that students will progress steadily towards the completion of requirements for the degree. In particular, it is normally expected that:

- a full-time student will complete 3.0 credits of course work within two terms of study, and an acceptable thesis proposal early in the third term of study; or 4.0 credits of course work within three terms, and an acceptable research essay proposal early in the fourth term; and all degree requirements within six terms of study.
- a part-time student will complete 3.0 credits of course work within three years of initial registration, and an acceptable thesis proposal early in the fourth year; or 4.0 credits of course work within four years, and an acceptable research essay proposal early in the fifth year; and all degree requirements within six years of initial registration.
- a student who registers in a combination of full-time and part-time study will, in consultation with an adviser, develop a schedule for completion of course requirements and a thesis or research essay proposal,

consistent with times to completion stated above and with the overall time limits specified in the General Regulations section in this Calendar.

M.A. Applied Linguistics and Discourse Studies with Specialization in African Studies (5.0 credits)**Requirements - Thesis pathway (5.0 credits)**

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 1.0 credit in:	1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies
4. 1.5 credits from any 5000-level ALDS course (in consultation with their advisor, students may take up to 1.0 credit in graduate courses from other programs at Carleton University or the University of Ottawa; up to 1.0 credit can be taken at the 4000 level; up to 1.5 credits can be taken in piggybacked courses)	1.5
5. 2.0 credits in:	2.0
ALDS 5909 [2.0]	M.A. Thesis
Total Credits	5.0

Requirements - Research Essay pathway (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 1.0 credit in:	1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies
4. 2.5 credits from any 5000-level ALDS course (in consultation with their advisor, students may take up to 1.0 credit in graduate courses from other programs at Carleton University or the University of Ottawa; up to 1.0 credit can be taken at the 4000 level; up to 1.5 credits can be taken in piggybacked courses)	2.5
5. 1.0 credit in:	1.0
ALDS 5908 [1.0]	Research Essay
Total Credits	5.0

M.A. Applied Linguistics with Specialization in Digital Humanities (5.0 credits)**Requirements - Thesis pathway (5.0 credits)**

1. 1.0 credit in:	1.0
ALDS 5001 [0.5]	Directions in Applied Linguistics and Discourse Studies
ALDS 5002 [0.5]	Inquiry Strategies in Applied Linguistics and Discourse Studies
2. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities

3. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
4. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
5. 1.0 credit from any 5000-level ALDS course	1.0
6. 2.0 credits in:	2.0
ALDS 5909 [2.0] M.A. Thesis	
Total Credits	5.0

Requirements - Research Essay pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5] Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5] Inquiry Strategies in Applied Linguistics and Discourse Studies	
2. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
3. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
4. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
5. 2.0 credits from any 5000-level ALDS course	2.0
6. 1.0 credit in:	1.0
ALDS 5908 [1.0] Research Essay	
Total Credits	5.0

Requirements - Coursework pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5] Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5] Inquiry Strategies in Applied Linguistics and Discourse Studies	
2. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
3. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
4. 0.5 credit in 5000-level ALDS with Digital Humanities focus or a DIGH course, chosen in consultation with the SLALS graduate supervisor	0.5
5. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
6. 2.5 credits from any 5000-level ALDS course	2.5
Total Credits	5.0

Ph.D. Applied Linguistics and Discourse Studies (5.0 credits)

Requirements (5.0 credits):

1. 1.0 credit in:	1.0
ALDS 6101 [0.5] Doctoral Core Seminar in Applied Linguistics and Discourse Studies, Part I	
ALDS 6102 [0.5] Doctoral Core Seminar in Applied Linguistics and Discourse Studies, Part II	
2. 1.0 credit in elective courses	1.0
3. 1.0 credit in:	1.0

ALDS 6200 [1.0] Praxis in Applied Linguistics and Discourse Studies	
or	
ALDS 6211 [0.5] Praxis in Applied Linguistics and Discourse Studies I	
& ALDS 6212 [0.5] Praxis in Applied Linguistics and Discourse Studies II	
4. 0.5 credit in:	0.5
ALDS 6300 [0.5] Interpretive Analysis in Applied Linguistics and Discourse Studies	
5. 0.5 credit in:	0.5
ALDS 6109 [0.5] Doctoral Project I: Literature Review	
6. 0.5 credit in:	0.5
ALDS 6209 [0.5] Doctoral Project II: Thesis Proposal	
7. 0.5 credit in:	0.5
ALDS 6309 [0.5] Doctoral Project III: Research Progress Report	
8. 0.0 credits in:	0.0
ALDS 6909 [0.0] Ph.D. Thesis	
Total Credits	5.0

Regulations

See the General Regulations section of this Calendar.

A standing of B- or better must be obtained in each credit counted towards the master's degree.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.A. Applied Linguistics and Discourse Studies including all specializations/concentrations is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Regulations

See the General Regulations section of this Calendar, and in addition the following:

- Candidates must maintain a grade point average of 10.0 or better throughout this program.

Residence Requirement

Ph.D. candidates must normally be registered full-time in a minimum of six terms to satisfy the residence requirement. If a candidate is registered part-time, the minimum residence requirement is eight terms.

Guidelines for Completion of Ph.D.

Full-time Ph.D. students are normally expected to complete their requirements in four calendar years. All part-time students must complete their requirements within a period of nine years, as set out in the General Regulations in the Graduate Calendar.

Admission

The normal minimum requirement for admission to the master's program is a B.A. Honours degree in a discipline involving the analysis of language or the study of language use or learning; or a 3 year B.A. in a relevant discipline together with a B.Ed. or C.T.E.S.L.

Students must have achieved a minimum of B+ in related courses and B overall in their academic work.

Relevant professional experience may also enhance a candidate's application.

For other admission regulations not specific to the School of Linguistics and Language Studies, refer to the General Regulations section of the Graduate Calendar, in particular the subsection on Admission Requirements and Eligibility.

Accelerated Pathway

The accelerated pathway in the School of Linguistics and Language Studies is a flexible and individualized plan of graduate study for students in their final year of a Carleton B.A. Honours degree, or equivalent, may qualify for this option.

Students in their third-year of study in the B.A. Honours degree in Applied Linguistics and Discourse Studies should consult with both the Undergraduate Advisor and the Graduate Advisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses and Honours project supervisor for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. Two ALDS courses at the 5000 level (excluding ALDS 5001 and ALDS 5002).
2. Minimal overall CGPA of B+

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission

The normal requirement for admission to the Ph.D. program is a Master's Degree in Applied Language Studies, Applied Linguistics, Teaching English as a Second Language, Composition and Rhetoric, or an acceptable equivalent field, with at least an A- average (10 G.P.A.).

Applicants whose academic preparation has deficiencies in certain areas may be admitted to the Ph.D. program with the requirement that they take additional courses.

In addition to transcripts and letters of reference, applications will include a statement of interest outlining the applicant's proposed area of doctoral research and a representative sample of the applicant's academic writing.

Applied Linguistics and Discourse Studies (ALDS) Courses

ALDS 5001 [0.5 credit]

Directions in Applied Linguistics and Discourse Studies

A survey of current research directions in Applied Linguistics and Discourse Studies and an introduction to ongoing research in the School. The course introduces students to the scope of theory and practice in the field.

ALDS 5002 [0.5 credit]

Inquiry Strategies in Applied Linguistics and Discourse Studies

A consideration of various approaches to the design of studies and the collection and analysis of data. Naturalistic and quasi-experimental methods will be discussed. The role of statistics in disciplined inquiry, including an introduction to elementary procedures.

ALDS 5005 [0.5 credit]

Theoretical Foundations for Applied Linguistics and Discourse Studies

Overview of the works of 20th and 21st-century theorists such as Bakhtin, Bourdieu, Burke, Foucault, Latour and Vygotsky.

ALDS 5102 [0.5 credit]

Systemic-Functional Linguistics

Functions of language in the exchange of meanings between people in a wide variety of communicative situations. Semantic and syntactic resources at risk in these different contexts. Interactions between language and the social context.

Prerequisite(s): restricted to graduate students in Applied Linguistics and Discourse Studies and Journalism and Communication.

Also offered at the undergraduate level, with different requirements, as ALDS 4709, for which additional credit is precluded.

ALDS 5202 [0.5 credit]

Curriculum in Language Teaching

Current theory and practice in language curriculum development and evaluation in the light of recent research in linguistics, sociolinguistics, language acquisition and language education policy.

Includes: Experiential Learning Activity

ALDS 5203 [0.5 credit]

Issues in English Language Teaching/Teacher Education

A research seminar to explore current issues in English language teaching/teacher education.

ALDS 5204 [0.5 credit]

Seminar in University Teaching

Theoretical and empirical work related to teaching in higher education. Analysis of instructional discourse, use of language in classroom decision-making, bases of effective practice and methods of instruction. Constructivist principles of teaching and learning. Role of teaching in university scholarship.

Also listed as PSYC 6104.

ALDS 5207 [0.5 credit]

Pedagogical Grammar in Second and Foreign Language (SL/FL) Teaching

The concept of pedagogical grammar in SL/FL teaching. Critical examination of recent theories of 'focus on form' in communicative language classrooms, and related empirical work.

Includes: Experiential Learning Activity

ALDS 5208 [0.5 credit]**Languages for Specific Purposes (LSP)**

Introduction to LSP, a sub-field of applied linguistics tailoring language instruction to specific groups of learners. Developments in strands of LSP (English for Science, Business, etc.). Research and teaching methodology. Emphasis on English for Academic Purposes/English for Specific Purposes research and instruction at Carleton.

Also offered at the undergraduate level, with different requirements, as ALDS 4208, for which additional credit is precluded.

ALDS 5215 [1.0 credit]**Methodology and Practicum in Teaching English as a Second Language**

Classification of classroom teaching methods and materials; creation and adaptation of teaching materials for particular situations; teaching techniques and strategies. The required practicum portion of the course integrates academics with practical work. Observation in ESL classes and possible assistance with teaching materials or classes.

Includes: Experiential Learning Activity

Precludes additional credit for ALDS 5205 (no longer offered), ALDS 5806 (no longer offered).

ALDS 5301 [0.5 credit]**Language and Cognition**

Structure and representation of linguistic knowledge in human cognition. Evidence from child language acquisition, language processing and language impairment.

Includes: Experiential Learning Activity

Also listed as CGSC 5003 and LING 5608.

ALDS 5302 [0.5 credit]**Second Language Acquisition and Learning Theories**

Current social and cognitive theories of knowledge and learning and their application to the acquisition of first and additional languages; relation of theory to empirical studies of language learning in classroom and natural settings.

Includes: Experiential Learning Activity

ALDS 5303 [0.5 credit]**Linguistic Analysis, Culture and Cognition**

Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

Includes: Experiential Learning Activity

ALDS 5407 [0.5 credit]**Language Policy and Planning**

Interaction of political, social, and cultural factors in the planning and implementation of language policy in international contexts.

Prerequisite(s): fourth-year courses in linguistics or permission of the School.

ALDS 5408 [0.5 credit]**Critical Discourse Analysis**

Discourse in the structuring of social and cultural change and in a wide range of contexts such as the media and education.

Includes: Experiential Learning Activity

ALDS 5501 [0.5 credit]**Language Testing and Assessment**

Issues in language testing and classroom assessment, including validity theory and current validation research; challenges in test development; washback; models of alternative assessment.

Includes: Experiential Learning Activity

ALDS 5604 [0.5 credit]**Statistics for Language Research**

Application of statistical procedures to analysis of language data and to problems of measurement in experimental linguistics, applied linguistics, psycholinguistics, and related fields.

Includes: Experiential Learning Activity

Also listed as LING 5606.

Also offered at the undergraduate level, with different requirements, as ALDS 4606 and LING 4606., for which additional credit is precluded.

ALDS 5605 [0.5 credit]**Research and Theory in Workplace Writing**

Developments in the study of workplace writing from the 1970s, with a focus on recent work. Discussion of how writing is used in accomplishing work, what constitutes proficiency in workplace writing, and how novices learn to write in the workplace.

Includes: Experiential Learning Activity

ALDS 5607 [0.5 credit]**Research and Theory in Academic Writing**

Major developments in the study of academic writing from the 1970s, with a focus on recent work. Discussion of what academic writing entails, what constitutes proficiency in academic writing, and how instruction can help students develop their writing abilities.

Includes: Experiential Learning Activity

ALDS 5703 [0.5 credit]**Approaches to Genre Studies**

Major developments in the study of non-literary genres from the 1980s, with a focus on recent work. Consideration of genre as text-based social action. Discussion of genre as a central concept and tool of analysis in Writing Studies and Discourse Studies.

Includes: Experiential Learning Activity

ALDS 5705 [0.5 credit]**Second Language Writing: Research and Theory**

Second language writing: research, theory, and pedagogy.

ALDS 5801 [0.5 credit]**Linguistic Field Methods**

With a language consultant, students discover the phonological, morphological, and syntactic structures of the target language using linguistic elicitation. Language will vary from year to year, but will normally be a non-European language. Language documentation, data management, ethical issues surrounding research in indigenous communities.

Includes: Experiential Learning Activity

Also listed as LING 5801.

Also offered at the undergraduate level, with different requirements, as LING 4801, for which additional credit is precluded.

Lectures three hours a week.

ALDS 5902 [0.5 credit]**Tutorial in Applied Linguistics and Discourse Studies**

A one-term tutorial to study applications of linguistics in such areas as first-language education and second-language teaching.

ALDS 5903 [0.5 credit]**Special Topics in the Teaching and Acquisition of Additional Languages**

Exploration of topics from current research into the teaching and acquisition of additional languages. Topic to be announced.

ALDS 5904 [0.5 credit]**Special Topics in Written Discourse/Literacies**

Exploration of topics from current research into the nature, acquisition and teaching of written discourse/literacies.

Topic to be announced.

ALDS 5905 [0.5 credit]**Special Topics in Applied Linguistics and Discourse Studies**

Exploration of a topic from current research in Applied Linguistics and Discourse Studies. Topic to be announced.

ALDS 5907 [1.0 credit]**Tutorial in Applied Linguistics and Discourse Studies**

A two-term tutorial to study applications of linguistics in such areas as first-language education and second-language teaching.

ALDS 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

ALDS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

ALDS 6101 [0.5 credit]**Doctoral Core Seminar in Applied Linguistics and Discourse Studies, Part I**

Detailed examination of foundational texts, current theories, and research methodologies in Applied Linguistics and Discourse Studies.

Includes: Experiential Learning Activity

ALDS 6102 [0.5 credit]**Doctoral Core Seminar in Applied Linguistics and Discourse Studies, Part II**

Detailed examination of foundational texts, current theories, and research methodologies in Applied Linguistics and Discourse Studies.

Includes: Experiential Learning Activity

Prerequisite(s): ALDS 6101.

ALDS 6105 [0.5 credit]**Directed Readings in Applied Linguistics and Discourse Studies**

Research on a topic chosen in consultation with a faculty member and with the approval of the graduate supervisor.

ALDS 6109 [0.5 credit]**Doctoral Project I: Literature Review**

The production, oral presentation and written submission of a synthesis of a prescribed body of theory and research underlying the fields of Applied Linguistics and Discourse Studies.

Prerequisite(s): ALDS 6102.

ALDS 6200 [1.0 credit]**Praxis in Applied Linguistics and Discourse Studies**

Field placement in an educational, workplace or community setting with guided reflective, theory-informed analysis of the field experience.

Includes: Experiential Learning Activity

Precludes additional credit for ALDS 6201 (No longer offered), ALDS 6202 (No longer offered), ALDS 6211, ALDS 6212.

ALDS 6209 [0.5 credit]**Doctoral Project II: Thesis Proposal**

The production, public presentation, written submission, and defence of a proposal for the student's thesis research.

ALDS 6211 [0.5 credit]**Praxis in Applied Linguistics and Discourse Studies I**

Field placement in an educational, workplace or community setting with guided reflective, theory-informed analysis of the field experience.

Includes: Experiential Learning Activity

Precludes additional credit for ALDS 6200, ALDS 6201 (no longer offered), ALDS 6202 (no longer offered).

ALDS 6212 [0.5 credit]**Praxis in Applied Linguistics and Discourse Studies II**

Field placement in an educational, workplace or community setting with guided reflective, theory-informed analysis of the field experience.

Includes: Experiential Learning Activity

Precludes additional credit for ALDS 6200, ALDS 6201 (no longer offered), ALDS 6202 (no longer offered).

ALDS 6300 [0.5 credit]**Interpretive Analysis in Applied Linguistics and Discourse Studies**

Analysis of research data and presentation of results. Emphasis on students' own data collection and analysis process. Qualitative, quantitative, and/or mixed methods will be emphasized, depending on the student's research. Graded Sat/Uns.

Precludes additional credit for ALDS 6301.

Tutorial.

ALDS 6309 [0.5 credit]**Doctoral Project III: Research Progress Report**

A written progress report on the student's thesis research, which, in consultation with the thesis supervisor, can consist of a research article prepared for publication, a conference-based paper, or another format deemed of relevance to the student's doctoral research.

ALDS 6407 [0.5 credit]**Revitalization Policy**

The core PhD seminar in Revitalization Policy. Topics include the detailed examination of foundational texts, current theories, research methodologies, and best practices in language revitalization. Includes significant focus on interactions with language communities, field methods, and related ethics.

ALDS 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Architecture

This section presents the requirements for programs in:

- M. Architectural Studies
- M. Architecture 2-year stream
- M. Architecture 3-year stream
- Ph.D. Architecture
- Graduate Diploma in Architectural Conservation

Program Requirements**M. Architectural Studies (6.0 credits)****General Requirements:**

1. 3.5 credits in core courses	3.5
2. 0.5 credit in elective course credit	0.5
3. 2.0 credits in thesis, which must be defended at an oral examination	2.0

Total Credits **6.0**

Specific Requirements:**Year 1****Fall Term**

ARCH 5301 [0.5]	Seminar: Vitruvian Exercises I
ARCN 5301 [0.5]	Workshop: Daedalic Exercises I
ARCH 5101 [1.0]	Colloquium I (over two terms)

Winter Term

ARCH 5302 [0.5]	Seminar II: Vitruvian Exercises II
ARCN 5302 [0.5]	Workshop: Daedalic Exercises II

ARCH 5101 [1.0]	Colloquium I (continued from Fall Term)
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Year 2**Fall Term**

ARCH 5003 [0.5]	Design and Culture Workshop
ARCT 5909 [2.0]	M.A.S. Thesis ¹

Winter Term

ARCT 5909 [2.0]	M.A.S. Thesis ¹
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0.5 credit in elective from courses at the 5000-level or above, approved by the Associate Director (Graduate Programs)

¹ ARCT 5909 [2.0] normally extends over two terms.

M. Architecture 2-year stream (8.0 credits)**General Requirements (8.0 credits):**

1. 2.0 credits in core courses	2.0
2. 1.0 credit in elective courses	1.0
3. 3.0 credits in studio courses	3.0
4. 2.0 credits in Thesis, which must be defended at an oral examination	2.0

Total Credits **8.0**

Specific Requirements:**Year 1****Fall Term**

ARCH 5200 [0.5]	Graduate Seminar 1: Introduction to Critical Thought in Architecture
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ARCC 5100 [0.5]	Advanced Building Systems
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ARCS 5105 [1.5]	Graduate Studio 1
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ARCC 5200 [0.5] or 0.5 credit elective, if ARCC 5200 is not taken at this time, from courses at the 5000 level or above, approved by the Associate Director (Graduate Programs)

Winter Term

ARCH 5201 [0.5]	Graduate Seminar 2: Contemporary Theoretical Perspectives in Architecture
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ARCS 5106 [1.5]	Graduate Studio 2
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0.5 credit in elective from courses at the 5000 level or above, approved by the Associate Director (Graduate Programs)

Year 2**Fall Term**

ARCS 5909 [2.0]	Thesis - Independent Study (See Note 1, below)
	or ARCN 5909 [2] Thesis - Directed Research Studio (DRS)

ARCC 5200 or 0.5 credit elective from courses at the 5000 level or above, approved by the Associate Director (Graduate Programs)

Winter Term

ARCS 5909 [2.0]	Thesis - Independent Study (See Note 1, below)
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or ARCN 5909 [2.0] Thesis - Directed Research Studio (DRS)

0.5 credit in elective from courses at the 5000 level or above, approved by the Associate Director (Graduate Programs)

M. Architecture 3-year stream (15.5 credits)**General Requirements (15.5 credits) - Program Core Curriculum**

1. 6.0 credits in core courses	6.0
2. 7.5 credits in studio courses	7.5
3. 2.0 credits in:	2.0
ARCN 5909 [2.0] Thesis - Directed Research Studio (DRS) (which must be defended at an oral examination)	

Total Credits **15.5**

Year 1

Fall Term **3.5**

ARCS 5031 [2.0]	M.Arch. 1 - Studio I
ARCC 5096 [0.5]	Building Technology I
ARCH 5010 [0.5]	History and Theory of Modern Architecture
ARCN 5005 [0.5]	Theory and Practice of Architectural Representation

Winter Term **3.0**

ARCS 5032 [1.5]	M.Arch. 1 - Studio II
ARCC 5097 [0.5]	Building Technology II
ARCC 5099 [0.5]	Building Technology IV
ARCH 5020 [0.5]	Theories of Modernity

Summer Term **1.5**

ARCC 5098 [0.5]	Building Technology III
ARCS 5033 [1.0]	M.Arch. 1 - Studio III

Year 2

Fall Term **2.5**

ARCS 5105 [1.5]	Graduate Studio 1
ARCC 5200 [0.5]	Professional Practice
ARCC 5100 [0.5]	Advanced Building Systems

Winter Term **2.0**

ARCS 5106 [1.5]	Graduate Studio 2
ARCH 5200 [0.5]	Graduate Seminar 1: Introduction to Critical Thought in Architecture

Year 3

Fall Term **3.0**

ARCN 5909 [2.0]	Thesis - Directed Research Studio (DRS)
ARCH 5201 [0.5]	Graduate Seminar 2: Contemporary Theoretical Perspectives in Architecture (0.5 credit elective)

0.5 credits in elective courses at the 5000 level or above, approved by the Associate Director (Graduate Programs)

Winter Term

ARCN 5909 [2.0]	Thesis - Directed Research Studio (DRS)
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Total Credits **15.5**

Notes:

1. ARCS 5909 [2.0] Thesis - Independent Study and ARCN 5909 [2.0] Thesis - Directed Research Studio (DRS) normally extend over two terms. This project will follow guidelines prescribed by the Associate Director (Graduate Programs).
2. The thesis is expected to include both a written text and a design component with appropriate modes of two and three-dimensional representation, including digital. Final thesis documentation must satisfy the

requirements established by the Faculty of Graduate and Postdoctoral Affairs.

Ph.D. Architecture (6.0 credits)

Students admitted to the PhD program in Architecture will be required to complete the following 6.0 credits:

- 1.0 credit in core Workshop courses
- 1.0 credit in core Seminar courses
- 2.0 credits in PhD. Colloquium
- 1.0 credit in comprehensive examination
- 1.0 credit in dissertation proposal examination
- oral defence of thesis

Specific Requirements:

Year 1

Fall term

ARCH 6001 [0.5]	Seminar: Vitruvian Exercises I	
ARCN 6001 [0.5]	Workshop: Daedalic Exercises I	
ARCH 6101 [1.0]	Colloquium I *	

Winter term

ARCH 6002 [0.5]	Seminar II: Vitruvian Exercises II	
ARCN 6002 [0.5]	Workshop: Daedalic Exercises II	
ARCH 6101 [1.0]	Colloquium I *	

Year 2

ARCH 6102 [1.0]	Colloquium II	
ARCH 6907 [1.0]	Ph.D. Comprehensive Examination	
ARCH 6908 [1.0]	Ph.D. Proposal Examination *	

Year 3

ARCH 6909 [0.0]	Ph.D. Dissertation	
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Note(s):

* ARCH 6101 [1.0] Colloquium I, ARCH 6102 [1.0] Colloquium II, ARCH 6907 [1.0] Ph.D. Comprehensive Examination, ARCH 6908 [1.0] Ph.D. Proposal Examination are 1.0-credit courses and extend over two terms.

Graduate Diploma in Architectural Conservation (4.0 credits)

Requirements:

Fall term

CDNS 5401 [0.5]	Heritage Conservation I: History, Principles, and Concepts	0.5
ARCH 4002 [0.5]	Canadian Architecture	0.5
ARCU 5402 [0.5]	Workshop: Urban Studies in Heritage Conservation	0.5
ARCH 4200 [0.5]	Architectural Conservation Philosophy and Ethics	0.5

Winter term

CDNS 5402 [0.5]	Heritage Conservation II: Theory in Practice	0.5
ARCN 5100 [0.5]	Representation and Documentation in Architectural Conservation	0.5
ARCH 5402 [0.5]	Evaluation of Heritage Properties	0.5
ARCC 5401 [0.5]	Workshop: Technical Studies in Heritage Conservation	0.5

Total Credits **4.0**

Regulations

See the General Regulations section of this Calendar.

M. Architecture

Architecture permits the C+ option in the 15.5-credit M.Arch. 1 curriculum only. (See Section 11.2 of the General Regulations).

Admission Requirements

Master of Architecture (M.Arch.)

Two-year M.Arch. (8.0 credits)

A four-year honours undergraduate degree or its equivalent in architecture, with significant studio experience in architectural design, and a minimum overall standing of B-.

Three-year M.Arch. (15.5 credits)

A four-year honours undergraduate degree from diverse backgrounds with a minimum overall B+ standing.

For the three-year M.Arch., all students will apply for the 15.5-credit program. Most will be admitted to the fall term of Year 1. Some applicants possessing a B.A.S. Conservation and Sustainability or an equivalent degree in an environmental design field may be eligible for second entry, to be determined by the Azrieli School of Architecture and Urbanism and the Faculty of Graduate and Postdoctoral Affairs. Students admitted into second entry will be accepted into the winter term of Year 1 and will complete 12.0 credits.

All applicants whose first language is not English must demonstrate proficiency in the English language. See Section 3.6 of the General Regulations section of this calendar for details.

For more information, please visit <https://carleton.ca/architecture/programs/>

M. Architectural Studies (M.A.S.)

The Master of Architectural Studies is a non-professional degree for students interested in pursuing in-depth architectural research.

The minimum requirement for admission to the M.A.S. is a four-year honours undergraduate degree in architecture or equivalent, with a minimum overall standing of B-.

All applicants whose first language is not English must demonstrate proficiency in the English language. See Section 3.6 of the General Regulations section of this calendar for details.

For more information visit <https://carleton.ca/architecture/programs/>

Ph.D. Architecture

The normal requirement for admission to the doctoral program in architecture is a master's degree (or equivalent) in architecture or a related field with a minimum overall standing of A-.

All applicants whose first language is not English must demonstrate proficiency in the English language. See Section 3.6 of the General Regulations section of this calendar for details.

Graduate Diploma in Architectural Conservation

There are two points of entry into the program:

Direct Entry

- The normal requirement is a bachelor degree with a minimum average of B+. The program can be taken part-time or full-time.

Admission from the M.Arch. or M.A.S.

- Students may apply to the Graduate Diploma in Architectural Conservation during the first year of study in the Master of Architecture professional program or the Master of Architectural Studies program.

All applicants whose first language is not English must demonstrate proficiency in the English language. See Section 3.6 of the General Regulations section of this calendar for details.

For more information visit <https://carleton.ca/architecture/programs/>

Architecture-MAS (ARCT) Courses

ARCT 5909 [2.0 credits]

M.A.S. Thesis

Scholarly written thesis supported by methods of two and three-dimensional representation. Research undertaken by the student is expected to engage a topic in the culture of practice in Architecture. Proposals must be approved by the graduate committee of the Azrieli School of Architecture and Urbanism.(ARCU). Includes: Experiential Learning Activity

Architecture - Studio (ARCS) Courses

ARCS 5031 [2.0 credits]

M.Arch. 1 - Studio I

Sensory components of architecture: use, effect, and symbolic potential. Light, lighting, sound, sensation of heat and cold, and related phenomena studied in modes of building proposals. Social considerations of architecture. Conventions of architectural drawing. Computer modeling as a medium of architectural analysis, documentation, and presentation.

ARCS 5032 [1.5 credit]

M.Arch. 1 - Studio II

Building materials and practices within the context of increasingly complex building programs. Social context of architecture in relation to material expression. Modeling is stressed.

ARCS 5033 [1.0 credit]

M.Arch. 1 - Studio III

A comprehensive studio dealing with issues of program and site as the culturally defining aspects of architectural practice within complex urban and social situations, using difficult sites and hybrid programs. Projects brought to a high degree of technical, formal, and graphic resolution.

ARCS 5105 [1.5 credit]**Graduate Studio 1**

An architectural investigation within a contemporary urban setting, usually dealing with central-city sites and complex programs. Projects address the question of urban architecture both from practical and theoretical perspectives. Architecturally relevant building technology and systems will be introduced in the Studio as required. Includes: Experiential Learning Activity

ARCS 5106 [1.5 credit]**Graduate Studio 2**

The design of a large-scale and culturally significant building project, set within a prominent urban or natural landscape. Integrated resolution of the combined issue of site, program, and expression is expected. Architecturally relevant building technology and systems will be introduced in the Studio as required. Includes: Experiential Learning Activity
Prerequisite(s): ARCS 5105.

ARCS 5909 [2.0 credits]**Thesis - Independent Study**

Student-initiated design investigation, developed with a thesis supervisor, supported by text and appropriate methods of two and three-dimensional representation. Proposals must be approved by the Graduate Committee of the Azrieli School of Architecture and Urbanism. Includes: Experiential Learning Activity

Architecture - Technical (ARCC) Courses**ARCC 5000 [0.5 credit]****Directed Studies in Architecture and Technology**

Reading and research tutorials. Prerequisite(s): permission of the School.

ARCC 5001 [0.5 credit]**Introduction to Design and Multimedia**

Multimedia and interactive design as they relate to architecture and the field of design. Special topics include virtual environments, user interface in software, Web and product design, perceptual and cognitive science, navigation, film/video and sound editing and animation technologies.

ARCC 5002 [0.5 credit]**Topics in Design and Multimedia: Information Architecture and the World Wide Web**

Introduction to the design of Web-based applications, focusing on process, site architecture, usability testing, and Web functionality. Students synthesize and customize software applications. Client and server-side functionality. Introduction to relational database design, JavaScript, cgi scripts, and «middleware» products such as WebObjects and ColdFusion.

ARCC 5003 [0.5 credit]**Design and Technology Workshop**

The prime objective of the workshop is to investigate issues in architectural design in relation to technology as a cultural paradigm. The workshop operates as a directed study with specific content, objectives, and scheduling arranged between student and academic advisor. Includes: Experiential Learning Activity

ARCC 5096 [0.5 credit]**Building Technology I**

General introduction to materials and methods of construction with particular focus on wood and timber frame construction. Site conditions, foundations, structure and envelope in terms of their response to local climate: sun (light and heat), wind, moisture. Includes: Experiential Learning Activity

ARCC 5097 [0.5 credit]**Building Technology II**

Technical issues involved in architectural design of buildings from ancient times to the present. Technological innovation and materials related to structural developments, and the organization and design of structures. Basic concepts of equilibrium, and mechanics of materials. Final projects developed in conjunction with design studio. Includes: Experiential Learning Activity

ARCC 5098 [0.5 credit]**Building Technology III**

Wood frame, post and beam, steel and concrete systems and construction techniques. Structural systems and building envelope principles and practice are explored in conjunction with mechanical and electrical systems in small buildings. Final projects developed in conjunction with design studio. Includes: Experiential Learning Activity

ARCC 5099 [0.5 credit]**Building Technology IV**

Medium scale steel, concrete, and wood frame buildings as case studies to explore approaches to building science principles, building envelope design, advanced construction methods and materials, acoustics and sound control, and fire protection, with a focus on sustainable design strategies and environmental impact. Includes: Experiential Learning Activity

ARCC 5100 [0.5 credit]**Advanced Building Systems**

Introduction to advanced design in building technology and systems integration. Leading edge building materials, technologies and philosophies will be explored through intensive case study research and analysis, comparing, and critically evaluating, traditional methods with current computer modeling and analysis techniques. Includes: Experiential Learning Activity

ARCC 5200 [0.5 credit]**Professional Practice**

The practice of architecture. Professional organization and conduct, the architect's services, business law, office organization and management, contract documents, building codes, contract management, cost control, accounting and site supervision. Guest speakers and case studies.

Includes: Experiential Learning Activity

Precludes additional credit for ARCU 4200.

ARCC 5401 [0.5 credit]**Workshop: Technical Studies in Heritage Conservation**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

ARCC 5500 [0.5 credit]**Advanced Design Economics**

Principles of building economics. Determinants and prediction of building costs. Uncertainty and investment economics. Creative cost control for buildings during schematic design, design development, construction document preparation and construction. Economic evaluation during all phases of design process; emphasis on sustainable strategies.

Includes: Experiential Learning Activity

ARCC 5909 [2.0 credits]**M.Arch. Post-Professional Thesis (Design and Technology)**

Basic or applied research in architectural, industrial, and digital design. Areas include interactive education/training, product/interface design, programming/scripting, culture/technology, or research as defined by the student. Final thesis documentation must satisfy the requirements established by the Faculty of Graduate Studies.

Includes: Experiential Learning Activity

Prerequisite(s): Proposals must be approved by the Graduate Committee of the Azrieli School of Architecture and Urbanism.

Architecture - Techniques (ARCN) Courses**ARCN 5000 [0.5 credit]****Directed Studies in Computer-Aided Design**

Reading and research tutorials.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

ARCN 5001 [0.5 credit]**Directed Studies in Architecture**

Reading and research tutorials.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

ARCN 5005 [0.5 credit]**Theory and Practice of Architectural Representation**

Free-hand drawing as a way of observing and understanding the world. Various media and techniques introduced through a wide range of studio and outdoor exercises. (Theory/History Elective).

Includes: Experiential Learning Activity

ARCN 5100 [0.5 credit]**Representation and Documentation in Architectural Conservation**

An in-depth study of the conventions and history of heritage recording including traditional field survey, photogrammetry, laser scanning technologies, and hybrid representations.

Workshop, six hours a week (including field trips and on-site work).

ARCN 5101 [0.5 credit]**Interactive Design Workshop I**

An intensive introduction to the design of interactive environments, using multimedia software including Adobe Photoshop, Illustrator, Premiere, Macromedia, Dreamweaver, Fireworks, Director, 3D Modeling programs, and sound editing. Basic design, graphic design, and software literacy. Presentations by design professionals.

Includes: Experiential Learning Activity

ARCN 5102 [0.5 credit]**Interactive Design Workshop II**

An introduction to the logistic aspects of producing multimedia products with an emphasis on usability testing and user-interface design. Topics include: storyboarding/graphic design, instructional design, rapid prototyping, project streaming, management and marketing, technical writing, product evaluation. Organized as a seminar. Work is done in teams.

Includes: Experiential Learning Activity

ARCN 5301 [0.5 credit]**Workshop: Daedalic Exercises I**

Experimental mediation, materiality and making.

Includes: Experiential Learning Activity

ARCN 5302 [0.5 credit]**Workshop: Daedalic Exercises II**

Innovative mediation, materiality and making.

Includes: Experiential Learning Activity

ARCN 5909 [2.0 credits]**Thesis - Directed Research Studio (DRS)**

An intensive research-based design project. The unit is initiated and guided by a faculty member engaged in organized research. Proposals must be approved by the Graduate Committee of the Azrieli School of Architecture and Urbanism.

Includes: Experiential Learning Activity

ARCN 6001 [0.5 credit]**Workshop: Daedalic Exercises I**

Experimental mediation, materiality and making. This course is required of all first year doctoral students in architecture.

Includes: Experiential Learning Activity

ARCHN 6002 [0.5 credit]**Workshop: Daedalic Exercises II**

Experimental mediation, materiality and making. This course is required of all first year doctoral students in architecture.

Includes: Experiential Learning Activity

ARCHN 6901 [0.5 credit]**Placement in Architecture**

An opportunity to earn academic credit by engaging in research activities under the supervision of a professional architect or researcher in architectural, government, non-governmental or other professional settings. Placement research must be related to the preparation of the doctoral research. Design Studios/Design Thesis/Research (ARCS).

Includes: Experiential Learning Activity

Architecture - Theory/History (ARCH) Courses**ARCH 5000 [0.5 credit]****Directed Studies in History and Theory of Architecture**

Reading and research tutorials.

Prerequisite(s): permission of the School.

ARCH 5001 [0.5 credit]**Architecture Seminar 1**

An introduction to the intellectual frameworks connecting design and culture as manifest in theories of culture and architecture. The seminar builds on previous undergraduate studies, and is not an introduction to these fields. The field of inquiry is both historical and contemporary.

ARCH 5002 [0.5 credit]**Architecture Seminar II**

A continuation of ARCH 5001, this seminar follows the same general description, but concentrates more on architectural design, on the contemporary condition, and on the ways of thinking that characterize embodiment of cultural content in architecture and other artifacts.

Prerequisite(s): ARCH 5001.

ARCH 5003 [0.5 credit]**Design and Culture Workshop**

The prime objective of the workshop is to investigate cultural issues in architectural design. The workshop operates as a directed study with specific content, objectives, and scheduling arranged between student and academic advisor.

Includes: Experiential Learning Activity

ARCH 5010 [0.5 credit]**History and Theory of Modern Architecture**

Architectural and urban ideals of modernism with emphasis upon the development of the avant-garde in the early twentieth century. The phenomenon of modern architecture within the broader framework of the development of western thought.

ARCH 5020 [0.5 credit]**Theories of Modernity**

Theories of modernity (including recent developments in cultural theory, theorizing from the Global South and more, recent technological and socio-political transformations) and how they help shape contemporary architectural discourse.

ARCH 5100 [0.5 credit]**Directed Studies in Architecture and Society**

Reading and research tutorials.

Prerequisite(s): permission of the School.

ARCH 5101 [1.0 credit]**Colloquium I**

This seminar brings together graduate students with architectural faculty to present their work-in-progress. It focuses on an immersion in conventions of theoretical and methodological approaches to advanced architectural research, including research ethics, proposal writing and research funding.

ARCH 5200 [0.5 credit]**Graduate Seminar 1: Introduction to Critical Thought in Architecture**

Critical theories and research approaches relevant to the field of architecture. Identification of issues through a coordinated series of lectures and readings. Development of analytical and interpretative skills through seminar discussions and writing culminating in a scholarly position paper by the student.

ARCH 5201 [0.5 credit]**Graduate Seminar 2: Contemporary Theoretical Perspectives in Architecture**

Lectures, readings, and case studies on contemporary issues in architecture and allied fields of study. Critical analysis of trends and possibilities set against traditional modes of architectural thought and practice. This course serves as a forum for a preliminary articulation of the thesis proposal.

Includes: Experiential Learning Activity

Prerequisite(s): ARCH 5200.

ARCH 5301 [0.5 credit]**Seminar: Vitruvian Exercises I**

Investigation of the cunning and graphic intelligence of architects: i.e. architectural modes of research.

ARCH 5302 [0.5 credit]**Seminar II: Vitruvian Exercises II**

Seminar II builds upon the fall term with a focus on the study of the fabric of architectural theory stretched within the marble loom of construction. This course is required of all first year M.A.S. students.

ARCH 5402 [0.5 credit]**Evaluation of Heritage Properties**

The cultural, political, economic and legal factors that shape our definition of heritage architecture. Processes for and implications of heritage designation, cultural value and costs associated with restoration and ongoing preservation. (Theory/History Elective).

Includes: Experiential Learning Activity
Lectures, three hours a week.

ARCH 5600 [0.5 credit]**Housing and Culture Seminar**

Housing as a function of social organization, demographics, market demand and governmental policies. The evolution of housing form, the role of the state, and the participation of architects in the housing marketplace promoting design as a form of social reform. Precludes additional credit for ARCH 4201.

ARCH 5909 [2.0 credits]**M.Arch. Post-Professional Thesis (Architecture and Cultural Diversity)**

A scholarly, written thesis supported by appropriate methods of two and three-dimensional representation. Research undertaken by the student is expected to engage one of the research topics outlined above. Final thesis documentation must satisfy the requirements established by the Faculty of Graduate and Postdoctoral Affairs.

Includes: Experiential Learning Activity
Prerequisite(s): Proposals must be approved by the graduate committee of the Azrieli School of Architecture and Urbanism.

ARCH 6001 [0.5 credit]**Seminar: Vitruvian Exercises I**

Investigation of the cunning and graphic intelligence of architects: i.e. architectural modes of research. This course is required of all first year doctoral students in architecture.

ARCH 6002 [0.5 credit]**Seminar II: Vitruvian Exercises II**

Seminar II builds upon the fall term with a focus on the study of the fabric of architectural theory stretched within the marble loom of construction. This course is required of all first year doctoral students in architecture.

ARCH 6101 [1.0 credit]**Colloquium I**

This seminar brings together doctoral students with architectural faculty to present their work-in-progress. Immersion in conventions of theoretical and methodological approaches to advanced architectural research, including research ethics, proposal writing and research funding. This course is required of all first year doctoral students in architecture.

Includes: Experiential Learning Activity

ARCH 6102 [1.0 credit]**Colloquium II**

This seminar continues to bring together doctoral students with architectural faculty and guest lecturers to present their work-in-progress. This course is required of all students enrolled in the Ph.D. program from the second year through until completion of the dissertation.

Includes: Experiential Learning Activity

ARCH 6907 [1.0 credit]**Ph.D. Comprehensive Examination**

Students must demonstrate to their thesis advisory committees a sufficiently broad background in the theoretical and topical area literatures and constructions relevant to their individual projects.

ARCH 6908 [1.0 credit]**Ph.D. Proposal Examination**

Students must demonstrate to thesis advisory committees their ability to link theory to a work or practice of architecture. This examination requires the preparation of a drawing or a model, to then be discussed within a theoretical framework during the oral part of the exam.

ARCH 6909 [0.0 credit]**Ph.D. Dissertation**

The dissertation will be comprised of two critical modes of investigation of equal importance: a speculative project and a research text. The speculative project is realized using specific traditional and non-traditional media as deemed appropriate.

Includes: Experiential Learning Activity

Architecture - Urban (ARCU) Courses**ARCU 5000 [0.5 credit]****Directed Studies in Architecture and the City**

Reading and research tutorials.

Includes: Experiential Learning Activity

ARCU 5402 [0.5 credit]**Workshop: Urban Studies in Heritage Conservation**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

Art and Architectural History

This section presents the requirements for programs in:

- M.A. Art and Architectural History
- M.A. Art and Architectural History with Specialization in Digital Humanities

Program Requirements

Students in the M.A. in Art and Architectural History must select one of the following streams:

M.A. Art and Architectural History (4.0 credits)**Requirements - Coursework stream (4.0 credits):**

1. 1.0 credit in:	1.0
ARTH 5010 [1.0] Art and Its Institutions	
2. 3.0 credits in Art and Architectural History, of which 1.0 credit must be selected from:	3.0

ARTH 5112 [0.5]	Topics in Historiography, Methodology and Criticism	
ARTH 5113 [0.5]	Perspectives on Pre-Modernity	
ARTH 5114 [0.5]	Feminism and Gender	
ARTH 5115 [0.5]	Topics in Modern and Contemporary Art	
ARTH 5117 [0.5]	Community/Identity	
ARTH 5210 [0.5]	Topics in Indigenous Art	
ARTH 5218 [0.5]	Museum Studies and Curatorial Practice	
ARTH 5403 [0.5]	Architecture and Its Institutions	
ARTH 5500 [0.5]	Photography and Its Institutions	
Students are normally required to take 0.5 credit in another Art and Architectural History course and 1.0 credit as a practicum. The remaining 0.5 credit may be taken in Art and Architectural History, or in special cases where the student's program of study justifies it, alternative courses may be selected with the approval of the Graduate Supervisor. Out of the 3.0 credits taken, at least 0.5 must be in an area outside that of the student's research paper specialization.		
3. 0.0 credit in:		0.0
ARTH 5800 [0.0]	Carleton Art Forum	
4. Language Requirement:		
Students are required to demonstrate a reading knowledge of French (or another language to be approved by the Art and Architectural History graduate supervisor).		
Total Credits		4.0
Requirements - Research Essay stream (4.0 credits):		
1. 1.0 credit in:		1.0
ARTH 5010 [1.0]	Art and Its Institutions	
2. 2.0 credits in Art and Architectural History, of which 0.5 credit must be selected from:		2.0
ARTH 5112 [0.5]	Topics in Historiography, Methodology and Criticism	
ARTH 5113 [0.5]	Perspectives on Pre-Modernity	
ARTH 5114 [0.5]	Feminism and Gender	
ARTH 5115 [0.5]	Topics in Modern and Contemporary Art	
ARTH 5117 [0.5]	Community/Identity	
ARTH 5210 [0.5]	Topics in Indigenous Art	
ARTH 5218 [0.5]	Museum Studies and Curatorial Practice	
ARTH 5403 [0.5]	Architecture and Its Institutions	
ARTH 5500 [0.5]	Photography and Its Institutions	
Students are normally required to take 1.0 credit as a practicum. The remaining 0.5 credit may be taken in Art and Architectural History or, in special cases where the student's program of study justifies it, alternative courses may be selected with the approval of the Graduate Supervisor. Out of the 2.0 credits taken, at least 0.5 must be in an area outside that of the student's research paper specialization.		
3. 1.0 credit in:		1.0
ARTH 5908 [1.0]	Research Essay	
4. 0.0 credit in:		0.0
ARTH 5800 [0.0]	Carleton Art Forum	
5. Language Requirement:		

Students are required to demonstrate a reading knowledge of French (or another language to be approved by the Art and Architectural History graduate supervisor).		
Total Credits		4.0
Requirements - Thesis stream (4.0 credits)		
1. 1.0 credit in:		1.0
ARTH 5010 [1.0]	Art and Its Institutions	
2. 1.5 credits in Art and Architectural History, of which 0.5 credit must be selected from:		1.5
ARTH 5112 [0.5]	Topics in Historiography, Methodology and Criticism	
ARTH 5113 [0.5]	Perspectives on Pre-Modernity	
ARTH 5114 [0.5]	Feminism and Gender	
ARTH 5115 [0.5]	Topics in Modern and Contemporary Art	
ARTH 5117 [0.5]	Community/Identity	
ARTH 5210 [0.5]	Topics in Indigenous Art	
ARTH 5218 [0.5]	Museum Studies and Curatorial Practice	
ARTH 5403 [0.5]	Architecture and Its Institutions	
ARTH 5500 [0.5]	Photography and Its Institutions	
Students are normally required to take 0.5 credit as a practicum. The remaining 0.5 credit may be taken in Art and Architectural History or, in special cases where the student's program of study justifies it, alternative courses may be selected with the approval of the Graduate Supervisor. Out of the 1.5 credits taken, at least 0.5 credit must be in an area outside that of the student's thesis specialization.		
3. 1.5 credits in:		1.5
ARTH 5909 [1.5]	M. A. Thesis	
4. 0.0 credit in:		0.0
ARTH 5800 [0.0]	Carleton Art Forum	
5. Language Requirement:		
Students are required to demonstrate a reading knowledge of French (or another language to be approved by the Art and Architectural History graduate supervisor).		
Total Credits		4.0

Notes:

- A maximum of 1.0 credit may be selected from course offerings at the 4000-level in Art and Architectural History.
- To enter the thesis stream, students are required to notify the Graduate Supervisor of their intent at the beginning of their first term of study. The thesis (60-80 pages) is written under the supervision of a faculty member with both expertise and an interest in the student's topic. The Graduate Committee will determine whether a student is eligible to enter the thesis stream after one term of study in the case of full-time students and after two terms of study in the case of part-time students. For those students allowed into the thesis stream, the deadline for the submission of the thesis proposal to the Graduate Committee is normally no later than April 15 of the first year of study for students enrolled full-time, and no later than

the middle of the fifth term of registration for students enrolled part-time.

M.A. Art and Architectural History with Specialization in Digital Humanities (4.5 credits)

Requirements:

1. 1.0 credit in:		1.0
ARTH 5010 [1.0]	Art and Its Institutions	
2. 2.0 credits in ARTH, including 1.5 credits from:		2.0
ARTH 5112 [0.5]	Topics in Historiography, Methodology and Criticism	
ARTH 5113 [0.5]	Perspectives on Pre-Modernity	
ARTH 5114 [0.5]	Feminism and Gender	
ARTH 5115 [0.5]	Topics in Modern and Contemporary Art	
ARTH 5117 [0.5]	Community/Identity	
ARTH 5210 [0.5]	Topics in Indigenous Art	
ARTH 5218 [0.5]	Museum Studies and Curatorial Practice	
ARTH 5403 [0.5]	Architecture and Its Institutions	
ARTH 5500 [0.5]	Photography and Its Institutions	
and		
ARTH 5011 [0.5]	Graduate Practicum	
3. 0.5 credit in:		0.5
ARTH 5011 [0.5]	Graduate Practicum (with a Digital Humanities focus)	
4. 0.0 credit in:		0.0
ARTH 5800 [0.0]	Carleton Art Forum	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in Digital Humanities (DIGH 5011, DIGH 5012, or annually listed Digital Humanities course)		0.5
6. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	

Total Credits 4.5

Regulations

See the General Regulations section of this Calendar.

Academic standing: a standing of B- or better must be obtained in each credit counted towards the master's degree.

Regulations governing requirements for the master's thesis, including deadlines for submission, are outlined in the General Regulations section of this Calendar.

Admission

The minimum requirement for admission to the master's program is an honours bachelor's degree (or the equivalent) in art history, history and theory of architecture, or a related discipline, with at least high honours standing. Related disciplines may include architectural studies, anthropology, history, and Canadian studies. Applicants without a background in art or architectural history may be required to take up to a maximum of 2.0 credits in certain designated courses from the undergraduate art history program in addition to their regular program.

Qualifying-Year Program

Applicants who do not qualify for direct admission to the master's program may be admitted to a qualifying-year program. Applicants who lack an honours degree, but have a three-year degree with honours standing (at least B overall) will normally be admitted to a qualifying-year program. Refer to the General Regulations section of this Calendar.

Art and Architectural History (ARTH) Courses

ARTH 5010 [1.0 credit]

Art and Its Institutions

The institutions of art and art history, the archive, the social institutions of art and their mediations. Gender, Aboriginal culture, commodification, reception, technology, memory and subversive tactics are addressed. Canadian contexts are emphasized.

Precludes additional credit for ARTH 5000.

ARTH 5011 [0.5 credit]

Graduate Practicum

Practical on-site work in the collecting institutions of the National Capital Region (as available), including a written assignment. The practicum coordinator and the on-site supervisor jointly determine the final mark. A maximum of 1.0 practicum credit may be applied towards degree requirements.

Includes: Experiential Learning Activity

Precludes additional credit for ARTH 5001.

ARTH 5012 [0.5 credit]

Directed Readings and Research

Students pursue topics in art and its institutions, which they select in consultation with the graduate faculty of the program.

Includes: Experiential Learning Activity

Precludes additional credit for ARTH 5002.

ARTH 5112 [0.5 credit]

Topics in Historiography, Methodology and Criticism

Historiographical, methodological, and critical issues in the history of art and criticism in Canadian and/or international contexts.

Precludes additional credit for ARTH 5102.

ARTH 5113 [0.5 credit]

Perspectives on Pre-Modernity

Issues in premodern art and institutions of art production, and critical theory in light of current concerns and new research.

ARTH 5114 [0.5 credit]

Feminism and Gender

Art and its institutions in terms of critical issues of feminism and gender studies. Topics include the questioning of the canon, sexuality, the gaze, queer theory, the body, and the use of art as a means to communicate issues of public significance.

Precludes additional credit for ARTH 5104 and ARTH 5106.

ARTH 5115 [0.5 credit]**Topics in Modern and Contemporary Art**

The production and reception of modern and contemporary art in light of current concerns in Canadian and/or international contexts.

Precludes additional credit for ARTH 5105.

ARTH 5117 [0.5 credit]**Community/Identity**

Art and the interrelationships among the artist, architect, patron, critic and public in the context of the contribution of art and its institutions to the articulation or constitution of communal identities in Canadian and/or international contexts.

Precludes additional credit for ARTH 5107.

ARTH 5210 [0.5 credit]**Topics in Indigenous Art**

The creative production, aesthetic culture, and reception of selected indigenous peoples in pre-contact, historic, and/or modern time, drawing on postcolonial and critical theory.

Precludes additional credit for ARTH 5200 (no longer offered), ARTH 5204 (no longer offered), and ARTH 5303 (no longer offered).

ARTH 5218 [0.5 credit]**Museum Studies and Curatorial Practice**

Aspects of museum practice, history and theoretical discourse will be examined in a classroom setting, or the preparation, realization, and/or study of an exhibition in an Ottawa-area museum.

Precludes additional credit for ARTH 5207 and ARTH 5208.

ARTH 5403 [0.5 credit]**Architecture and Its Institutions**

Specialized topics examine theory and practice of architects, architectural historians and critics from historical and contemporary perspectives in Canadian and/or international contexts.

ARTH 5500 [0.5 credit]**Photography and Its Institutions**

Photographic practice and reception with emphasis on social, political and cultural contexts and theoretical approaches to the study of photographs in Canadian and/or international contexts.

ARTH 5777 [0.5 credit]**Art Exhibition Studio**

This course is a hands-on examination of art exhibition practices that includes site visits and a series of workshops designed to help students create an exhibition proposal for submission to the Carleton University Art Gallery or other space.

Includes: Experiential Learning Activity

ARTH 5788 [0.5 credit]**Directed Art Exhibition**

Selected students will be offered the opportunity to put on an exhibition in the Carleton University Art Gallery, in another venue on campus or online.

Includes: Experiential Learning Activity

ARTH 5800 [0.0 credit]**Carleton Art Forum**

Students are required to participate as audience members or presenters in scholarly and art community activities such as professional talks, symposia, conferences and art gallery events. The course will be graded as either satisfactory or unsatisfactory based on participation and engagement.

Includes: Experiential Learning Activity

ARTH 5908 [1.0 credit]**Research Essay**

An examination of an approved topic that is in an area of departmental specialization.

Includes: Experiential Learning Activity

ARTH 5909 [1.5 credit]**M. A. Thesis**

Includes: Experiential Learning Activity

Biochemistry

This section presents the requirements for programs in:

- M.Sc. Biology with Collaborative Specialization in Biochemistry
- M.Sc. Chemistry with Collaborative Specialization in Biochemistry
- Ph.D. Biology with Collaborative Specialization in Biochemistry
- Ph.D. Chemistry with Collaborative Specialization in Biochemistry

M.Sc. Biology with Collaborative Specialization in Biochemistry (5.0 credits)

Requirements:

1. 1.0 credits in:	1.0
BIOL 5002 [0.5] Seminar in Biochemistry I	
BIOL 5004 [0.5] Advances in Applied Biochemistry	
4. 4.0 credits in:	4.0
BIOL 5909 [4.0] M.Sc. Thesis (in the specialization)	

Total Credits **5.0**

M.Sc. Chemistry with Collaborative Specialization in Biochemistry (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CHEM 5800 [0.5] Seminar in Biochemistry I	
CHEM 5806 [0.5] Advances in Applied Biochemistry	
2. 1.0 credit in:	1.0
CHEM 5801 [1.0] Seminar I	
3. 3.0 credits in:	3.0

CHEM 5909 [3.0] M.Sc. Thesis (in the Specialization)

Total Credits 5.0

Ph.D. Biology with Collaborative Specialization in Biochemistry (1.0 credit)

Requirements:

1. 1.0 credit in: 1.0

BIOL 6102 [0.5] Seminar in Biochemistry II

BIOL 5004 [0.5] Advances in Applied Biochemistry

3. 0.0 credits in: 0.0

BIOL 6909 [0.0] Ph.D. Thesis (in the specialization)

Total Credits 1.0

Ph.D. Chemistry with Collaborative Specialization in Biochemistry (4.0 credits)

Requirements:

1. 1.0 credit in: 1.0

CHEM 5806 [0.5] Advances in Applied Biochemistry

CHEM 6800 [0.5] Seminar in Biochemistry II

2. 2.0 credits in: 2.0

CHEM 5801 [1.0] Seminar I

CHEM 5802 [1.0] Seminar II

3. 1.0 credit in graduate courses 1.0

4. A two-part comprehensive in Chemistry (see Note below). 0.0

5. 0.0 credits in:

CHEM 6909 [0.0] Ph.D. Thesis (in the specialization)

6. At least three years of full-time study

Total Credits 4.0

Comprehensive examination Part 1 examines the depth and breadth of knowledge in the student's own research area.

Comprehensive examination Part 2 will involve the submission of a research proposal that is both novel and of a sound scientific basis that may be loosely related to the thesis research of the student but not a topic that the student has investigated in any manner. The research proposal will be submitted to a committee for oral defense.

Failure to pass either part of the comprehensive examination will result in deregistration from the graduate program.

Regulations

See the General Regulations section of this Calendar, and the regulations pertaining to the participating units offering this specialization.

Bioinformatics

This section presents the requirements for programs in:

- M.A.Sc. Biomedical Engineering with Specialization in Bioinformatics
- M.Sc. Biology with Specialization in Bioinformatics
- M.Sc. Mathematics and Statistics with Specialization in Bioinformatics

Program Requirements

The student is responsible for fulfilling both the participating unit requirements for the Master's degree, and the requirements of the Collaborative Program.

The minimum requirements of the collaborative program include successful completion of two required courses, and a master's thesis on an approved bioinformatics topic.

Required courses:

- 0.5 credit in BIOL 5515 Bioinformatics
- 0.5 credit in BIOL 5517 Bioinformatics Seminar
- Thesis - candidates must successfully complete a research thesis on a topic in bioinformatics supervised by a faculty member of the Collaborative Program in Bioinformatics.

Notes:

1. Students in programs in Biology and Mathematics & Statistics may use BIOL 5515 Bioinformatics to count towards degree requirements; BIOL 5517 Bioinformatics Seminar must be taken in addition to the regular seminar course.
2. Students in Biomedical Engineering may use both BIOL 5515 Bioinformatics and BIOL 5517 Bioinformatics Seminar to count towards degree requirements.
3. In addition, the student's thesis committee or advisory committee may direct the student to take or audit further courses to complement the student's background and research program.

M.A.Sc. Biomedical Engineering with Specialization in Bioinformatics (5.0 credits)

Consult the Bioinformatics section for details regarding admission requirements to this program.

Requirements - by thesis (5.0 credits)

1. 0.5 credit in: 0.5

BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. 1.0 credit in: 1.0

BIOL 5515 [0.5] Bioinformatics

BIOL 5517 [0.5] Bioinformatics Seminar

3. 1.0 credit in BIOM (BMG) courses 1.0

4. 2.5 credits in: 2.5

BIOM 5909 [2.5] M.A.Sc. Thesis

5. 0.0 credit in: 0.0

BIOM 5800 [0.0] Biomedical Engineering Seminar

Total Credits 5.0

M.Sc. Biology with Specialization in Bioinformatics (5.0 credits)

Requirements:

1. 1.0 credit in: 1.0

BIOL 5515 [0.5] Bioinformatics

BIOL 5517 [0.5] Bioinformatics Seminar

2. 4.0 credits in: 4.0

BIOL 5909 [4.0] M.Sc. Thesis

Total Credits 5.0

M.Sc. Mathematics and Statistics with Specialization in Bioinformatics (4.5 credits)

Requirements:

1. 1.0 credit in:	1.0
BIOL 5515 [0.5] Bioinformatics	
BIOL 5517 [0.5] Bioinformatics Seminar	
2. 1.5 credits in coursework	1.5
3. 2.0 credits in:	2.0
MATH 5909 [2.0] M.Sc. Thesis in Mathematics (on an approved bioinformatics topic)	

Total Credits **4.5**

1. Students must receive approval for course selection from their supervisor before registering in courses.
2. All master's students should normally participate in a seminar or research talks under the guidance of their supervisors.

Bioinformatics-Related Courses

Biology

BIOL 5105 (BIO 5302) Methods in Molecular Genetics
BIOL 5201 (BIO 8301) Evolutionary Bioinformatics
BIOL 5409 (BIO 5306) Modelling for Biologists
BIOL 5501 (BIO 8100) Directed Studies in Biology
BIOL 5502 (BIO 8102) Selected Topics in Biology
BIOL 5516 (BNF 5107) Applied Bioinformatics

Biomedical Engineering

BIOM 5400 (BMG 5317) Medical Computing
BIOM 5405 (BMG 5305) Pattern Classification and Experiment Design

Computer Science

COMP 5306 (CSI 5100) Data Integration
COMP 5307 (CSI 5101) Knowledge Representation
COMP 5704 (CSI 5131) Parallel Algorithms and Applications in Data Science
COMP 5703 (CSI 5163) Algorithm Analysis and Design
COMP 5108 (CSI 5126) Algorithms in Bioinformatics

Mathematics and Statistics

STAT 5708 (MAT 5170) Probability Theory I
STAT 5709 (MAT 5171) Probability Theory II
STAT 5703 (MAT 5181) Data Mining
STAT 5702 (MAT 5182) Modern Applied and Computational Statistics
STAT 5600 (MAT 5190) Mathematical Statistics I
STAT 5501 (MAT 5191) Mathematical Statistics II

MATH 6507 (MAT 5319) Topics in Probability

Systems and Computer Engineering

SYSC 5104 (ELG 6114) Methodologies For Discrete-Event Modeling And Simulation
SYSC 5703 (ELG 6173) Integrated Database and Cloud Systems

Regulations

See the General Regulations section of this Calendar, and the regulations pertaining to the participating units offering this specialization.

Admission

Application to the Program

Applications should be directed to the primary participating unit which is the most appropriate to the student's research interests. Once accepted into one of the participating graduate programs, students must then be sponsored into the collaborative program in Bioinformatics by a faculty member. This is normally the student's supervisor. This faculty member must be appointed, cross-appointed or stand as an adjunct at one or more of the participating units.

Application forms and further information can be obtained by writing directly to any of the participating institutes or departments, or the program coordinator.

Requirements

The requirements for admission to the master's in the Collaborative Program in Bioinformatics are as follows:

- prior admission to the master's program in one of the supporting units participating in the program.
- a letter of recommendation from the participating faculty member of the Collaborative Program, which both recommends admission and indicates the willingness of the faculty member to supervise the candidate's research program in Bioinformatics.

Biology

This section presents the requirements for programs in:

- M.Sc. Biology
- M.Sc. Biology with Collaborative Specialization in Biochemistry
- M.Sc. Biology with Specialization in Bioinformatics
- M.Sc. Biology with Specialization in Chemical and Environmental Toxicology
- M.Sc. Biology with Specialization in Data Science
- Ph.D. Biology
- Ph.D. Biology with Collaborative Specialization in Biochemistry
- Ph.D. Biology with Specialization in Chemical and Environmental Toxicology

Program Requirements

M.Sc. Biology (5.0 credits)

Requirements:

1. 1.0 credit in approved coursework	1.0
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2. 4.0 credits in:		
BIOL 5909 [4.0]	M.Sc. Thesis (including successful oral defence)	4.0
Total Credits		5.0

M.Sc. Biology with Collaborative Specialization in Biochemistry (5.0 credits)

Requirements:

1. 1.0 credits in:		1.0
BIOL 5002 [0.5]	Seminar in Biochemistry I	
BIOL 5004 [0.5]	Advances in Applied Biochemistry	
4. 4.0 credits in:		4.0
BIOL 5909 [4.0]	M.Sc. Thesis (in the specialization)	
Total Credits		5.0

M.Sc. Biology with Specialization in Bioinformatics (5.0 credits)

Requirements:

1. 1.0 credit in:		1.0
BIOL 5515 [0.5]	Bioinformatics	
BIOL 5517 [0.5]	Bioinformatics Seminar	
2. 4.0 credits in:		4.0
BIOL 5909 [4.0]	M.Sc. Thesis	
Total Credits		5.0

Bioinformatics-Related Courses

Biology

BIOL 5105 (BIO 5302)	Methods in Molecular Genetics
BIOL 5201 (BIO 8301)	Evolutionary Bioinformatics
BIOL 5409 (BIO 5306)	Modelling for Biologists
BIOL 5501 (BIO 8100)	Directed Studies in Biology
BIOL 5502 (BIO 8102)	Selected Topics in Biology
BIOL 5516 (BNF 5107)	Applied Bioinformatics

Biomedical Engineering

BIOM 5400 (BMG 5317)	Medical Computing
BIOM 5405 (BMG 5305)	Pattern Classification and Experiment Design

Computer Science

COMP 5306 (CSI 5100)	Data Integration
COMP 5307 (CSI 5101)	Knowledge Representation
COMP 5704 (CSI 5131)	Parallel Algorithms and Applications in Data Science
COMP 5703 (CSI 5163)	Algorithm Analysis and Design
COMP 5108 (CSI 5126)	Algorithms in Bioinformatics

Mathematics and Statistics

STAT 5708 (MAT 5170)	Probability Theory I
STAT 5709 (MAT 5171)	Probability Theory II

STAT 5703 (MAT 5181)	Data Mining
STAT 5702 (MAT 5182)	Modern Applied and Computational Statistics
STAT 5600 (MAT 5190)	Mathematical Statistics I
STAT 5501 (MAT 5191)	Mathematical Statistics II
MATH 6507 (MAT 5319)	Topics in Probability

Systems and Computer Engineering

SYSC 5104 (ELG 6114)	Methodologies For Discrete-Event Modeling And Simulation
SYSC 5703 (ELG 6173)	Integrated Database and Cloud Systems

M.Sc. Biology with Specialization in Chemical and Environmental Toxicology (5.0 credits)

Requirements:

1. 1.5 credits in:		1.5
BIOL 6405/CHEM 5825 [0.5]	Principles in Toxicology	
BIOL 6402/CHEM 5825 [0.5]	Principles of Toxicology or BIOL 6403/CHEM 5825 [0.5]	
	and 0.5 credit in additional approved coursework	
2. 3.5 credits in:		3.5
BIOL 5909 [4.0]	M.Sc. Thesis (including successful oral defence)	
Total Credits		5.0

M.Sc. Biology with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in	approved coursework	0.5
2. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
3. 4.0 credits in:		4.0
BIOL 5909 [4.0]	M.Sc. Thesis	
Total Credits		5.0

Note:

- Completion of the graduate courses specified by the student's advisory committee and the director or associate director of the OCIB is required. These are normally two one-term courses, but additional courses may be required, depending on the background and research program of the student.
- The passing grade for all required courses is 70% or the equivalent, and the student is not allowed a supplemental examination.
- The admissions committee or the student's advisory committee may also direct the student to take or to audit additional courses. Knowledge of a second language may be specified as a requirement.
- Completion of at least two terms as a full-time student resident at one of the two universities is normally required. Programs for part-time students may be arranged.

- Presentation of one public seminar on the candidate's thesis research is required.
- Completion of a thesis incorporating the results of original research carried out under the direct supervision of an approved faculty member is required.
- Successful oral defence of the thesis before an examination board of at least four faculty members, normally drawn from both universities, is required.

Ph.D. Biology (1.0 credit)

Requirements:

1. 1.0 credit in approved coursework	1.0
2. 0.0 credits in:	0.0
BIOL 6909 [0.0] Ph.D. Thesis	
Total Credits	1.0

Ph.D. Biology with Collaborative Specialization in Biochemistry (1.0 credit)

Requirements:

1. 1.0 credit in:	1.0
BIOL 6102 [0.5] Seminar in Biochemistry II	
BIOL 5004 [0.5] Advances in Applied Biochemistry	
3. 0.0 credits in:	0.0
BIOL 6909 [0.0] Ph.D. Thesis (in the specialization)	
Total Credits	1.0

Ph.D. Biology with Specialization in Chemical and Environmental Toxicology (1.5 credits)

Requirements:

1. 1.0 credit in:	1.0
BIOL 6405/CHEM 5805 [0.5] Seminar in Toxicology	
BIOL 6402/CHEM 5 Principles of Toxicology or BIOL 6403 [0.5] Ecotoxicology or CHEM 5705 [0.5] Ecotoxicology	
2. 0.5 credit in additional course work	0.5
2. 0.0 credits in:	0.0
BIOL 6909 [0.0] Ph.D. Thesis	
Total Credits	1.5

Note:

- Completion of the graduate courses specified by the student's advisory committee and the director or associate director of the OCIB is required. These will normally be two one-term courses (four one-term courses if transferred to the Ph.D. program without completing the M.Sc.).
- Only graduate courses may form part of the candidate's course requirements.
- The passing grade for all required courses is 70%, and the student is not allowed a supplemental examination.
- The admissions committee or the student's advisory committee may also direct the student to take or to audit additional courses. Knowledge of a second language may be specified as a requirement.
- Scheduling of an oral Qualifying Examination within approximately 12 months of entry into the program and completion normally within 18 months is required;

this examination will cover the candidate's area of research, and related topics. The format of the examination will be established by the departmental graduate committee. The examination committee generally will be composed of faculty members of both universities.

- Presentation of at least one public seminar on the candidate's thesis research is required.
- A thesis incorporating the results of original research carried out under the direct supervision of an approved faculty member is required.
- Completion of at least four terms as a full-time student resident at one of the two universities (or six terms if transferred from an M.Sc.) is required. Under exceptional conditions programs may be arranged for part-time students.
- Successful oral defence of the thesis is required before an examination board of at least five faculty members is required, with representation from both universities, and including an external examiner from outside the two universities who is an authority on the thesis research area.

Regulations

See the General Regulations section of this Calendar.

Guidelines for Completion of Master's Degree

The maximum time limits for the completion of the requirements of the master's program are listed in the General Regulations, Section 13 of this Calendar.

Full-time candidates in the master's program are expected to complete their degree requirements within six terms of first registration for full-time study.

Part-time candidates in the master's program are expected to complete their degree requirements within four calendar years or twelve terms from the initial registration in the master's program.

Regulations

See the General Regulations section of this Calendar.

Guidelines for Completion of the Doctoral Degree

The maximum time limits for the completion of the program requirements of the doctoral program are listed in the General Regulations, Section 13 of this Calendar.

Full-time candidates in the doctoral program are expected to schedule their oral Qualifying Examination within approximately 12 months of entry into the program, and to complete it within 18 months of entry into the program.

Part-time candidates in the doctoral program are expected to schedule their oral Qualifying Examination within approximately 18 months after entry into the program.

Full-time candidates are expected to complete their degree requirements within four (4) calendar years or 12 terms of registered full-time study.

Doctoral candidates who have transferred from the master's to the doctoral program without completing the master's program are expected to complete their degree requirements within four (4) calendar years or 12 terms

of registered full-time study from initial registration in the master's program.

Part-time candidates in the doctoral program are expected to complete their degree requirements within six (6) calendar years or 18 terms after the date of initial registration.

Admission

An Honours B.Sc. or equivalent degree at a standard acceptable to the two universities is required for admission to the M.Sc. program.

Applicants with acceptable standing in a non-honours degree may be admitted to a qualifying-year program which will be determined in each case by the admissions committee.

Applicants must demonstrate a fluent knowledge of English (Carleton), or either English or French (Ottawa).

Admission

An M.Sc. from a recognized university is required for entry to the Ph.D. program.

A student already registered for the M.Sc. may be permitted to transfer to the Ph.D. program following a recommendation by the departmental graduate committee and successful completion of the Qualifying Examination required of Ph.D. candidates.

All applicants must demonstrate a fluent knowledge of English (Carleton), or either English or French (Ottawa).

Biology (BIOL) Courses

BIOL 5001 [0.5 credit] (BIO 5101)

Topics in Biotechnology

A course concerned with the use of biological substances and activities of cells, genes, and enzymes in manufacturing, agricultural, and service industries. A different topic will be selected each year.

Includes: Experiential Learning Activity

Prerequisite(s): a course in cell physiology or biochemistry, or permission of the instructor and permission of the director or associate director of OCIB.

BIOL 5002 [0.5 credit]

Seminar in Biochemistry I

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.

Includes: Experiential Learning Activity

Also listed as CHEM 5800.

BIOL 5003 [0.5 credit] (BIO 5103)

Advanced Biochemistry

Advanced topics in biochemistry: the chemical structure and function of biological macromolecules, biochemical thermodynamics, metabolism, photosynthesis, lipids and membranes.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5004 [0.5 credit] (BIO 5104)

Advances in Applied Biochemistry

A practical hands-on course in the field of Biochemistry. This course is run in a laboratory and will train students in highly specialized technique(s) in Biochemistry. The students will run experiments, gather data, assess and analyze the results and present the findings as a seminar.

Includes: Experiential Learning Activity

Also listed as CHEM 5806.

BIOL 5105 [0.5 credit] (BIO 5302)

Methods in Molecular Genetics

Theory and associated applications of emerging methods in molecular genetics, including information gathered from large-scale genome-wide analysis and protein-protein interaction data, and how this information can advance understanding of cell biology.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5106 [0.5 credit] (BIO 5308)

Laboratory Techniques in Molecular Genetics

Laboratory course designed to give students practical experience in recent important techniques in molecular genetics.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5111 [0.5 credit] (BIO 5111)

Biophysical Techniques

Theory and application of current biochemical/ biophysical instrumentation and techniques including X-ray crystallography, nuclear magnetic resonance spectrometry, infrared, circular dichroism and fluorescence spectroscopy, and isothermal titration and differential scanning calorimetry.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5121 [0.5 credit] (BIO 5121)

Advances in Protein Engineering

An advanced lecture, discussion and seminar course covering the theory, development and current techniques of protein and enzyme engineering. Topics to be discussed may also include applications in biotechnology, nanotechnology and new frontiers in basic and applied research.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5201 [0.5 credit]

Evolutionary Bioinformatics

Basic concepts in molecular evolution and hands-on experience with the computer analysis of DNA sequences. Topics may include molecular sequence databases, multiple alignments and phylogenetic trees.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5202 [0.5 credit] (BIO 8302)**Topics in Evolutionary Genetics**

A lecture/seminar course on the genetic mechanisms and forces responsible for variation and evolutionary change in natural populations. Topics to include protein and genome evolution, molecular phylogenies, DNA sequences in population biology, and the evolution of multigene families. Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5203 [0.5 credit] (BIO 8303)**Advanced Microscopy**

Development of the practical skills of microscopy through original research and supporting theory lectures.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5304 [1.0 credit]**Fundamentals in Neuroscience**

A comprehensive neuroscience course from cellular levels to neural systems and behaviour. Topics covered include aspects of neuroanatomy, neurophysiology, neuropharmacology and behavioural and cognitive neuroscience.

Also listed as NEUR 5100.

Precludes additional credit for PSYC 5200.

BIOL 5307 [0.5 credit] (BIO 8122)**Advanced Insect Biology**

Overview of the biological processes that allow insects to function in their environments and to overcome the constraints and limitations that the environment places on them.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5402 [0.5 credit] (BIO 8162)**Advanced Endocrinology**

Major topics in comparative endocrinology: understanding the structure, function and evolution of vertebrate endocrine systems, including endocrine disruption.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5407 [0.5 credit] (BIO 5305)**Biostatistics I**

Application of statistical analyses to biological data. Topics include ANOVA, regression, GLMs, and may include loglinear models, logistic regression, general additive models, mixed models, bootstrap and permutation tests.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5409 [0.5 credit] (BIO 5306)**Modelling for Biologists**

Use and limitations of mathematical and simulation modelling approaches for the study of biological phenomena.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5501 [0.5 credit] (BIO 8900)**Directed Studies in Biology**

One-to-one instruction in selected aspects of specialized biological subjects not covered by other graduate courses. Students may not take this course from their thesis supervisor(s), and are limited to one directed studies course per program.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5502 [0.5 credit] (BIO 8120)**Selected Topics in Biology**

Lecture and seminar courses in selected aspects of specialized biological subjects not covered by other graduate courses.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5503 [0.5 credit] (BIO 5901)**Biological Science in Practice**

Introduction to cross-cutting skills and issues in common to all biological disciplines. Key perspectives on philosophy of science, practical approaches to scientific publication and peer-review, data analysis and presentation, scientific inference, and technical writing will be provided through discipline-specific examples and associated practical work.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5506 [0.5 credit] (BIO 5213)**Principles and Methods of Biological Systematics**

Biological systematics with reference to morphological and molecular character evolution and phylogeny reconstruction.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5508 [0.5 credit] (BIO 8306)**Advanced Topics in Ecology**

Recent developments in population, community and/or ecosystem ecology.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5510 [0.5 credit] (BIO 5310)**Advanced Evolutionary Biology**

Advances in micro- and macroevolution including the mechanisms both driving and constraining evolutionary change, phylogenetic relationships, patterns of evolutionary change at the molecular or phenotypic level, and evolutionary theory and techniques as applied to these areas.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5511 [0.5 credit] (BIO 5311)**Advanced Evolutionary Ecology**

The ecological causes and consequences of evolutionary change, focussing on how the ecological interactions among organisms and their biotic and abiotic environments shape the evolution of phenotypic and species diversity.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5512 [0.5 credit] (BIO 8105)**Advances in Applied Ecology**

The application of ecological and evolutionary principles in addressing resource management challenges and environmental problems.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5514 [0.5 credit] (BIO 5314)**Advances in Aquatic Sciences**

Advanced theoretical and applied aquatic sciences including current topics in limnology and oceanography (e.g. impacts of climate change, invasive species, atmospheric pollution) with implications for lake, river, coastal and wetland management.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5515 [0.5 credit] (BNF 5106)**Bioinformatics**

Major concepts and methods of bioinformatics. Topics may include genetics, statistics and probability theory, alignments, phylogenetics, genomics, data mining, protein structure, cell simulation and computing.

Includes: Experiential Learning Activity

BIOL 5516 [0.5 credit] (BNF 5107)**Applied Bioinformatics**

Introduction to programming for students in the life sciences. Through lectures, assignments, and independent projects, students will learn about basic concepts and techniques in programming, including variables, control structures, subroutines, and input/output. No previous knowledge of bioinformatics or programming is required.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of Ottawa-Carleton Institute for Biology.

BIOL 5517 [0.5 credit] (BNF 6100)**Bioinformatics Seminar**

Current topics in bioinformatics. Students must successfully complete a presentation and written report.

BIOL 5518 [0.5 credit] (BNF 5318)**Biostatistics II**

Application of multivariate methods to biological data, including methods such as discriminant functions analysis, cluster analysis, MANOVA, principle components analysis.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5520 [0.5 credit] (BIO 5320)**Advances in Conservation Biology**

Interdisciplinary exploration of the science of scarcity and diversity in a human dominated world.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5521 [0.5 credit] (BIO 5321)**Evolutionary Genetics**

Genetic mechanisms and processes responsible for variation and evolutionary change in natural populations. Topics may include population and quantitative genetics as applied to protein and genome evolution, molecular phylogenies, DNA sequences in population biology, and the evolution of multigene families.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5526 [0.5 credit]**Analysis of Next-generation Sequence Data**

Assembly and analysis of next-generation sequence (NGS) data. Through hands-on exercises and independent projects, students will learn to use tools for quality control, assembly, mutation calling, and other NGS applications. No previous knowledge of bioinformatics or programming is required.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Director or Associate Director of OCIB.

BIOL 5605 [0.5 credit] (BIO 5102)**Advanced Field Ecology**

Field experience in a new environment (e.g., local, national, international) to learn about ecological processes (note - extra fees associated with course).

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5709 [0.5 credit] (BIO 8113)**Chemical Toxicology**

An introduction to modeling chemical hazards and exposures at the cellular level. The properties of toxic substances are compared to the responses of enzymatic systems. These interactions are defined as Quantitative Structure-Activity Relationships and used to interpret hazardous materials under regulations such as WHMIS. Also listed as CHEM 5709/CHM 8157.

Prerequisite(s): BIOL 6402/CHEM 5708 (BIO 9101/CHM 8156), and permission of the director or associate director of OCIB.

BIOL 5801 [0.5 credit] (BIO 5105)**Advanced Neuroethology**

A comparative and evolutionary approach to studying neural mechanisms underlying animal behaviour, including genetic, neural and hormonal influences on behaviour.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5802 [0.5 credit] (BIO 8365)**Advanced Behavioural Ecology**

Recent advances in behavioural ecology including topics such as the evolution of tactics and strategies of group living, foraging, anti-predation, resource use and defence, cooperation, reproduction, and parental care.

Prerequisite(s): Either BIOL 3802 or BIOL 3804 or equivalent AND permission of the director or associate director of OCIB.

BIOL 5810 [0.5 credit]**Education Research in Biology**

Introduction to the science of teaching and learning in biology. Students will be introduced to the foundational concepts in, and tools of, Discipline-Based Education Research (DBER) and will conduct their own DBER research project.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as BIOL 4810, for which additional credit is precluded.

BIOL 5909 [4.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

BIOL 6001 [0.5 credit] (BIO 8109)**Advanced Molecular Biology**

In-depth coverage of the structure, function, and synthesis of DNA, RNA, and proteins.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6002 [0.5 credit] (BIO 8116)**Advances in Plant Molecular Biology**

Use of molecular genetics in general plant biology and the contribution of plant genomics to our understanding of plant metabolism, plant development, and plant interactions with the environment at the molecular, genome, and cellular levels.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6102 [0.5 credit]**Seminar in Biochemistry II**

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.

Includes: Experiential Learning Activity

Also listed as CHEM 6800.

BIOL 6201 [0.5 credit] (BIO 8117)**Advanced Cell Biology**

Recent advances in cell biology, including such topics as membranes, signalling, the cytoskeleton and control of the cell cycle.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6202 [0.5 credit] (BIO 8118)**Advanced Cell Biology II**

Topics for discussion may include: the structure, composition and three-dimensional organization of the nucleus, mechanisms and regulation of genome replication, structure organization of transcription. Nuclear reorganization during gamete development, fertilization, viral infection and the mitotic cell cycle. Normally offered in alternate years.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6203 [0.5 credit] (BIO 6103)**Special Topics in Neuroscience**

In-depth study of current topics in neuroscience. Course content varies yearly and has recently included cognitive neuroscience, neuropharmacology, neurodegeneration, and behavioural medicine.

Also listed as NEUR 5800.

BIOL 6204 [0.5 credit] (BIO 6304)**Techniques in Neuroscience**

Completion of a research project carried out under the supervision of a neuroscience faculty member, normally not the current supervisor. The student will learn a new neuroscience technique and apply it to a research objective. Students must obtain prior approval from the graduate committee.

Also listed as NEUR 6301, NEUR 6302.

Precludes additional credit for PSYC 6204.

BIOL 6300 [0.5 credit] (BIO 8320)**Advanced Plant Biology**

Recent developments in plant biology. Topics may include plant anatomy, systematics, evolution, genetics, ecology, ethnobotany, cell biology, and/or biotechnology.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6304 [0.5 credit] (BIO 8361)**Advanced Animal Physiology**

Recent advances in animal physiology, emphasizing comparative, evolutionary and environmental approaches.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

**BIOL 6305 [1.0 credit] (BIO 6305)
Advanced Seminar in Neuroscience**

A comprehensive pro-seminar series, covering issues ranging from cellular and molecular processes through to neural systems and behaviours as well as psychopathology. Students will also be required to attend the neuroscience colloquia series as part of this course. Also listed as NEUR 6100.

Precludes additional credit for PSYC 6200, PSYC 6202, PSYC 6203, BIOL 6303.

Prerequisite(s): BIOL 5304 or equivalent.

**BIOL 6306 [0.5 credit]
Adv Seminar in Neuroscience II**

A comprehensive pro-seminar series, covering issues ranging from cellular and molecular processes through to neural systems and behaviours as well as psychopathology.

Precludes additional credit for BIOL 6303.

Prerequisite(s): BIOL 6305.

**BIOL 6402 [0.5 credit] (BIO 9101, CHM 8156, TOX 8156)
Principles of Toxicology**

The basic theorems of toxicology with examples of current research problems. The concepts of exposure, hazard and risk assessment will be defined and illustrated with experimental material from some of the more dynamic areas of modern research.

Also listed as CHEM 5708.

Prerequisite(s): permission of the director or associate director of OCIB.

**BIOL 6403 [0.5 credit] (BIO 9104, CHM 9109, TOX 9104)
Ecotoxicology**

Advances in ecotoxicology. Biological effects of contaminants. Potential for biotic perturbation from chronic and acute exposure of ecosystems to selected toxicants. Pesticide, herbicide and pollutant residue analysis and the concept of bound residues.

Also listed as CHEM 5705.

Prerequisite(s): BIOL 6402/CHEM 5708 (BIO 9101/CHM 8156), permission of the director or associate director of OCIB.

BIOL 6404 [0.5 credit] (BIO 8938)

Plant: Animal Interactions

The biology of co-evolutionary relationships between plants and phytophagous animals.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6405 [0.5 credit] (BIO 9105)

Seminar in Toxicology

A seminar course highlighting current topics in toxicology. The student will present a seminar and submit a report on the seminar topic. Student, faculty and invited seminar speakers.

Includes: Experiential Learning Activity

Also listed as CHEM 5805.

Prerequisite(s): permission of the director or associate director of OCIB.

**BIOL 6406 [0.5 credit] (BIO 9106)
Genetic Toxicology**

Topics in mutagenesis and DNA repair, including spontaneous and induced mutagenesis, genetic toxicology testing, the genetics and biochemistry of replication, DNA repair and recombination, and the role of mutagens in the development of genetic disease and cancer.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

**BIOL 6500 [0.5 credit]
Advanced Science Communication**

The theory and practice of effective science communication. Topics may include: writing for, presenting to, and engaging with diverse audiences, as well as graphic design and data visualization, social and digital media, and knowledge mobilization.

Includes: Experiential Learning Activity

BIOL 6505 [0.5 credit] (BIO 8108)

Advanced Topics in Development

Recent advances in developmental biology. Topics may include embryonic induction, regulation of morphogenesis and differentiation, mechanisms of regional specification and pattern formation, and developmental genetics.

Offered in alternate years.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6909 [0.0 credit]

Ph.D. Thesis

Includes: Experiential Learning Activity

Biomedical Engineering

This section presents the requirements for programs in:

- M.A.Sc. Biomedical Engineering
- M.A.Sc. Biomedical Engineering with Specialization in Data Science
- M.A.Sc. Biomedical Engineering with Specialization in Bioinformatics
- M.Eng. Biomedical Engineering
- M.Eng. Biomedical Engineering with Concentration in Clinical Engineering
- M.Eng. Biomedical Engineering with Specialization in Data Science
- Ph.D. Biomedical Engineering

Program Requirements

All master's students must successfully complete a total of 5.0 credits, which includes a 2.5 credit master's thesis. Courses must be selected with the approval of the student's supervisor.

M.A.Sc. Biomedical Engineering (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering	
2. 1.0 credit in BIOM (BMG) courses	1.0

3. **1.0 credit** in elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director 1.0

4. **2.5 credits in:** 2.5
BIOM 5909 [2.5] M.A.Sc. Thesis

5. **0.0 credit in:** 0.0
BIOM 5800 [0.0] Biomedical Engineering Seminar

Total Credits 5.0

M.A.Sc. Biomedical Engineering with Specialization in Data Science (5.0 credits)

Requirements:

1. **0.5 credit in:** 0.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. **0.5 credit in:** 0.5
DATA 5000 [0.5] Data Science Seminar

3. **1.0 credit in** BIOM (BMG) courses 1.0

4. **0.5 credit in** elective courses taken either at Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director 0.5

5. **2.5 credits in:** 2.5
BIOM 5909 [2.5] M.A.Sc. Thesis

6. **0.0 credit in:** 0.0
BIOM 5800 [0.0] Biomedical Engineering Seminar

Total Credits 5.0

Note: for the course work **Item 3** and **Item 4** above, one 0.5 credit data science elective course must be taken (one of BIOM 5202, BIOM 5400, BIOM 5405, COMP 5100, COMP 5101, COMP 5107, COMP 5108, COMP 5111, COMP 5112, COMP 5204, COMP 5209, COMP 5305, COMP 5306, COMP 5307, COMP 5308, COMP 5401, COMP 5703, COMP 5704, PHYS 5002, SYSC 5001, SYSC 5003, SYSC 5004, SYSC 5007, SYSC 5101, SYSC 5102, SYSC 5103, SYSC 5108, SYSC 5201, SYSC 5207, SYSC 5300, SYSC 5303, SYSC 5306, SYSC 5401, SYSC 5404, SYSC 5405, SYSC 5407, SYSC 5500, SYSC 5703, SYSC 5706).

M.A.Sc. Biomedical Engineering with Specialization in Bioinformatics (5.0 credits)

Consult the Bioinformatics section for details regarding admission requirements to this program.

Requirements - by thesis (5.0 credits)

1. **0.5 credit in:** 0.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. **1.0 credit in:** 1.0
BIOL 5515 [0.5] Bioinformatics
BIOL 5517 [0.5] Bioinformatics Seminar

3. **1.0 credit in** BIOM (BMG) courses 1.0

4. **2.5 credits in:** 2.5
BIOM 5909 [2.5] M.A.Sc. Thesis

5. **0.0 credit in:** 0.0
BIOM 5800 [0.0] Biomedical Engineering Seminar

Total Credits 5.0

M.Eng. Biomedical Engineering (5.0 credits)

Requirements - by coursework

1. **0.5 credit in:** 0.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. **2.0 credits in** BIOM (BMG) courses 2.0

3. **2.5 credits in** elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director 2.5

4. **0.0 credit in:** 0.0
BIOM 5800 [0.0] Biomedical Engineering Seminar

Total Credits 5.0

Requirements - by project

1. **0.5 credit in:** 0.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. **1.5 credits in** BIOM (BMG) courses 1.5

3. **1.5 credits in** elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director 1.5

4. **0.0 credit in:** 0.0
BIOM 5800 [0.0] Biomedical Engineering Seminar

5. **1.5 credits in:** 1.5
BIOM 5900 [1.5] Biomedical Engineering Project

Total Credits 5.0

M.Eng. Biomedical Engineering with Concentration in Clinical Engineering (5.0 credits)

Requirements:

1. **2.5 credits in:** 2.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering

BIOM 5100 [0.5] Biomedical Instrumentation

BIOM 5200 [0.5] Medical Imaging Modalities

BIOM 5406 [0.5] Clinical Engineering

HLTH 5201 [0.5] Fundamentals of Policy I: Policy Analysis

2. **0.0 credit in:** 0.0
BIOM 5800 [0.0] Biomedical Engineering Seminar

3. **1.5 credit in:** 1.5
BIOM 5901 [1.5] Clinical Engineering Project

4. **1.0 credit in:** 1.0
BIOM 5801 [1.0] Clinical Engineering Internship

Total Credits 5.0

M.Eng. Biomedical Engineering with Specialization in Data Science (5.0 credits)

Requirements - by coursework:

1. **0.5 credit in:** 0.5
BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. **0.5 credit in:** 0.5
DATA 5000 [0.5] Data Science Seminar

3. **2.0 credits in** BIOM (BMG) courses 2.0

4. **2.0 credits in** elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director 2.0

5. 0.0 credit in:	
BIOM 5800 [0.0]	Biomedical Engineering Seminar

Total Credits **5.0**

Note: for the course work Item 3 and Item 4 above, three 0.5-credit data science elective courses must be taken (three of BIOM 5400, BIOM 5405, COMP 5100, COMP 5101, COMP 5107, COMP 5108, COMP 5111, COMP 5112, COMP 5204, COMP 5209, COMP 5305, COMP 5306, COMP 5307, COMP 5308, COMP 5401, COMP 5703, COMP 5704, PHYS 5002, SYSC 5001, SYSC 5003, SYSC 5004, SYSC 5007, SYSC 5101, SYSC 5102, SYSC 5103, SYSC 5108, SYSC 5201, SYSC 5207, SYSC 5300, SYSC 5303, SYSC 5306, SYSC 5401, SYSC 5404, SYSC 5405, SYSC 5407, SYSC 5500, SYSC 5703, SYSC 5706)

Requirements - by project:

1. 0.5 credit in:	0.5
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BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. 0.5 credit in:	0.5
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DATA 5000 [0.5] Data Science Seminar

3. 1.5 credits in BIOM (BMG) courses	1.5
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4. 1.0 credit in elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director	1.0
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5. 0.0 credit in:	
BIOM 5800 [0.0]	Biomedical Engineering Seminar

6. 1.5 credit in:	1.5
BIOM 5900 [1.5]	Biomedical Engineering Project

Total Credits **5.0**

Note: for the course work Item 3 and Item 4 above, three 0.5-credit data science elective courses must be taken (three of BIOM 5400, BIOM 5405, COMP 5100, COMP 5101, COMP 5107, COMP 5108, COMP 5111, COMP 5112, COMP 5204, COMP 5209, COMP 5305, COMP 5306, COMP 5307, COMP 5308, COMP 5401, COMP 5703, COMP 5704, PHYS 5002, SYSC 5001, SYSC 5003, SYSC 5004, SYSC 5007, SYSC 5101, SYSC 5102, SYSC 5103, SYSC 5108, SYSC 5201, SYSC 5207, SYSC 5300, SYSC 5303, SYSC 5306, SYSC 5401, SYSC 5404, SYSC 5405, SYSC 5407, SYSC 5500, SYSC 5703, SYSC 5706)

Notes:

- University of Ottawa course numbers are in parentheses.
- Course selection: only a selection of courses listed is given in a particular academic year. For information on courses offered in a given year please consult the Institute's web site (www.ocibme.ca).
- Given that the students admitted to this program are from different academic backgrounds, any elective course listed in this program can only be taken by qualified students who satisfy the prerequisites.

Ph.D. Biomedical Engineering (1.5 credits)

Requirements:

1. 0.5 credit in:	0.5
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BIOM 5010 [0.5] Introduction to Biomedical Engineering

2. 0.5 credit in BIOM (BMG) courses	0.5
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3. 0.5 credit in elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director	0.5
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4. Completion of:	0.0
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BIOM 6800 [0.0] Biomedical Engineering PhD Seminar

5. Successful completion of the comprehensive examination before the end of the fourth term of registration	
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6. A written thesis proposal and oral examination to take place before the end of the sixth term of registration	
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7. 0.0 credits in:	0.0
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BIOM 6909 [0.0] Ph.D. Thesis

Total Credits **1.5**

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.Eng. Biomedical Engineering (coursework and research project pathways only), including all concentrations and specializations, is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Admission

M.A.Sc. Biomedical Engineering

The normal requirement for admission is a four-year bachelor's degree in engineering, science, computer science, or a related discipline, with an average of at least B+.

M.A.Sc. Biomedical Engineering Accelerated Pathway

The accelerated pathway in the M.A.Sc. Biomedical Engineering is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.Eng. degree with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third-year of study in the B.Eng. degree should consult with both their Undergraduate Program Coordinator and the Associate Chair for Graduate Studies to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. At least 0.5 credit in a BIOM courses (5000 level or higher) with a grade of B+ or higher.
2. Minimal overall CGPA of A-.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission

M.Eng. Biomedical Engineering

The normal requirement for admission is a four-year bachelor's degree in engineering, science, computer science, biomedical sciences, health sciences, or a related discipline, with an average of at least B+. Applicants should note that simply meeting the minimum standards for admission will not guarantee admission to the program as there are only a limited number of positions available each year.

Admission

Ph.D. Biomedical Engineering

The normal requirement for admission into the Ph.D. program is a master's degree with thesis in engineering, science, computer science, or a related discipline, with an average of at least B+.

Students registered full-time in the M.A.Sc. in Biomedical Engineering program at Carleton University, who shows outstanding academic performance and demonstrates significant promise for advanced research, may be permitted to transfer into the doctoral program, without completing the master's program, upon recommendation of the student's home academic unit.

Biomedical Engineering (BIOM) Courses

BIOM 5010 [0.5 credit]

Introduction to Biomedical Engineering

Research ethics and methods. Engineering systems approach to analysis and modelling of human anatomy and physiology. Introduction to topics including biomechanics, electrophysiology, and computational biology. Biomedical technologies. Impact of technology on society.

BIOM 5100 [0.5 credit] (BMG 5103)

Biomedical Instrumentation

Instrumentation designed to measure physiological variables related to the function of the heart, lungs, kidney, nervous and musculo-skeletal system; emergency, critical care, surgery and anaesthesia equipment. Also listed as SYSC 5302 (ELG 6320). Prerequisite(s): permission of the instructor.

BIOM 5101 [0.5 credit] (BMG 5104)

Biological Signals

Modeling of neuromuscular biological signals, including subthreshold phenomena, active behaviour of cell membranes, and innervation processes. Measurement of biological signals, including electrode effects. Time domain, frequency domain, and adaptive filtering techniques for noise reduction. Also listed as SYSC 5307 (ELG 6307).

BIOM 5106 [0.5 credit] (BMG 5109)

Advanced Topics in Medical Instrumentation

Recent and advanced topics in the field of medical instrumentation and its related areas.

BIOM 5200 [0.5 credit] (BMG 5105)

Medical Imaging Modalities

Mathematical models of image formation based on the image modality and tissue properties. Linear models of image degradation and reconstruction. Inverse problems, regularization for image reconstruction. Image formation in radiology, computed tomography, MRI, nuclear medicine, ultrasound, positron emission tomography. Also listed as SYSC 5304 (ELG 5127).

BIOM 5201 [0.5 credit] (BMG 5106)

Introduction to Medical Imaging Principles and Technology

Basic principles and technological implementation of x-ray, nuclear medicine, magnetic resonance imaging (MRI), and other imaging modalities used in medicine. Contrast, resolution, storage requirements for digital images. Applications outside medicine, future trends. Also listed as PHYS 5201. Prerequisite(s): permission of the Physics department.

BIOM 5202 [0.5 credit] (BMG 5107)

Applications in Biomedical Image Processing

Image processing methods applied to biomedical images. Overview of medical imaging modalities. Image enhancement, segmentation, registration and fusion. Image quality metrics. Image formats. Application examples. Includes: Experiential Learning Activity. Also listed as SYSC 5202.

BIOM 5203 [0.5 credit] (BMG 5108)

Advanced Topics in Biomedical Image Processing

Recent and advanced topics in the field of biomedical image processing and its related areas. Prerequisite(s): permission of the instructor.

BIOM 5300 [0.5 credit] (BMG 5300)

Biological and Engineering Materials

Properties of structural biological materials (bone, tendon, ligament, skin, cartilage, muscle, and blood vessels) from an engineering materials viewpoint. Selection of engineering materials as biomaterials. Introduction to biocompatibility. Histology of soft tissues. Viscoelasticity, mechanical properties and models of muscles, ligaments and tendons. Prerequisite(s): permission of the instructor.

BIOM 5301 [0.5 credit] (BMG 5301)

Biomechanics of Skeletal System, Motion and Tissue

Analysis of human motion. Kinematics and kinetics of various activities. Engineering analysis and modeling techniques applied to human motion. Injury mechanics, treatment, prosthetic replacements. Fracture behaviour and healing processes. Prerequisite(s): permission of the instructor.

BIOM 5302 [0.5 credit] (BMG 5302)**Biofluid Mechanics**

Properties of blood. Blood flow models for vessels, circulation systems and the heart. Artificial blood vessels. Kidney flow and exchange. Modeling of perfused tissues and cells. Transport phenomena across membranes. Molecular and ionic transport. Other body fluids. Prerequisite(s): permission of the instructor.

BIOM 5303 [0.5 credit] (BMG 5303)**Ergonomics and Design**

Review of ergonomic issues encountered in engineering design, including biomechanical, physical and physiological issues. Strategies for human interaction with complex systems, such as aircraft cockpits, equipment control consoles, human-robotic interactions, and tele-operated equipment. Prerequisite(s): permission of the instructor.

BIOM 5304 [0.5 credit] (BMG 5110)

Advanced Topics in Biomechanics and Biomaterials
Recent and advanced topics in the field of biomechanics and biomaterials and its related areas.

BIOM 5306 [0.5 credit] (BMG 5306)**Special Topics in Mechanical and Aerospace Engineering: Biomechanics**

Overview of human anatomy and physiology with emphasis on artificial organ and prosthetic device design requirement. Application of engineering principles to cells and tissues, biofluid mechanics, human body energetics, measurement techniques, mechanics of human body systems, with emphasis on the artificial heart. Also listed as MECH 5801 (MCG 5489). Precludes additional credit for MCG 5489/MECH 5801. Also offered at the undergraduate level, with different requirements, as MAAE 4906, for which additional credit is precluded.

BIOM 5311 [0.5 credit] (BMG 5311)**Design of Medical Devices and Implants**

Solutions to clinical problems through the use of implants and medical devices. Pathology of organ failure and bioengineering and clinical aspects of artificial organs. Examples: blood substitutes, oxygenators, cardiac support, vascular substitutes, pacemakers, ventricular assist devices, artificial hearts and heart valves. Prerequisite(s): permission of the instructor.

BIOM 5312 [0.5 credit] (BMG 5312)**Design of Orthopaedic Implants and Prostheses**

Anatomy of the musculo-skeletal system. Electromyography. Static and dynamic analysis of the human skeleton. Materials and manufacturing considerations for orthopaedic devices. Strength and failure theories. Implant fatigue, fracture and corrosion. Prerequisite(s): permission of the instructor.

BIOM 5314 [0.5 credit] (BMG 5314)**Biocontrols**

Application of traditional control system principles to the human body. Functionality of sample actuators and sensors. Characterization of human body control loops with emphasis on system stability, robustness, and effect of adverse external disturbance. Prerequisite(s): permission of the instructor.

BIOM 5315 [0.5 credit] (BMG 5315)**Biorobotics**

Interpretation of physical laws as applied to human motion, kinematics and dynamics of humanoid robots, modeling of biological sensors and actuators, artificial muscles, tele-manipulation, robot assisted surgery, and multi-fingered end-effectors. Design of mechatronic devices including rehabilitators, extenders, haptic devices, and minimally invasive surgery systems. Prerequisite(s): permission of the instructor.

BIOM 5316 [0.5 credit] (BMG 5316)**Biotransport Processes**

Application of chemical engineering principles to medicine and biology. Principles of mass transfer and fluid dynamics in topics such as hemodialysis, artificial kidney, diffusion in blood, mass transfer in the eye, drug distribution in the body, and advanced life support systems. Prerequisite(s): permission of the instructor.

BIOM 5323 [0.5 credit] (BMG 5323)**Rehabilitation Engineering**

Multidisciplinary approach to assistive-device design. Biomechanics applied to rehabilitation. Gait, neurological disorders, pathological gait, prosthetics, orthotics, seating, and mobility. Transducers, bio-instrumentation, EMG, FES. Augmentive communication and sensory aids. Human-assistive device interfaces, human-robot interfaces, computer-vision-guided rehabilitation aids, telerehabilitation. Prerequisite(s): permission of the instructor.

BIOM 5330 [0.5 credit] (BMG 5330)**Electromagnetic Fields and Biological Systems**

Review of electromagnetic waves at radio and microwave frequencies. Electrical and magnetic properties of tissue. Impact of electromagnetic waves on tissue. Cellular effects. Prerequisite(s): permission of the instructor.

BIOM 5400 [0.5 credit] (BMG 5317)**Medical Computing**

Introduction to information technology research used in the medically related fields such as biotechnology, cancer treatment, and biometric. Topics may include: medical imaging, telemedicine, telesurgery, DNA analysis, and medical information systems. Prerequisite(s): permission of the instructor.

BIOM 5401 [0.5 credit] (BMG 5318)**Advanced Health Care Engineering**

Healthcare and technology; overview of medical devices and sensors; safe and effective use and management of technology; telemedicine; medical databases, data collection, storage, retrieval and computers in medicine; electronic patient records, PACS; clinical decision-support systems.

Also listed as SYSC 5300 (ELG 6130), EACJ 5303 (ELG 5123).

Prerequisite(s): permission of the instructor.

BIOM 5402 [0.5 credit] (BMG 5304)**Interactive Networked Systems and Telemedicine**

Telemicromanipulator; human motor and sensory capabilities; typical interface devices; mathematical model of haptic interfaces; haptic rendering; stability and transparency; remote control schemes; time delay compensation; networking and real-time protocols, history and challenges of telemedicine; telemedicine applications: telesurgery, tele-monitoring, tele-diagnosis and tele-homecare.

Also listed as SYSC 5303 (ELG 6133).

Prerequisite(s): permission of the instructor.

BIOM 5403 [0.5 credit] (BMG 5111)**Advanced Topics in Medical Informatics and Telemedicine**

Recent and advanced topics in the field of medical informatics and telemedicine and its related areas.

BIOM 5405 [0.5 credit] (BMG 5305)**Pattern Classification and Experiment Design**

Introduction to a variety of supervised and unsupervised pattern classification techniques with emphasis on correct application. Statistically rigorous experimental design and reporting of performance results. Case studies will be drawn from various fields including biomedical informatics.

Includes: Experiential Learning Activity

Also listed as SYSC 5405 (ELG 6102).

Prerequisite(s): undergraduate introductory probability and statistics.

BIOM 5406 [0.5 credit]**Clinical Engineering**

Overview of the Canadian health care system; brief examples of other countries; clinical engineering and the management of technologies in industrialized and in developing countries; safety, reliability, quality assurance; introduction to biomedical sensor technologies; applications of telemedicine; impact of technology on health care.

Prerequisite(s): enrolment in M.Eng. Biomedical Engineering with Concentration in Clinical Engineering.

Also offered at the undergraduate level, with different requirements, as SYSC 4202, for which additional credit is precluded.

BIOM 5800 [0.0 credit] (BMG 6996)**Biomedical Engineering Seminar**

This course is in the form of seminars presented by graduate students and other researchers in the area of Biomedical Engineering. To complete this course, a student must attend at least ten seminars and make one presentation in the context of this seminar series.

Includes: Experiential Learning Activity

BIOM 5801 [1.0 credit]**Clinical Engineering Internship**

Internship placements are set in an institutional setting outside of the University. Students must complete a formal written paper in addition to their internship activities.

Includes: Experiential Learning Activity

BIOM 5900 [1.5 credit]**Biomedical Engineering Project**

Students pursuing the project-based M.Eng. completion option conduct a biomedical engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity

BIOM 5901 [1.5 credit]**Clinical Engineering Project**

Students pursuing the M.Eng. Clinical Engineering completion option conduct a clinical engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity

BIOM 5906 [0.5 credit] (BMG 7199)**Directed Studies in Biomedical Engineering**

Various possibilities exist for pursuing directed studies on topics approved by a course supervisor, including the above-listed course topics where they are not offered on a formal basis.

BIOM 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

BIOM 6800 [0.0 credit]**Biomedical Engineering PhD Seminar**

This course is in the form of seminars presented by graduate students and other researchers in the area of Biomedical Engineering.

BIOM 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Biostatistics

This section presents the requirements for programs in:

- M.Sc. Mathematics and Statistics with Collaborative Specialization in Biostatistics

Program Requirements

M.Sc. Mathematics and Statistics with Collaborative Specialization in Biostatistics (6.0 credits)

The M.Sc. in Mathematics and Statistics: Specialization in Biostatistics is part of the M.Sc. in Mathematics and Statistics with Concentration in Statistics and has two completion options.

Requirements - Thesis option (6.0 credits)

1. 3.5 credits in course work	3.5
2. 0.5 credit in:	0.5
STAT 5902 [0.5] Seminar in Biostatistics	
3. 2.0 credits in Thesis	2.0
Total Credits	6.0

Requirements - Coursework option (5.0 credits)

1. 4.5 credits in courses	4.5
2. 0.5 credit in:	0.5
STAT 5902 [0.5] Seminar in Biostatistics	
Total Credits	5.0

Unless prior approval by the Director of the collaborative program has been obtained, students in the M.Sc. Mathematics program should take EPIJ 5240, EPIJ 5241, EPIJ 6178, EPIJ 6278, STAT 5600 (MAT 5375) or STAT 5610 (MAT 5375), and STAT 5501 (MAT 5191) or STAT 5602 (MAT 5317). The remaining courses should be in Mathematics and Statistics at the graduate level.

Academic Regulations

See the General Regulations section of this Calendar.

Admission

The normal requirement for admission to the master's program is an Honours bachelor's degree in mathematics, statistics or the equivalent, with B+ or higher in the honours subject and B- or higher overall.

Applicants holding a general (three-year) degree with an overall GPA of at least B+ may be admitted to a qualifying-year program. Subsequent admission to the regular master's program depends on performance during the qualifying-year program and will be decided no later than one year after admission to the qualifying-year program. Details are outlined in the General Regulations section of this Calendar.

Epidemiology - Joint (EPIJ) Courses

EPIJ 5240 [0.5 credit] (EPI 5240)
Epidemiology

EPIJ 5241 [0.5 credit] (EPI 5241)
Epidemiology II

EPIJ 5330 [0.5 credit] (EPI 5330)
Vital and Health Statistics

EPIJ 5340 [0.25 credit] (5340)

Epidemiological Methods

Major principles of study design and analysis: validity in epidemiologic studies; precision and statistics in epidemiology studies; confounding; additive and multiplicative interaction; stratified analysis; regression models; regression modeling; bias analysis; analytical strategy.

Includes: Experiential Learning Activity

Prerequisite(s): EPI 5240, (EPI 5242 or MAT 5375).

EPIJ 5344 [0.25 credit] (EPI 5344)

Survival Analysis in the Health Sciences

Types of survival data. Hazard function and its links to incidence rate/density. Nonparametric analysis including actuarial life tables, Kaplan-Meier method and log-rank test. Proportional hazards (Cox regression) modeling. Methods for time varying covariates and non-proportional hazards. SAS software for hands-on modeling.

Includes: Experiential Learning Activity

Prerequisite(s): EPI 5340.

EPIJ 5345 [0.25 credit] (EPI 5340)

Applied Logistic Regression

Foundation of model estimation: maximum likelihood; modeling dichotomous outcome (dependent) variables: logistic regression; logistic models with several independent variables; interpretation of model parameters; model-building strategies; assessing the fit of the model; regression diagnostics. Classes will include hands-on modeling examples using SAS statistical software.

Includes: Experiential Learning Activity

Prerequisite(s): EPI 5340.

EPIJ 5346 [0.25 credit] (EPI 5346)

Applied Longitudinal and Clustered Data Analysis

Introduction to longitudinal (repeated measures) and clustered data and overview of regression models for correlated data; linear mixed effects models: modelling the mean; modelling the covariance structure; generalized estimating equations and generalized linear mixed effects models; regression diagnostics; missing data and drop-out; case studies.

Includes: Experiential Learning Activity

Prerequisite(s): EPI 5340.

EPIJ 6178 [0.5 credit] (EPI 6178)

Clinical Trials

EPIJ 6278 [0.5 credit] (EPI 6278)

Advanced Clinical Trials

Mathematics (MATH) Courses

MATH 5001 [0.5 credit] (MAT 5144)

Commutative Algebra

Prime spectrum of a commutative ring (as a topological space); localization of rings and modules; tensor product of modules and algebras; Hilbert's Nullstellensatz and consequences for finitely generated algebras; Krull dimension of a ring; integral dependence, going-up, going-down; Noether Normalization Lemma and dimension theory.

MATH 5002 [0.5 credit] (MAT 5149)**Algebraic Geometry**

Brief overview of commutative algebra, Hilbert's Nullstellensatz, algebraic sets, and Zariski topology. Affine and projective varieties over algebraically closed fields. Regular functions and rational maps. Additional topics.

MATH 5003 [0.5 credit] (MAT 5122)**Banach Algebras**

Commutative Banach algebras; the space of maximal ideals; representation of Banach algebras as function algebras and as operator algebras; the spectrum of an element. Special types of Banach algebras: for example, regular algebras with involution, applications.

MATH 5005 [0.5 credit] (MAT 5127)**Complex Analysis**

Complex differentiation and integration, harmonic functions, maximum modulus principle, Runge's theorem, conformal mapping, entire and meromorphic functions, analytic continuation.

MATH 5007 [0.5 credit] (MAT 5125)**Real Analysis I (Measure Theory and Integration)**

General measure and integral, Lebesgue measure and integration on \mathbb{R} , Fubini's theorem, Lebesgue-Radon-Nikodym theorem, absolute continuity and differentiation, LP-spaces. Selected topics such as Daniell-Stone theory. Also offered at the undergraduate level, with different requirements, as MATH 4007, for which additional credit is precluded.

MATH 5008 [0.5 credit] (MAT 5126)**Real Analysis II (Functional Analysis)**

Banach and Hilbert spaces, bounded linear operators, dual spaces. Topics selected from: weak-topologies, Alaoglu's theorem, compact operators, differential calculus in Banach spaces, Riesz representation theorems. Prerequisite(s): MATH 5007 (MAT 5125) or permission of the School.

Also offered at the undergraduate level, with different requirements, as MATH 4003, for which additional credit is precluded.

MATH 5009 [0.5 credit] (MAT 5121)**Introduction to Hilbert Space**

Geometry of Hilbert Space, spectral theory of linear operators in Hilbert Space.

MATH 5102 [0.5 credit] (MAT 5148)**Group Representations and Applications**

An introduction to group representations and character theory, with selected applications.

MATH 5103 [0.5 credit] (MAT 5146)**Rings and Modules**

Generalizations of the Wedderburn-Artin theorem and applications, homological algebra.

MATH 5104 [0.5 credit] (MAT 5143)**Lie Algebras**

Basic concepts: ideals, homomorphisms, nilpotent, solvable, semi-simple. Representations, universal enveloping algebra. Semi-simple Lie algebras: structure theory, classification, and representation theory. Prerequisite(s): MATH 5107 (MAT 5141) and MATH 5109 (MAT 5142) or permission of the School.

MATH 5106 [0.5 credit] (MAT 5145)**Group Theory**

Fundamental principles as applied to abelian, nilpotent, solvable, free, and finite groups; representations. Also offered at the undergraduate level, with different requirements, as MATH 4106, for which additional credit is precluded.

MATH 5107 [0.5 credit] (MAT 5141)**Algebra I: Rings and Modules**

Noetherian and artinian modules and rings. Varieties, Hilbert Basis Theorem, radical ideals, Hilbert Nullstellensatz. Localization and tensor products of modules and algebras. Semisimple rings and modules, Schur's Lemma, Jacobson Density Theorem, Artin-Wedderburn Theorem. Short exact sequences. Free, projective, injective and flat modules.

MATH 5108 [0.5 credit] (MAT 5147)**Homological Algebra and Category Theory**

Axioms of set theory, categories, functors, natural transformations; free, projective, injective and flat modules; tensor products and homology functors, derived functors; dimension theory.

Also offered at the undergraduate level, with different requirements, as MATH 4108, for which additional credit is precluded.

MATH 5109 [0.5 credit] (MAT 5142)**Algebra II: Groups and Galois Theory**

Group actions, class equation, Sylow theorems, central composition and derived series, Jordan-Holder theorem, field extensions and minimal polynomials, algebraic closure, separable extensions, integrality, Galois groups, fundamental theorem of Galois theory, finite fields, cyclotomic field extensions, fundamental theorem of algebra, transcendental extensions.

MATH 5201 [0.5 credit] (MAT 5150)**Topics in Geometry**

Various axiom systems of geometry. Detailed examinations of at least one modern approach to foundations, with emphasis upon the connections with group theory.

MATH 5202 [0.5 credit] (MAT 5168)**Homology Theory**

The Eilenberg-Steenrod axioms and their consequences, singular homology theory, applications to topology and algebra.

Prerequisite(s): MATH 5205 (MAT 5151) or permission of the School.

MATH 5205 [0.5 credit] (MAT 5151)**Topology I**

Topological spaces, product and identification topologies, countability and separation axioms, compactness, connectedness, homotopy, fundamental group, net and filter convergence.

Also offered at the undergraduate level, with different requirements, as MATH 4205, for which additional credit is precluded.

MATH 5206 [0.5 credit] (MAT 5152)**Topology II**

Covering spaces, homology via the Eilenberg-Steenrod Axioms, applications, construction of a homology functor. Prerequisite(s): MATH 5205 (MAT 5151) or permission of the School.

Also offered at the undergraduate level, with different requirements, as MATH 4206, for which additional credit is precluded.

MATH 5207 [0.5 credit] (MAT 5169)**Foundations of Geometry**

A study of at least one modern axiom system of Euclidean and non-Euclidean geometry, embedding of hyperbolic and Euclidean geometries in the projective plane, groups of motions, models of non-Euclidean geometry.

MATH 5208 [0.5 credit] (MAT 5155)**Differentiable Manifolds**

A study of differentiable manifolds from the point of view of either differential topology or differential geometry. Topics such as smooth mappings, transversality, intersection theory, vector fields on manifolds, Gaussian curvature, Riemannian manifolds, differential forms, tensors, and connections are included.

MATH 5300 [0.5 credit] (MAT 5160)**Mathematical Cryptography**

Analysis of cryptographic methods used in authentication and data protection, with particular attention to the underlying mathematics, e.g. Algebraic Geometry, Number Theory, and Finite Fields. Advanced topics on Public-Key Cryptography: RSA and integer factorization, Diffie-Hellman, discrete logarithms, elliptic curves. Topics in current research.

MATH 5301 [0.5 credit] (MAT 5161)**Mathematical Logic**

A basic graduate course in mathematical logic. Propositional and predicate logic, proof theory, Gentzen's Cut-Elimination, completeness, compactness, Henkin models, model theory, arithmetic and undecidability. Special topics (time permitting) depending on interests of instructor and audience.

MATH 5305 [0.5 credit] (MAT 5163)**Analytic Number Theory**

Dirichlet series, characters, Zeta-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, binary quadratic forms.

MATH 5306 [0.5 credit] (MAT 5164)**Algebraic Number Theory**

Algebraic number fields, bases, algebraic integers, integral bases, arithmetic in algebraic number fields, ideal theory, class number.

Also offered at the undergraduate level, with different requirements, as MATH 4306, for which additional credit is precluded.

MATH 5403 [0.5 credit] (MAT 5187)**Topics in Applied Mathematics****MATH 5405 [0.5 credit] (MAT 5131)****Ordinary Differential Equations**

Linear systems, fundamental solution. Nonlinear systems, existence and uniqueness, flow. Equilibria, periodic solutions, stability. Invariant manifolds and hyperbolic theory. One or two specialized topics taken from, but not limited to: perturbation and asymptotic methods, normal forms and bifurcations, global dynamics.

MATH 5406 [0.5 credit] (MAT 5133)**Partial Differential Equations**

First-order equations, characteristics method, classification of second-order equations, separation of variables, Green's functions. L_p and Sobolev spaces, distributions, variational formulation and weak solutions, Lax-Milgram theorem, Galerkin approximation. Parabolic PDEs. Wave equations, hyperbolic systems, nonlinear PDEs, reaction-diffusion equations, infinite-dimensional dynamical systems, regularity.

MATH 5407 [0.5 credit] (MAT 5134)**Topics in Partial Differential Equations**

Theory of distributions, initial-value problems based on two-dimensional wave equations, Laplace transform, Fourier integral transform, diffusion problems, Helmholtz equation with application to boundary and initial-value problems in cylindrical and spherical coordinates. Prerequisite(s): MATH 5406 or permission of the School. Also offered at the undergraduate level, with different requirements, as MATH 4701, for which additional credit is precluded.

MATH 5408 [0.5 credit] (MAT 5185)**Asymptotic Methods of Applied Mathematics**

Asymptotic series: properties, matching, application to differential equations. Asymptotic expansion of integrals: elementary methods, methods of Laplace, Stationary Phase and Steepest Descent, Watson's Lemma, Riemann-Lebesgue Lemma. Perturbation methods: regular and singular perturbation for differential equations, multiple scale analysis, boundary layer theory, WKB theory.

MATH 5605 [0.5 credit] (MAT 5165)**Theory of Automata**

Algebraic structure of sequential machines, decomposition of machines; finite automata, formal languages; complexity.

Also offered at the undergraduate level, with different requirements, as MATH 4805/COMP 4805, for which additional credit is precluded.

MATH 5607 [0.5 credit] (MAT 5324)**Game Theory**

Two-person zero-sum games; infinite games; multi-stage games; differential games; utility theory; two-person general-sum games; bargaining problem; n-person games; games with a continuum of players.

Also offered at the undergraduate level, with different requirements, as MATH 4807, for which additional credit is precluded.

MATH 5609 [0.5 credit] (MAT 5301)**Topics in Combinatorial Mathematics**

Courses in special topics related to Combinatorial Mathematics, not covered by other graduate courses.

MATH 5801 [0.5 credit] (MAT 5303)**Linear Optimization**

Linear programming problems; simplex method, upper bounded variables, free variables; duality; postoptimality analysis; linear programs having special structures; integer programming problems; unimodularity; knapsack problem.

MATH 5803 [0.5 credit] (MAT 5304)**Nonlinear Optimization**

Methods for unconstrained and constrained optimization problems; Kuhn-Tucker conditions; penalty functions; duality; quadratic programming; geometric programming; separable programming; integer nonlinear programming; pseudo-Boolean programming; dynamic programming.

MATH 5804 [0.5 credit] (MAT 5307)**Topics in Operations Research****MATH 5805 [0.5 credit] (MAT 5308)****Topics in Algorithm Design****MATH 5806 [0.5 credit] (MAT 5180)****Numerical Analysis**

Error analysis for fixed and floating point arithmetic; systems of linear equations; eigen-value problems; sparse matrices; interpolation and approximation, including Fourier approximation; numerical solution of ordinary and partial differential equations.

MATH 5807 [0.5 credit] (MAT 5167)**Formal Language and Syntax Analysis**

Computability, unsolvable and NP-hard problems. Formal languages, classes of language automata. Principles of compiler design, syntax analysis, parsing (top-down, bottom-up), ambiguity, operator precedence, automatic construction of efficient parsers, LR, LR(O), LR(k), SLR, LL(k). Syntax directed translation.

Also listed as COMP 5807.

Prerequisite(s): MATH 5605.

MATH 5808 [0.5 credit] (MAT 5305)**Combinatorial Optimization I**

Network flow theory and related material. Topics will include shortest paths, minimum spanning trees, maximum flows, minimum cost flows. Optimal matching in bipartite graphs.

MATH 5809 [0.5 credit] (MAT 5306)**Combinatorial Optimization II**

Topics include optimal matching in non-bipartite graphs, Euler tours, and the Chinese Postman problem. Other extensions of network flows: dynamic flows, multicommodity flows, and flows with gains, bottleneck problems. Matroid optimization. Enumerative and heuristic algorithms for the Traveling Salesman and other problems. Prerequisite(s): MATH 5808 or permission of the school.

MATH 5818 [0.5 credit] (MAT 5105)**Discrete Applied Mathematics I: Graph Theory**

Paths and cycles, trees, connectivity, Euler tours and Hamilton cycles, edge colouring, independent sets and cliques, vertex colouring, planar graphs, directed graphs. Selected topics from one or more of the following areas: algebraic graph theory, topological graph theory, random graphs.

MATH 5819 [0.5 credit] (MAT 5107)**Discrete Applied Mathematics II: Combinatorial Enumeration**

Ordinary and exponential generating functions, product formulas, permutations, rooted trees, cycle index, WZ method. Lagrange inversions, singularity analysis of generating functions and asymptotics. Selected topics from one or more of the following areas: random graphs, random combinatorial structures, hypergeometric functions.

MATH 5821 [0.5 credit] (MAT 5341)**Quantum Computing**

Space of quantum bits; entanglement. Observables in quantum mechanics. Density matrix and Schmidt decomposition. Quantum cryptography. Classical and quantum logic gates. Quantum Fourier transform. Shor's quantum algorithm for factorization of integers.

MATH 5822 [0.5 credit] (MAT 5343)**Mathematical Aspects of Wavelets and Digital Signal Processing**

Lossless compression methods. Discrete Fourier transform and Fourier-based compression methods. JPEG and MPEG. Wavelet analysis. Digital filters and discrete wavelet transform. Daubechies wavelets. Wavelet compression.

Also offered at the undergraduate level, with different requirements, as MATH 4822, for which additional credit is precluded.

MATH 5900 [0.5 credit] (MAT 5990)**Seminar****MATH 5901 [0.5 credit] (MAT 5991)****Directed Studies****MATH 5906 [0.5 credit] (MAT 5996)****Research Internship**

This course affords students the opportunity to undertake research in mathematics as a cooperative project with governmental or industrial sponsors. The grade will be based upon the mathematical content and upon oral and written presentation of results.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the graduate director.

MATH 5909 [2.0 credits] (MAT 7999)**M.Sc. Thesis in Mathematics**

Includes: Experiential Learning Activity

MATH 5910 [1.0 credit] (MAT 6997)**M.Sc. Project in Mathematics**

Project in mathematics supervised by a professor approved by the graduate director resulting in a major report (approximately 30-40 pages), together with a short presentation on the report. Graded by the supervisor and another professor appointed by the graduate director.

Includes: Experiential Learning Activity

Precludes additional credit for MATH 5909.

MATH 5993 [0.0 credit] (MAT 5993)**Research Participation**

Includes: Experiential Learning Activity

MATH 6002 [0.5 credit] (MAT 5309)**Harmonic Analysis on Groups**

Transformation groups; Haar measure; unitary representations of locally compact groups; completeness and compact groups; character theory; decomposition.

MATH 6008 [0.5 credit] (MAT 5326)**Topics in Analysis****MATH 6101 [0.5 credit] (MAT 5327)****Topics in Algebra****MATH 6104 [0.5 credit] (MAT 5158)****Lie Groups**

Matrix groups: one-parameter groups, exponential map, Campbell-Hausdorff formula, Lie algebra of a matrix group, integration on matrix groups. Abstract Lie groups. Prerequisite(s): MATH 5007 and PADM 5107 or permission of the School.

MATH 6201 [0.5 credit] (MAT 5312)**Topics in Topology****MATH 6507 [0.5 credit] (MAT 5319)****Topics in Probability****MATH 6806 [0.5 credit] (MAT 5361)****Topics in Mathematical Logic****MATH 6807 [0.5 credit] (MAT 5162)****Mathematical Foundations of Computer Science**

Foundations of functional languages, lambda calculi (typed, polymorphically typed, untyped), Curry-Howard Isomorphism, proofs-as-programs, normalization and rewriting theory, operational semantics, type assignment, introduction to denotational semantics of programs, fixed-point programming.

MATH 6900 [0.5 credit] (MAT 6990)**Seminar****MATH 6901 [0.5 credit] (MAT 6991)****Directed Studies****MATH 6909 [0.0 credit] (MAT 9999)****Ph.D. Thesis**

Includes: Experiential Learning Activity

Statistics (STAT) Courses**STAT 5500 [0.5 credit] (MAT 5177)****Multivariate Normal Theory**

Multivariate normal distribution properties, characterization, estimation of means, and covariance matrix. Regression approach to distribution theory of statistics; multivariate tests; correlations; classification of observations; Wilks' criteria.

STAT 5501 [0.5 credit] (MAT 5191)**Mathematical Statistics II**

Confidence intervals and pivots; Bayesian intervals; optimal tests and Neyman-Pearson theory; likelihood ratio and score tests; significance tests; goodness-of-fit tests; large sample theory and applications to maximum likelihood and robust estimation.

Prerequisite(s): STAT 5600 or permission of the School.

Also offered at the undergraduate level, with different requirements, as STAT 4507, for which additional credit is precluded.

STAT 5502 [0.5 credit] (MAT 5192)**Sampling Theory and Methods**

Unequal probability sampling with and without replacement; unified theory for standard errors; prediction approach; ratio and regression estimation; stratification and optimal designs; multistage cluster sampling; double sampling; domains of study; post-stratification; nonresponse; measurement errors; related topics.

STAT 5503 [0.5 credit] (MAT 5193)**Linear Models**

Theory of non full rank linear models; estimable functions, best linear unbiased estimators, hypotheses testing, confidence regions; multi-way classifications; analysis of covariance; variance component models; maximum likelihood estimation, Minque, Anova methods; miscellaneous topics.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5504 [0.5 credit] (MAT 5194)**Stochastic Processes and Time Series Analysis**

Stationary stochastic processes, inference for stochastic processes, applications to time series and spatial series analysis.

STAT 5505 [0.5 credit] (MAT 5195)**Design of Experiments**

Overview of linear model theory; orthogonality; randomized block and split plot designs; latin square designs; randomization theory; incomplete block designs; factorial experiments: confounding and fractional replication; response surface methodology. Miscellaneous topics.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5506 [0.5 credit] (MAT 5175)**Robust Statistical Inference**

Tests for location, scale, and regression parameters; derivation of rank tests; distribution theory of linear rank statistics and their efficiency. Robust estimation of location, scale and regression parameters; Huber's M-estimators, Rank-methods, L-estimators. Influence function. Adaptive procedures.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5507 [0.5 credit] (MAT 5176)**Advanced Statistical Inference**

Pure significance test; uniformly most powerful unbiased and invariant tests; asymptotic comparison of tests; confidence intervals; large-sample theory of likelihood ratio and chi-square tests; likelihood inference; Bayesian inference; fiducial and structural methods; resampling methods.

Prerequisite(s): STAT 5501 or permission of the School.

STAT 5508 [0.5 credit] (MAT 5172)**Topics in Stochastic Processes**

Course contents will vary, but will include topics drawn from Markov processes. Brownian motion, stochastic differential equations, martingales, Markov random fields, random measures, and infinite particle systems, advanced topics in modeling, population models.

STAT 5509 [0.5 credit] (MAT 5196)**Multivariate Analysis**

Multivariate methods of data analysis, including principal components, cluster analysis, factor analysis, canonical correlation, MANOVA, profile analysis, discriminant analysis, path analysis.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5516 [0.5 credit] (MAT 5197)**Nonparametric Statistics**

Order statistics; projections; U-statistics; L-estimators; rank, sign, and permutation test statistics; nonparametric tests of goodness-of-fit, homogeneity, symmetry, and independence; nonparametric density estimation; nonparametric regression analysis: kernel estimators, orthogonal series estimators, smoothing splines; high-dimensional inference problems and false discovery.

Prerequisite(s): STAT 5600 or permission of the School.

Also offered at the undergraduate level, with different requirements, as STAT 4506, for which additional credit is precluded.

Lectures three hours a week.

STAT 5600 [0.5 credit] (MAT 5190)**Mathematical Statistics I**

Statistical decision theory; likelihood functions; sufficiency; factorization theorem; exponential families; UMVU estimators; Fisher's information; Cramer-Rao lower bound; maximum likelihood, moment estimation; invariant and robust point estimation; asymptotic properties; Bayesian point estimation.

Also offered at the undergraduate level, with different requirements, as STAT 4500, for which additional credit is precluded.

STAT 5601 [0.5 credit] (MAT 5197)**Stochastic Optimization**

Topics chosen from stochastic dynamic programming, Markov decision processes, search theory, optimal stopping.

STAT 5602 [0.5 credit] (MAT 5317)**Analysis of Categorical Data**

Analysis of one-way and two-way tables of nominal data; multi-dimensional contingency tables, log-linear models; tests of symmetry, marginal homogeneity in square tables; incomplete tables; tables with ordered categories; fixed margins, logistic models with binary response; measures of association and agreement.

Prerequisite(s): STAT 5600 and STAT 5501, or permission of the School.

STAT 5603 [0.5 credit] (MAT 5318)**Reliability and Survival Analysis**

Types of censored data; nonparametric estimation of survival function; graphical procedures for model identification; parametric models and maximum likelihood estimation; exponential and Weibull regression models; nonparametric hazard function models and associated statistical inference; rank tests with censored data applications.

Prerequisite(s): STAT 5600 and STAT 5501 or permission of the School.

STAT 5604 [0.5 credit] (MAT 5173)**Stochastic Analysis**

Brownian motion, continuous martingales, and stochastic integration.

Prerequisite(s): STAT 5708 or permission of the School.

STAT 5610 [0.5 credit] (MAT 5375)**Introduction to Mathematical Statistics**

Limit theorems. Sampling distributions. Parametric estimation. Concepts of sufficiency and efficiency. Neyman-Pearson paradigm, likelihood ratio tests. Parametric and non-parametric methods for two-sample comparisons. Notions of experimental design, categorical data analysis, the general linear model, decision theory and Bayesian inference.

Precludes additional credit for STAT 5600.

Also offered at the undergraduate level, with different requirements, as STAT 4500, for which additional credit is precluded.

STAT 5701 [0.5 credit] (MAT 5198)**Stochastic Models**

Markov systems, stochastic networks, queuing networks, spatial processes, approximation methods in stochastic processes and queuing theory. Applications to the modeling and analysis of computer-communications systems and other distributed networks.

Also offered at the undergraduate level, with different requirements, as STAT 4508, for which additional credit is precluded.

STAT 5702 [0.5 credit] (MAT 5182)**Modern Applied and Computational Statistics**

Resampling and computer intensive methods: bootstrap, jackknife with applications to bias estimation, variance estimation, confidence intervals, and regression analysis. Smoothing methods in curve estimation; statistical classification and pattern recognition: error counting methods, optimal classifiers, bootstrap estimates of the bias of the misclassification error.

STAT 5703 [0.5 credit] (MAT 5181)**Data Mining**

Visualization and knowledge discovery in massive datasets; unsupervised learning: clustering algorithms; dimension reduction; supervised learning: pattern recognition, smoothing techniques, classification.

Computer software will be used.

Includes: Experiential Learning Activity

STAT 5704 [0.5 credit] (MAT 5174)**Network Performance**

Advanced techniques in performance evaluation of large complex networks. Topics may include classical queueing theory and simulation analysis; models of packet networks; loss and delay systems; blocking probabilities.

STAT 5705 [0.5 credit] (MAT 5373)**Statistical Machine Learning**

Discriminant analysis, principal component analysis, support vector machines; reproducing kernel Hilbert spaces and kernel methods; neural networks; VC Theory, PAC learning. Additional topics may include: Bayesian modelling, manifold learning, boosting.

Includes: Experiential Learning Activity

STAT 5708 [0.5 credit] (MAT 5170)**Probability Theory I**

Probability spaces, random variables, expected values as integrals, joint distributions, independence and product measures, cumulative distribution functions and extensions of probability measures, Borel-Cantelli lemmas, convergence concepts, independent identically distributed sequences of random variables.

STAT 5709 [0.5 credit] (MAT 5171)**Probability Theory II**

Laws of large numbers, characteristic functions, central limit theorem, conditional probabilities and expectations, basic properties and convergence theorems for martingales, introduction to Brownian motion.

Prerequisite(s): STAT 5708 (MAT 5170) or permission of the School.

STAT 5713 [0.5 credit]**Advanced Data Mining**

Topics from recent literature on mining complex data structures and data such as: tree/graph, sequence, web/test, stream, spatiotemporal, high-dimensional, multivariate time series, mixed-mode; clustering (EM, topic modeling, fuzzy), SVM; multi-label learning; deep learning; combining learners, network analysis/link prediction/graphical models (Bayesian, Markov networks); anomaly detection.

STAT 5900 [0.5 credit] (MAT 5990)**Seminar****STAT 5901 [0.5 credit] (MAT 6991)****Directed Studies**

STAT 5902 [0.5 credit] (MAT 5992)**Seminar in Biostatistics**

Students work in teams on the analysis of experimental data or experimental plans. The participation of experimenters in these teams is encouraged. Student teams present their results in the seminar, and prepare a brief written report on their work.

STAT 5904 [0.5 credit] (MAT 5993)**Statistical Internship**

This project-oriented course allows students to undertake statistical research and data analysis projects as a cooperative project with governmental or industrial sponsors. Practical data analysis and consulting skills will be emphasized. The grade will be based upon oral and written presentation of results.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the graduate director.

STAT 5909 [2.0 credits]**M.Sc. Thesis in Statistics****STAT 5910 [1.0 credit]****M.Sc. Project in Statistics**

Project in statistics supervised by a professor approved by the graduate director resulting in a major report (approximately 30-40 pages), together with a short presentation on the report. Graded by the supervisor and another professor appointed by the graduate director.

Includes: Experiential Learning Activity

STAT 6508 [0.5 credit] (MAT 5314)**Topics in Probability and Statistics****STAT 6900 [0.5 credit] (MAT 6990)****Seminar****STAT 6901 [0.5 credit] (MAT 6991)****Directed Studies****STAT 6909 [0.0 credit] (MAT 9999)****Ph.D. Thesis**

Includes: Experiential Learning Activity

Business

This section presents the requirements for programs in:

- Master of Accounting
- M.B.A.
- M.B.A. with concentration
- M.B.A. with concentrations
- Master of Arts Economics with Concentration in Financial Economics - Master of Business Administration with Concentration in Finance and Economics
- M.B.A. Concentration in Arts Management
- M.B.A. Concentration in Business Analytics
- M.B.A. Concentration in Financial Management
- M.B.A. Concentration in International Business

- M.B.A. Concentration in International Development Management
- M.B.A. Concentration in Management and Change
- M.B.A. Concentration in Technology Management
- M.B.A. with Collaborative Specialization in Climate Change
- M.B.A. with Specialization in African Studies
- M.Sc. Management
- M.Sc. Management with Collaborative Specialization in Climate Change
- Ph.D. Management

Program Requirements**Master of Accounting (6.0 credits)****Requirements:**

1. 5.0 credits in compulsory courses:	5.0
ACCT 5120 [0.5] Advanced Concepts	
ACCT 5121 [0.5] Advanced Concepts II	
ACCT 5123 [0.5] Advanced Taxation	
ACCT 5124 [0.25] Data Analytics for Professional Accountants	
ACCT 5125 [0.5] Advanced Assurance	
ACCT 5128 [0.25] Strategy for Professional Accountants	
ACCT 5129 [0.25] Professional Accounting Cases I	
ACCT 5130 [0.5] Advanced Finance	
ACCT 5131 [0.5] Performance Management	
ACCT 5134 [0.5] Advanced Integration I	
ACCT 5136 [0.5] Advanced Integration II	
ACCT 5137 [0.25] Professional Accounting Cases II	
2. 1.0 credit in:	1.0
ACCT 5199 [1.0] Internship	
Total Credits	6.0

M.B.A. Program Structure and Variations**M.B.A. (8.5 credits)**

1. 4.25 credits in compulsory core courses	4.25
2. 3.25 credits in elective courses	3.25
3. 1.0 credit in:	1.0
BUSI 5999 [1.0] Internship ¹	
4. 0.0 credit in:	
BUSI 5998 [0.0] MBA Skills Workshop ²	
Total Credits	8.5

M.B.A. with concentration (8.5 credits)

1. 4.25 credits in compulsory core courses	4.25
2. 2.25 credits in a chosen concentration	2.25
3. 1.0 credit in elective courses	1.0
4. 1.0 credit in: ¹	1.0
BUSI 5999 [1.0] Internship ¹	
5. 0.0 credit in:	0.0
BUSI 5998 [0.0] MBA Skills Workshop ²	
Total Credits	8.5

M.B.A. with concentrations (9.75 credits)**Requirements (full-time stream):**

1. 4.25 credits in compulsory core courses	4.25
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2. **4.5 credits** in the concentrations: 2.25 credits in each of two concentrations 4.5

3. **1.0 credit** in: 1.0
BUSI 5999 [1.0] Internship ¹

4. **0.0 credit** in: 0.0
BUSI 5998 [0.0] MBA Skills Workshop ²

Total Credits 9.75

¹ Students with less than two (2) years of professional employment experience must successfully complete BUSI 5999 [1.0] Internship in order to graduate. Students with two or more years work experience may apply for an exemption.

Variations:

M.B.A. - Accelerated stream (6.0 credits)

1. **1.75 credits** in compulsory core courses ¹ 1.75

2. **3.25 credits** in elective courses 3.25

3. **1.0 credit** in: 1.0
BUSI 5999 [1.0] Internship ²

4. **0.0 credit** in: 0.0
BUSI 5998 [0.0] MBA Skills Workshop

Total Credits 6.0

M.B.A. - Accelerated stream with one concentration (6.0 credits)

1. **1.75 credits** in compulsory core courses ¹ 1.75

2. **2.25 credits** in a chosen concentration 2.25

3. **1.0 credit** in elective courses 1.0

4. **1.0 credit** in: 1.0
BUSI 5999 [1.0] Internship

5. **0.0 credit** in: 0.0
BUSI 5998 [0.0] MBA Skills Workshop

Total Credits 6.0

M.B.A. - Accelerated stream with two concentrations (7.25 credits for full-time stream)

1. **1.75 credits** in compulsory core courses ¹ 1.75

2. **4.5 credits** in the concentrations: 2.25 credits in each of two concentrations 4.5

3. **1.0 credit** in: 1.0
BUSI 5999 [1.0] Internship

4. **0.0 credit** in: 0.0
BUSI 5998 [0.0] MBA Skills Workshop

Total Credits 7.25

¹ The required core courses will be based on previous course work. Courses may vary from one student to another and will depend on their undergraduate program, grades obtained in the relevant undergraduate courses and their chosen concentration.

² Students with less than two (2) years of relevant professional employment experience must successfully complete the Internship in order to graduate. Students with two or more years relevant work experience may apply for an exemption.

³ Non-credit required skills workshop.

**Master of Arts Economics with Concentration in Financial Economics -
Master of Business Administration
with Concentration in Finance and Economics
(10.0 credits)**

Students completing the dual degree pathway will graduate with: M.A. Economics with Concentration in Financial Economics, and M.B.A. with Concentration in Financial Economics.

Requirements:

1. **6.0 credits** in compulsory courses: 6.0

ACCT 5001 [0.25]	Financial Accounting
ACCT 5002 [0.25]	Managerial Accounting
BUSI 5802 [0.25]	Business Ethics
BUSI 5998 [0.0]	MBA Skills Workshop
ECON 5020 [0.5]	Microeconomic Theory
ECON 5021 [0.5]	Macroeconomic Theory
ECON 5027 [0.5]	Econometrics I
ECON 5029 [0.5]	Methods of Economic Research
FINA 5501 [0.25]	Financial Management
FINA 5502 [0.25]	Corporate Finance
IBUS 5701 [0.25]	International Business
ITIS 5401 [0.25]	Managing Information Systems in Organizations
MGMT 5100 [0.5]	Managing People and Organizations
MKTG 5200 [0.5]	Marketing Strategy
TOMS 5302 [0.25]	Operations Management
STGY 5900 [0.5]	Corporate and Business Strategy
STGY 5903 [0.5]	Strategic Concepts

2. **1.75 credits** in required concentration courses: 1.75

ECON 5051 [0.5]	Asset Pricing
ECON 5052 [0.5]	Financial Markets and Instruments
FINA 5512 [0.25]	Valuation
FINA 5513 [0.25]	Mergers and Acquisitions
FINA 5521 [0.25]	Financial Management Concentration Integration

3. **0.5 credit** in elective concentration from: 0.5

ECON 5055 [0.5]	Financial Econometrics
ECON 5058 [0.5]	Advanced Topics in Financial Economics
ECON 5602 [0.5]	International Monetary Theory and Policy
ECON 5608 [0.5]	Monetary Economics and Financial Intermediation
ECON 5713 [0.5]	Time-Series Econometrics

4. **0.75 credit** in M.B.A. elective courses 0.75

5. **1.0 credit** in: 1.0

BUSI 5999 [1.0]	Internship (Students with less than two (2) years of relevant professional employment experience must successfully complete the Internship in order to graduate. Students with two or more years relevant work experience may apply for an exemption.)
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Total Credits 10.0

M.B.A. Core Course Requirements

M.B.A. Compulsory Core Courses

ACCT 5001 [0.25]	Financial Accounting
ACCT 5002 [0.25]	Managerial Accounting
BUSI 5801 [0.25]	Statistics for Managers
BUSI 5802 [0.25]	Business Ethics
BUSI 5998 [0.0]	MBA Skills Workshop
FINA 5501 [0.25]	Financial Management
FINA 5502 [0.25]	Corporate Finance
IBUS 5701 [0.25]	International Business
ITIS 5401 [0.25]	Managing Information Systems in Organizations
MGMT 5100 [0.5]	Managing People and Organizations
MKTG 5200 [0.5]	Marketing Strategy
TOMS 5302 [0.25]	Operations Management
STGY 5900 [0.5]	Corporate and Business Strategy
STGY 5903 [0.5]	Strategic Concepts
For students in International Development Management Concentration Only:	
IDMG 5610 [0.25]	Introduction to International Development (replaces ACCT 5001 in core)
ITIS 5403 [0.25]	ICT for Development (replaces ITIS 5401 in core)
TOMS 5314 [0.25]	Supply Chain Management (replaces TOMS 5302 in core)

M.B.A. Concentration in Arts Management (2.25 credits)

Concentration requirements:

1. 1.25 credits in: 1.25

MGMT 5129 [0.5]	Managing the Arts
MKTG 5229 [0.5]	Marketing in the Arts and Culture Sectors
MGMT 5128 [0.25]	Ethical Issues in Managing Arts and Culture Organizations

2. 1.0 credit in elective concentration courses, taken from one of the following three areas: 1.0

Art History

ARTH 5112 [0.5]	Topics in Historiography, Methodology and Criticism
ARTH 5113 [0.5]	Perspectives on Pre-Modernity
ARTH 5114 [0.5]	Feminism and Gender
ARTH 5115 [0.5]	Topics in Modern and Contemporary Art
ARTH 5117 [0.5]	Community/Identity
ARTH 5210 [0.5]	Topics in Indigenous Art
ARTH 5218 [0.5]	Museum Studies and Curatorial Practice
ARTH 5403 [0.5]	Architecture and Its Institutions
ARTH 5500 [0.5]	Photography and Its Institutions

Canadian Studies

CDNS 5302 [0.5]	Canadian Cultural Policy
CDNS 5401 [0.5]	Heritage Conservation I: History, Principles, and Concepts
CDNS 5402 [0.5]	Heritage Conservation II: Theory in Practice

Music

One credit from any of the courses between MUSI 5000 and MUSI 5201 (inclusive). Some courses require permission of the department.

Total Credits 2.25

M.B.A. Concentration in Business Analytics (2.25 credits)

Concentration requirements:

1. 1.75 credits in: 1.75

DATA 5000 [0.5]	Data Science Seminar
ITIS 5431 [0.25]	Business Analytics for Managers
ITIS 5433 [0.5]	Business Analytics Methods
ITIS 5434 [0.25]	Data Visualization for Business Analytics
TOMS 5303 [0.25]	Managing Projects

2. 0.5 credit in elective concentration course from: 0.5

ITIS 5408 [0.5]	Social Analytics
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or 0.5 credit course at the 4000 level or above (with permission of the School).

Total Credits 2.25

M.B.A. Concentration in Financial Management (2.25 credits)

Concentration requirements:

1. 2.25 credits in: 2.25

ACCT 5011 [0.25]	Financial Statement Analysis
ACCT 5012 [0.25]	Performance Measurement and Control
ACCT 5013 [0.25]	Financial Reporting and Control in Public Organizations
ACCT 5014 [0.25]	Governance and Accountability
FINA 5511 [0.25]	Investments
FINA 5512 [0.25]	Valuation
FINA 5513 [0.25]	Mergers and Acquisitions
FINA 5514 [0.25]	International Finance
FINA 5521 [0.25]	Financial Management Concentration Integration

Total Credits 2.25

M.B.A. Concentration in International Business (2.25 credits)

Concentration requirements:

1. 2.25 credits in: 2.25

IBUS 5711 [0.25]	International Marketing and Trade
IBUS 5712 [0.25]	Business and Government in Emerging Economies
IBUS 5713 [0.25]	Doing Business in the United States
IBUS 5714 [0.25]	Buyer Behaviour in International Markets
IBUS 5715 [0.25]	Foreign Markets: Selection, Assessment and Entry Strategies
IBUS 5716 [0.25]	Management of International Business
IBUS 5721 [0.25]	Regional and Global Business Strategies Concentration Integration
FINA 5514 [0.25]	International Finance

TOMS 5314 [0.25] Supply Chain Management

Total Credits 2.25

M.B.A. Concentration in International Development Management (2.25 credits)

Concentration requirements:

1. 1.25 credits in: 1.25

IBUS 5712 [0.25] Business and Government in Emerging Economies

MGMT 5115 [0.25] Leadership

ITIS 5414 [0.25] Emerging Information Technologies and Business Innovation

TOMS 5303 [0.25] Managing Projects

TOMS 5305 [0.25] International Development Projects Preparation and Formulation

2. 0.5 credit in International Development from the Norman Paterson School of International Affairs (NPSIA), to be approved by the School of Business and NPSIA 0.5

3. 0.50 credit from the School of Public Policy and Administration (SPPA), with permission of the School of Business and SPPA 0.5

Total Credits 2.25

M.B.A. Concentration in Management and Change (2.25 credits)

Concentration requirements:

1. 2.25 credits in: 2.25

MGMT 5111 [0.25] Conflict and Negotiation

MGMT 5112 [0.25] Power and Influence

MGMT 5113 [0.25] Managing Teams

MGMT 5114 [0.25] Managing Diversity

MGMT 5115 [0.25] Leadership

MGMT 5116 [0.25] Managing Performance

MGMT 5117 [0.25] Knowledge Management

MGMT 5120 [0.5] Fundamentals of Leading and Managing Organizational Change

Total Credits 2.25

M.B.A. Concentration in Technology Management (2.25 credits)

Concentration requirements:

1. 2.5 credits in: 2.5

ITIS 5411 [0.25] IT Service Support

ITIS 5412 [0.25] IT Service Delivery

ITIS 5413 [0.25] Enterprise Architecture and Governance

ITIS 5421 [0.25] Strategic Management of Technology Concentration Integration

MKTG 5211 [0.25] Technology Marketing

TOMS 5311 [0.25] Quality Management

TOMS 5312 [0.25] Technology Development

TOMS 5313 [0.25] Technology Adoption for Services

TOMS 5314 [0.25] Supply Chain Management

Total Credits 2.5

M.B.A. with Collaborative Specialization in Climate Change (8.5 credits)

Requirements:

1. 1.0 credit in 1.0

CLIM 5000 [1.0] Climate Collaboration

2. 0.0 credit in:

CLIM 5800 [0.0] Climate Seminar Series

3. 0.25 credit in 0.25

BUSI 5108 [0.25] Sustainable Business Development

4. 1.0 credit in elective specialization courses designated as having sufficient climate change content, within the School of Business or elsewhere, with permission of the School of Business. 1.0

5. 4.25 credits in compulsory core courses 4.25

6. 1.0 credit in elective courses 1.0

7. 1.0 credit in: 1.0

BUSI 5999 [1.0] Internship ¹

8. 0.0 credit in

BUSI 5998 [0.0] MBA Skills Workshop ²

Total Credits 8.5

¹ Students with less than two (2) years of professional employment experience must successfully complete BUSI 5999 [1.0] Internship in order to graduate. Students with two or more years work experience may apply for an exemption.

² Non-credit required skills workshop.

M.B.A. with Specialization in African Studies (8.5 credits)

Requirements:

1. 0.75 credit in: 0.75

IBUS 5712 [0.25] Business and Government in Emerging Economies

AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

2. 0.0 credit in: 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. 1.5 credit in elective specialization courses designated as having sufficient African Studies content, within the School of Business or elsewhere, with permission of African Studies and the School of Business. 1.5

4. 4.25 credits in compulsory core courses 4.25

5. 1.0 credits in elective courses 1.0

6. 1.0 credit in: 1.0

BUSI 5999 [1.0] Internship ¹

7. 0.0 credit in: 0.0

BUSI 5998 [0.0] MBA Skills Workshop ²

Total Credits 8.5

¹ Students with less than two (2) years of professional employment experience must successfully complete BUSI 5999 [1.0] Internship in order to graduate. Students with two or more years work experience may apply for an exemption.

² Non-credit required skills workshop.

Selection of Courses - African Studies

The courses listed below are relevant to students of African Studies and could, with the approval of the specific requirements of the units involved, be used as courses to help fulfil degree requirements. There are also often graduate courses and 4000-level courses in a number of units at Carleton that are offered on an ad hoc basis that have significant content appropriate to African Studies. To have any such course count towards their degree requires approval of the Director of the Institute of African Studies when it is being offered.

African Studies

AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
AFRI 5050 [0.5]	Selected Topics in African Studies
AFRI 5100 [0.5]	African Studies Abroad
AFRI 5700 [0.5]	Directed Readings in African Studies
AFRI 5900 [0.5]	Placement
AFRI 5800 [0.0]	Scholarly Preparation in African Studies

Anthropology

ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment

English

ENGL 5008 [0.5]	Studies in African Literature
ENGL 5010 [0.5]	Studies in Caribbean Literature

French

FREN 5212 [0.5]	Littératures francophones
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International Affairs

INAF 5603 [0.5]	Issues in Development in Africa
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Law

LAWS 5007 [0.5]	Race, Ethnicity and the Law
LAWS 5603 [0.5]	International Law: Theory and Practice

Political Science

PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5203 [0.5]	Southern Africa After Apartheid

Sociology

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
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Women's and Gender Studies

WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II
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Additional M.B.A. Elective Courses

These are additional to electives selected from other concentrations, and are available to all M.B.A. students.

BUSI 5106 [0.25]	Business Case Analysis and Presentations
BUSI 5108 [0.25]	Sustainable Business Development
BUSI 5905 [0.5]	Special Topics
BUSI 5906 [0.25]	Special Topics
FINA 5515 [0.5]	Micro Finance
ITIS 5403 [0.25]	ICT for Development
TOMS 5303 [0.25]	Managing Projects

M.Sc.

Management (5.0 credits)

Requirements (5.0 credits):

1. 1.5 credits in:		1.5
BUSI 5980 [0.5]	Foundations of Management Theory and Research	
BUSI 5981 [0.5]	Statistics for Business Research	
BUSI 5982 [0.5]	Research Methodology in Business	
2. 0.5 credit from:		0.5
BUSI 5983 [0.5]	Qualitative Research Design	
BUSI 5984 [0.5]	Quantitative Research Design	
3. 1.0 credit from:		1.0
BUSI 5080 [0.5]	Seminar in Accounting I	
BUSI 5081 [0.5]	Seminar in Accounting II	
BUSI 5180 [0.5]	Seminar in Management I: Modern Organization Theory	
BUSI 5181 [0.5]	Seminar in Management II: Current Topics in Organizational Behaviour	
BUSI 5280 [0.5]	Seminar in Marketing I: Management and Strategy	
BUSI 5281 [0.5]	Seminar in Marketing II: Consumer Behaviour	
BUSI 5380 [0.5]	Seminar in Management of Production/Operations I: Strategic Management of Production Systems	
BUSI 5381 [0.5]	Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface	
BUSI 5383 [0.5]	Systems Optimization: Methods and Models	
BUSI 5480 [0.5]	Seminar in Information Systems I: Research Issues	
BUSI 5481 [0.5]	Seminar in Information Systems II: Current Trends	
BUSI 5580 [0.5]	Seminar in Finance I: Topical Issues in Investments	
BUSI 5581 [0.5]	Seminar in Finance II: Theories and Empirical Methods in Corporate Finance	
BUSI 5780 [0.5]	Seminar in International Business I: International Markets and Strategy	
BUSI 5781 [0.5]	Seminar in International Business II: Managing in a Global Environment	

or elective courses taken with the permission of the Director of the Graduate Research Program

4. Completion of the Research Tutorial	
5. 2.0 credits in:	2.0
BUSI 5989 [2.0] M.Sc. Thesis	
Total Credits	5.0

M.Sc. Management with Collaborative Specialization in Climate Change (5.0 credits)

Requirements (5.0 credits):

1. 1.0 credit from:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in:	1.5
BUSI 5980 [0.5] Foundations of Management Theory and Research	
BUSI 5981 [0.5] Statistics for Business Research	
BUSI 5982 [0.5] Research Methodology in Business	
4. 0.5 credit from:	0.5
BUSI 5983 [0.5] Qualitative Research Design	
BUSI 5984 [0.5] Quantitative Research Design	
5. Completion of the Research Tutorial	
6. 2.0 credits in:	2.0
BUSI 5989 [2.0] M.Sc. Thesis (in the specialization)	
Total Credits	5.0

Research Tutorial

Students working with their supervisors will identify appropriate research topics and questions and will be mentored on how to conduct their thesis research. Research seminar attendance and participation are required.

Thesis

BUSI 5989 [2.0] M.Sc. Thesis is equivalent to 2.0 credits and should relate to issues consistent with the general focus of the M.Sc. program. The thesis must represent the results of the candidate's independent research undertaken after being admitted to graduate studies at Carleton University's Sprott School of Business. Previous work of the candidate may be used only as introductory or background material for the thesis.

A candidate may carry on research work related to the thesis off-campus, provided that the work is approved in advance and arrangements have been made for regular supervision of research thesis activities with the Director of Graduate Research Programs.

All students require the Sprott School's approval for their research topic.

Each candidate submitting a thesis will be required to pass an oral examination on the subject of the thesis.

Ph.D. Management (5.0 credits)

This degree can be pursued on a full-time or part-time basis.

Requirements:

1. 1.5 credits in research and analysis methods	1.5
2. 1.5 credits in seminar courses in functional areas of business, including at least one functional pair of courses	1.5

3. 1.5 credits from a selection of course electives approved by the thesis supervisor or mentor	1.5
4. Presentation and oral defence of the thesis proposal	0.5
5. A Thesis, which must be defended at an oral examination	0.0
6. One written and one oral comprehensive examination	
7. Participation in the Sprott School of Business research seminar series	
8. Participation in the Sprott School of Business teaching seminar series	
9. Classroom teaching or equivalent research supported seminar delivery to professional audiences	
Total Credits	5.0

Specific course requirements

All students in the doctoral program are required to complete the following courses successfully:

1. 1.5 credits (BUSI 6902 and BUSI 6905 are mandatory) in:	1.5
BUSI 6902 [0.5] Research Methodology in Business	
BUSI 6903 [0.5] Qualitative Research Design	
BUSI 6904 [0.5] Quantitative Research Design	
BUSI 6905 [0.5] Advanced Statistical Methods for Business Research	
2. 1.5 credits in seminars including at least one functional pair of courses, from the following doctoral seminar courses:	1.5
BUSI 6000 [0.5] Seminar in Accounting I & BUSI 6001 [0.5] Seminar in Accounting II	
BUSI 6100 [0.5] Seminar in Management I: Modern Organization Theory & BUSI 6101 [0.5] Seminar in Management II: Current Topics in Organizational Behaviour	
BUSI 6103 [0.5] Seminar in Strategic Management	
BUSI 6200 [0.5] Seminar in Marketing I: Management and Strategy & BUSI 6201 [0.5] Seminar in Marketing II: Consumer Behaviour	
BUSI 6300 [0.5] Seminar in Management of Production/Operations I: Strategic Management of Production Systems & BUSI 6301 [0.5] Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface	
BUSI 6400 [0.5] Seminar in Information Systems I: Research Issues & BUSI 6401 [0.5] Seminar in Information Systems II: Current Trends	
BUSI 6500 [0.5] Seminar in Finance I: Topical issues in Investments & BUSI 6501 [0.5] Seminar in Finance II: Theories and Empirical Methods in Corporate Finance	
BUSI 6600 [0.5] Entrepreneurship	
BUSI 6700 [0.5] Seminar in International Business I: International Markets and Strategy & BUSI 6705 [0.5] Seminar in International Business II: Managing in a Global Environment	

3. The remaining 1.5 credits will be electives that are chosen with the approval of the thesis supervisor to assist in the thesis research process. Courses may be chosen from the list below, from the lists above or from outside the School in a supporting discipline with permission. 1.5

BUSI 6009 [0.5]	Special Topics in Accounting
BUSI 6104 [0.5]	Managing the Change Process
BUSI 6105 [0.5]	Women in Management
BUSI 6109 [0.5]	Special Topics in Management
BUSI 6209 [0.5]	Special Topics in Marketing
BUSI 6303 [0.5]	Systems Optimization: Methods and Models
BUSI 6304 [0.5]	Management of Innovation and Technology
BUSI 6306 [0.5]	Advanced Methods and Models of Management Science
BUSI 6309 [0.5]	Special Topics in Operations Management
BUSI 6409 [0.5]	Special Topics in Information Systems
BUSI 6509 [0.5]	Special Topics in Finance
BUSI 6709 [0.5]	Special Topics in International Business
BUSI 6900 [0.5]	Directed Readings
BUSI 6901 [0.5]	Special Topics
BUSI 6910 [0.5]	Foundations of Management Theory and Research

4. 0.5 credits in: 0.5

BUSI 6907 [0.5] Ph.D. Thesis Tutorial

5. 0.0 credit in: 0.0

BUSI 6909 [0.0] Ph.D. Thesis

Directed Reading: a student may, with the approval of his or her thesis supervisor, take up to two directed readings courses (BUSI 6900 Directed Readings). These courses should relate directly to the student's thesis work.

Second Point of Entry

Doctoral students who hold an M.Sc. in Management from Carleton University and have been admitted to the second point of entry are required to complete the following courses successfully:

1. 0.5 credit in: 0.5

BUSI 6905 [0.5] Advanced Statistical Methods for Business Research

2. 0.5 credit to complete a functional pair of courses (I+II), based on previous coursework or a course taken from item 3 or 4. 0.5

BUSI 6000 [0.5] Seminar in Accounting I
or BUSI 6001 [0.5] Seminar in Accounting II

BUSI 6100 [0.5] Seminar in Management I: Modern Organization Theory
or BUSI 6101 [0.5] Seminar in Management II: Current Topics in Organizational Behaviour

BUSI 6200 [0.5] Seminar in Marketing I: Management and Strategy
or BUSI 6201 [0.5] Seminar in Marketing II: Consumer Behaviour

BUSI 6300 [0.5] Seminar in Management of Production/Operations I: Strategic Management of Production Systems

or BUSI 6301 [0.5] Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface

BUSI 6400 [0.5] Seminar in Information Systems I: Research Issues

or BUSI 6401 [0.5] Seminar in Information Systems II: Current Trends

BUSI 6500 [0.5] Seminar in Finance I: Topical issues in Investments

or BUSI 6501 [0.5] Seminar in Finance II: Theories and Empirical Methods in Corporate Finance

BUSI 6700 [0.5] Seminar in International Business I: International Markets and Strategy

or BUSI 6705 [0.5] Seminar in International Business II: Managing in a Global Environment

3. 0.5 credit in functional seminars, from any of the courses listed above in item 2, or BUSI 6103 [0.5] Seminar in Strategic Management, or BUSI 6600 [0.5] Entrepreneurship. With departmental permission, students who have previously and successfully completed at least 1.0 credit in functional seminars at the masters level may replace this requirement with an appropriate graduate elective. 0.5

4. 0.5 credit in an elective chosen with the approval of the thesis supervisor to assist in the thesis research process. Courses may be chosen from the list below, from the lists above or from outside the School in a supporting discipline with permission. 0.5

BUSI 6009 [0.5] Special Topics in Accounting

BUSI 6104 [0.5] Managing the Change Process

BUSI 6105 [0.5] Women in Management

BUSI 6109 [0.5] Special Topics in Management

BUSI 6209 [0.5] Special Topics in Marketing

BUSI 6303 [0.5] Systems Optimization: Methods and Models

BUSI 6304 [0.5] Management of Innovation and Technology

BUSI 6306 [0.5] Advanced Methods and Models of Management Science

BUSI 6309 [0.5] Special Topics in Operations Management

BUSI 6409 [0.5] Special Topics in Information Systems

BUSI 6509 [0.5] Special Topics in Finance

BUSI 6709 [0.5] Special Topics in International Business

BUSI 6900 [0.5] Directed Readings

BUSI 6901 [0.5] Special Topics

BUSI 6910 [0.5] Foundations of Management Theory and Research

5. 0.5 credit in: 0.5

BUSI 6907 [0.5] Ph.D. Thesis Tutorial

6. 0.0 credit in: 0.0

BUSI 6909 [0.0] Ph.D. Thesis

Comprehensive Examinations

All Ph.D. candidates are required to successfully complete a comprehensive examination. The examination will cover material relating to the student's area of specialization, research methodology associated with that area, and important works in the management field. Questions for the examination will be set by the

student's comprehensive examination committee. The comprehensive examination will take place over a period of two to three weeks and will consist of a written and an oral part.

The comprehensive examinations must be completed successfully before the Ph.D. proposal defense is scheduled. Under normal circumstances, the written comprehensive and the oral defense must occur within eight terms of a full-time student's initial registration in the Ph.D. program. Part-time students should complete the comprehensives within sixteen terms of initial registration in the Ph.D. program. Students who do not fulfil this requirement will be asked to withdraw from the program.

Regulations - M.Acc.

See the General Regulations section of this Calendar.

Guidelines for Completion

Students admitted as full-time students must normally complete their degree requirements within four terms after the date of initial registration.

Academic Standing

A grade of B- or better is normally required in each credit counted towards the degree. However, a candidate may, with the recommendation of the School and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed to count a grade of C+ in 0.75 credits.

Withdrawal from the program will be required if an M.Acc. student:

- Receives a grade of lower than B- in 1.25 credits or more, or
- Fails to achieve a weighted GPA of 7.0 after completing 2.0 credits of study, or to maintain it, or
- Receives a grade lower than C+ in the same course more than once.

Ph.D. Management

Admission into the Ph.D. Management program will be judged primarily on the applicant's ability to undertake research successfully and his/her prospects for completion of the program.

The normal requirement for admission to the doctoral program in management is a master's degree (or equivalent) in business or a related field with an A-average and a bachelor's degree. A number of years of work experience is desirable.

A student enrolled in a research-based master's program in business who has completed a minimum of 2.5 credits and who has shown outstanding academic performance and research promise may be admitted to the Ph.D. program without completing the master's program. Normal Ph.D. program requirements, as stated below, will apply. Each case will be considered on an individual basis for advanced standing in the Ph.D. program. Advanced standing will be considered for a maximum of 1.5 credits.

Applicants who have completed a thesis-based master's program in business or a related area may have their program requirements adjusted at the time of admission.

Applicants who have completed the M.Sc. Management at Carleton University may be eligible for admission to a second point of entry, to be determined by the Sprott School of Business and the Faculty of Graduate and Postdoctoral Affairs, as outlined in the program requirements.

All Ph.D. candidates, regardless of their previous field of specialization, are expected to have or to acquire a basic knowledge of statistics and at least two of the following areas of management: accounting, finance, information systems, international business, management science, marketing, organizational behaviour, and productions/operations management. Students will be admitted to the program with a course of study designed where appropriate to supplement previous education, experience, and training.

Graduate Management Admission Test (GMAT) - the School requires that all applicants submit scores obtained in the Graduate Management Admission Test (GMAT) offered by the Graduate Management Admission Council (GMAC). Successful candidates will normally have a GMAT score of at least 600. Equivalent GRE scores (as defined by the Educational Testing Service) may be considered.

All applicants whose first language is not English must be tested for proficiency in the English language. See Section 3.6 of the General Regulations section of this Calendar for details.

Regulations - M.B.A.

See the General Regulations section of this Calendar.

Academic standing: a grade of B- or better is normally required in each credit counted towards the degree. However, a candidate may, with the recommendation of the School and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed to count a grade of C+ in 0.75 credits.

Withdrawal from the program will be required if an M.B.A. student:

- Receives a grade of lower than B- in 1.25 credits or more, or
- Fails to achieve a weighted GPA of 7.0 after completing 2.0 credits of study, or to maintain it, or
- Receives a grade lower than C+ in the same course more than once.

M.A.-M.B.A.: students following the M.A.-M.B.A. dual pathway are governed by the academic regulations for the M.B.A. (above) and the M.A. Economics. For academic regulations concerning the M.A., consult the Economics programs section of this Calendar.

Guidelines for Completion

Details on program timing are provided in the General Regulations section of this Calendar, under **Time Limits for Program**

Before students take concentration courses, they must have successfully completed the relevant core courses.

Elective credits may be selected from any of the other concentration courses for which students have the prerequisites, M.B.A. electives, 4000-level BUSI courses, or from relevant courses in other departments. Permission of the School is required for elective courses taken outside of Sprott and students are normally limited to no more than 1.5 credits outside of Sprott.

Students having less than two (2) years of professional employment experience must successfully complete BUSI 5999 [1.0] Internship in order to graduate. While enrolled in BUSI 5999, students are permitted to register in no more than the equivalent of 0.5 credit per term and this course(s) must be taken outside of normal working hours.

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or higher is normally required in each credit counted towards the degree. However, a candidate may, with the recommendation of the School and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed to count a grade of C+ in 0.5 credit.

Withdrawal from the program will be required if an M.Sc. student:

- Receives a grade of lower than B- in 1.0 credit or more, or
- Fails to achieve a weighted GPA of 7.0 after completing 2.0 credits of study, or to maintain it, or
- Receives a grade lower than C+ in the same course more than once.

Regulations - PhD

See the General Regulations section of this Calendar.

Academic Standing: doctoral students must normally obtain a grade of B- or better in each credit, and Satisfactory on the comprehensive examinations, the Ph.D. thesis and its oral defence.

Admission

M. Accounting

Applicants are expected to hold an honours bachelor's degree or equivalent, with a minimum overall average of B-; demonstrated coverage of the CPA Competency Map at the 'Entry' level, and a minimum grade of C- in each of the prerequisite courses (courses that meet the Entry level requirements of the CPA Competency Map) with a minimum overall average of B+ in the prerequisite courses.

Students who hold a CPA, CMA designation and who have completed the Strategic Leadership Program, Case Examination and Board Report, may be exempted from the course ACCT 5133 Advanced Integration I, with the approval of the M.Acc. Director.

Proficiency in English is necessary to pursue graduate studies at Carleton University. See Section 3.6 of the General Regulations of this Calendar for English proficiency rules.

M.B.A. and M.B.A. Accelerated Stream

- Applicants are expected to hold an Honours bachelor's degree or equivalent, with a minimum overall average of B.
- The Sprott School requires that all applicants submit a GMAT (Graduate Management Admission Test) with a minimum score of 550 or an equivalent GRE (Graduate Record Exam) score. The GRE Comparison Table for Business Schools can be used to calculate equivalent GRE scores.
- Proficiency in English is necessary to pursue graduate studies at Carleton University. See Section 3.6 of the General Regulations of this Calendar for English proficiency rules.

M.B.A. Accelerated Stream

Applicants to the M.B.A. accelerated stream must meet the following additional criteria:

- Must have completed, in the past five years, a four-year bachelor's degree from a recognized Canadian university in Business, or Economics with a minor in Business, or equivalent, and
- Have a minimum overall average of B+.

Note: admission is judged primarily on the applicant's ability to successfully undertake advanced study in management based on his/her work experience and achievement, GMAT score and undergraduate grades. Possession of the minimum admission requirements does not, in itself, guarantee acceptance.

M.A.-M.B.A.

Applicants to the M.A.-M.B.A. dual degree pathway must qualify for admission for both the M.A. Economics and the M.B.A program. For admission information concerning the M.A., consult the Economics program section of this Calendar.

M.Sc. Management

Admission into the M.Sc. in Management program will be judged primarily on the applicant's potential to undertake research successfully and his/her prospects for completion of the program. Applicants will submit a research proposal statement on applying to the program.

The normal requirement for admission to the master's program in management is an Honours Bachelor of Commerce degree (or equivalent, e.g. 4-year Commerce, Bachelor of Business Administration or similar degrees) with at least a B+ average. Applicants who do not meet the normal requirements for admission may be required to complete additional courses, extra to the normal program requirements.

All applicants to the program are required to submit a GMAT (Graduate Management Admission Test) score with a minimum of 600 or an equivalent GRE (Graduate Record Exam) score. To calculate the equivalent GRE score, applicants can use the GRE Comparison Table for Business Schools.

Ph.D. Management

Admission into the Ph.D. Management program will be judged primarily on the applicant's ability to undertake research successfully and his/her prospects for completion of the program.

The normal requirement for admission to the doctoral program in management is a master's degree (or equivalent) in business or a related field with an A-average and a bachelor's degree. A number of years of work experience is desirable.

A student enrolled in a research-based master's program in business who has completed a minimum of 2.5 credits and who has shown outstanding academic performance and research promise may be admitted to the Ph.D. program without completing the master's program. Normal Ph.D. program requirements, as stated below, will apply. Each case will be considered on an individual basis for advanced standing in the Ph.D. program. Advanced standing will be considered for a maximum of 1.5 credits.

Applicants who have completed a thesis-based master's program in business or a related area may have their program requirements adjusted at the time of admission.

Applicants who have completed the M.Sc. Management at Carleton University may be eligible for admission to a second point of entry, to be determined by the Spratt School of Business and the Faculty of Graduate and Postdoctoral Affairs, as outlined in the program requirements.

All Ph.D. candidates, regardless of their previous field of specialization, are expected to have or to acquire a basic knowledge of statistics and at least two of the following areas of management: accounting, finance, information systems, international business, management science, marketing, organizational behaviour, and production/operations management. Students will be admitted to the program with a course of study designed where appropriate to supplement previous education, experience, and training.

Graduate Management Admission Test (GMAT) - the School requires that all applicants submit scores obtained in the Graduate Management Admission Test (GMAT) offered by the Graduate Management Admission Council (GMAC). Successful candidates will normally have a GMAT score of at least 600. Equivalent GRE scores (as defined by the Educational Testing Service) may be considered.

All applicants whose first language is not English must be tested for proficiency in the English language. See Section 3.6 of the General Regulations section of this Calendar for details.

Transfer from the Master's to the Ph.D. Program

Students enrolled full-time in the M.Sc. in Management program at Carleton University may be permitted to transfer into the Ph.D. program without completing the master's program, provided they meet the following conditions:

- Completion of 2.5 credits of master's courses with a minimum average of A
- Have demonstrated exceptional research potential
- Make a formal application for admission to the Ph.D. program no later than the third term of initial registration in the M.Sc. program
- Have permission of the Director of Graduate Research Programs.

Accounting (ACCT) Courses

ACCT 5001 [0.25 credit]

Financial Accounting

Fundamentals of financial accounting. Techniques used to measure business transactions, preparation of financial statements, recording and valuation of assets, liabilities and equities.

Precludes additional credit for BUSI 5004 (no longer offered).

ACCT 5002 [0.25 credit]

Managerial Accounting

Fundamentals of managerial accounting and control. Techniques for management decision-making, planning, and control including cost-volume-profit analysis, product costing, variance analysis, relevant costing, transfer pricing and the balanced scorecard.

Precludes additional credit for BUSI 5005 (no longer offered).

Prerequisite(s): ACCT 5001.

ACCT 5011 [0.25 credit]

Financial Statement Analysis

A user-oriented approach to the study of financial statements. The role of the financial statements and the annual report in the financial reporting process, using ratio analysis to analyze firm performance and make forecasts of future performance.

Precludes additional credit for BUSI 5000 (no longer offered).

Prerequisite(s): ACCT 5002.

ACCT 5012 [0.25 credit]

Performance Measurement and Control

Efficacy and efficiency of corporate strategies. Design and use of performance measurement systems from an organizational integrated systems view. Balanced scorecard, activity-based management, and other performance measurement and control systems.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5000 (no longer offered).

Prerequisite(s): ACCT 5002.

ACCT 5013 [0.25 credit]

Financial Reporting and Control in Public Organizations

Public sector accounting principles, practices, and unique financial reporting requirements. Comparison with private sector financial reporting, control, and performance evaluation.

Prerequisite(s): ACCT 5002.

ACCT 5014 [0.25 credit]**Governance and Accountability**

Corporate governance functions including management and controllership, boards of directors, auditors, security commissions and the control of enterprise-wide risk management. Historical development and evaluation of current practices, including Sarbanes Oxley and its implications.

ACCT 5120 [0.5 credit]**Advanced Concepts**

An in-depth exploration of selected topics in financial accounting, assurance and taxation.

Includes: Experiential Learning Activity

ACCT 5121 [0.5 credit]**Advanced Concepts II**

An in-depth exploration of selected topics in management accounting, finance and corporate governance.

ACCT 5122 [0.25 credit]**Issues in Taxation**

This course will provide students additional knowledge in Canadian Federal Taxation required in the MAcc program. Emphasis on corporate income tax and some specialized topics.

Prerequisite(s): permission of the M.Acc. office.

ACCT 5123 [0.5 credit]**Advanced Taxation**

Canadian taxation planning issues regarding personal and business decisions involving individuals, corporations, partnerships and trusts.

Includes: Experiential Learning Activity

ACCT 5124 [0.25 credit]**Data Analytics for Professional Accountants**

Data and information analysis with application to professional accounting.

ACCT 5125 [0.5 credit]**Advanced Assurance**

Assurance concepts are applied to a range of assurance and auditing engagements, including auditing financial statements and non-financial statement assurance engagements. Current trends in assurance are also explored.

Includes: Experiential Learning Activity

ACCT 5128 [0.25 credit]**Strategy for Professional Accountants**

Overview of the strategy process required of professional accountants. Case-based course with accounting focus, exploring the development of a company's situation analysis, identification and analysis of strategic and operational issues.

Includes: Experiential Learning Activity

ACCT 5129 [0.25 credit]**Professional Accounting Cases I**

An introduction to approaching, planning and writing accounting cases, including integration across multiple disciplines.

Includes: Experiential Learning Activity

ACCT 5130 [0.5 credit]**Advanced Finance**

The impact of the financing decision upon the value of the firm, firm valuation, investing and risk management.

ACCT 5131 [0.5 credit]**Performance Management**

Exploration of performance management in evaluating organizational performance, management decision making, effective problem solving skills and making recommendations for improvements to organizational operations.

Includes: Experiential Learning Activity

ACCT 5134 [0.5 credit]**Advanced Integration I**

Discussion, analysis and integration with an emphasis on the application of strategic management to various accounting and finance issues.

Includes: Experiential Learning Activity

Precludes additional credit for ACCT 5133 (no longer offered).

Prerequisite(s): ACCT 5128. Completion of a minimum of 2.0 credits in the Master of Accounting program with a minimum average grade of B-.

ACCT 5136 [0.5 credit]**Advanced Integration II**

Discussion, analysis and integration of issues involving financial reporting, assurance, finance, management accounting, taxation and/or strategy.

Includes: Experiential Learning Activity

Precludes additional credit for ACCT 5135 (no longer offered).

Prerequisite(s): ACCT 5134.

ACCT 5137 [0.25 credit]**Professional Accounting Cases II**

A continued development and honing of problem solving abilities when placed in real-life, business situations. Case-writing skills will be finessed, with focus on analysis and integration, while keeping the big picture in mind.

Includes: Experiential Learning Activity

Prerequisite(s): ACCT 5120 and ACCT 5121.

ACCT 5199 [1.0 credit]**Internship**

Application of M.Acc. course knowledge and building management skills in a professional environment.

Minimum 480 hours. Graded Sat/Uns.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the M.Acc. office.

Business (BUSI) Courses

BUSI 5080 [0.5 credit]

Seminar in Accounting I

Foundations in accounting theory and research methods in financial accounting, management accounting, taxation and assurance.

Also offered, with different requirements, as BUSI 6000, for which additional credit is precluded.

BUSI 5081 [0.5 credit]

Seminar in Accounting II

Research methods, theory and practice in reporting, performance measurement, control, risk management and governance.

Also offered, with different requirements, as BUSI 6001, for which additional credit is precluded.

BUSI 5106 [0.25 credit]

Business Case Analysis and Presentations

Introduction to, and practical application of, the methods and tools of rigorous business case analysis and the design of strategic responses, including the preparation and delivery of presentations designed to convince decision makers of the validity of the analysis and strategic response.

Includes: Experiential Learning Activity

BUSI 5108 [0.25 credit]

Sustainable Business Development

An integration of sustainable business strategies examining corporate perspectives on environmental and social issues, and the implications on stakeholder management strategies. Students will apply concepts of sustainable business development in analyzing successful and flawed organizational strategies drawn from current business literature.

Includes: Experiential Learning Activity

BUSI 5180 [0.5 credit]

Seminar in Management I: Modern Organization Theory

The development of post-structuralist organization theory is examined. Theories of organizational culture and symbolism, political theories of organization, ethnomethodological, decision-based and population ecology approaches are investigated. The social, economic, and intellectual forces shaping organization theory provides a major focus.

Also offered, with different requirements, as BUSI 6100, for which additional credit is precluded.

BUSI 5181 [0.5 credit]

Seminar in Management II: Current Topics in Organizational Behaviour

Current topics and debates in the research on organizational behaviour. Potential topics include motivation, learning, communication, decision-making, small group behaviour, leadership, careers, power and conflict.

Also offered, with different requirements, as BUSI 6101, for which additional credit is precluded.

BUSI 5280 [0.5 credit]

Seminar in Marketing I: Management and Strategy

Marketing theory, history, and developments through the analysis, synthesis, and extension of theoretical and empirical papers on marketing management and strategy including all aspects of the marketing mix plus alliances, competitive advantage, global marketing strategies and segmenting, targeting and positioning.

Also offered, with different requirements, as BUSI 6200, for which additional credit is precluded.

BUSI 5281 [0.5 credit]

Seminar in Marketing II: Consumer Behaviour

Consumer decision making theory and practice including information processing, behavioural decision theory and consumer culture theory perspectives.

Also offered, with different requirements, as BUSI 6201, for which additional credit is precluded.

BUSI 5380 [0.5 credit]

Seminar in Management of Production/Operations I: Strategic Management of Production Systems

Developing a firm's strategies with respect to facilities, locations, technologies, vertical integration and sourcing arrangements. Recent developments in management policies and practices that enable production systems to excel and grow in the era of innovation-, cost-, time- and quality-based competition.

Also offered, with different requirements, as BUSI 6300, for which additional credit is precluded.

BUSI 5381 [0.5 credit]

Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface

The evolution and management of process innovation; management of productivity and sustainability using process technologies; integration of production strategy and technology; and supply chain interactions with development chain. Topics include process re-engineering, quality function deployment, supply chain restructuring and the deployment of process innovations.

Also offered, with different requirements, as BUSI 6301, for which additional credit is precluded.

BUSI 5383 [0.5 credit]

Systems Optimization: Methods and Models

Management science approaches in modeling systems for decision-making under certainty and uncertainty.

Linear programming, network flows problems and applications, discrete optimization models, heuristics and metaheuristics, dynamic programming, nonlinear programming, simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Also offered, with different requirements, as BUSI 6303, for which additional credit is precluded.

BUSI 5480 [0.5 credit]**Seminar in Information Systems I: Research Issues**

Research themes, approaches, and methods prevalent in the Information Systems area. Students will engage in examining research issues in IS and perform critical analyses of the research methodologies used to investigate and report on them.

Includes: Experiential Learning Activity

Also offered, with different requirements, as BUSI 6400, for which additional credit is precluded.

BUSI 5481 [0.5 credit]**Seminar in Information Systems II: Current Trends**

Theory and practice in current information systems research.

Also offered, with different requirements, as BUSI 6401, for which additional credit is precluded.

BUSI 5580 [0.5 credit]**Seminar in Finance I: Topical Issues in Investments**

Selected topics in financial theory. Topics chosen according to new developments in theory and with the interests of the students in mind and may include theory of derivatives, pricing theory, information asymmetries, agency theory, economic efficiency, and empirical methods.

Also offered, with different requirements, as BUSI 6500, for which additional credit is precluded.

BUSI 5581 [0.5 credit]**Seminar in Finance II: Theories and Empirical Methods in Corporate Finance**

Foundations for empirical research methodologies used in selected papers in finance; informational issues and their impact on capital market efficiency; economics of mergers and acquisitions, dividend and information; and emerging areas in finance such as market failures, corporate governance, financial crisis, and behavioural finance.

Also offered, with different requirements, as BUSI 6501, for which additional credit is precluded.

BUSI 5780 [0.5 credit]**Seminar in International Business I: International Markets and Strategy**

An advanced examination of contemporary theory on the international expansion of the firm: Globalization, trade and investment flows, trade blocs, and free trade zones; consumers and culture; key actors in global markets; sequential internationalization, expansion modes, and location theory; strategy by firm size.

Also offered, with different requirements, as BUSI 6700, for which additional credit is precluded.

BUSI 5781 [0.5 credit]**Seminar in International Business II: Managing in a Global Environment**

The role of culture, cognition, and behaviour as it relates to management theory and practices. Issues related to globalization, technology, and workplace diversity are explored through an investigation of cultural theories and their implications for cognition, behaviour, and management.

Also offered, with different requirements, as BUSI 6705, for which additional credit is precluded.

BUSI 5801 [0.25 credit]**Statistics for Managers**

Techniques for using data to make an informed use of statistics. Applications, interpretation and limitations of results. Sampling, descriptive statistics, probability concepts, estimation and testing of hypotheses and regression, using practical business situations.

Precludes additional credit for BUSI 5904.

BUSI 5802 [0.25 credit]**Business Ethics**

Impact of corporate decisions on society. Models and standards of business ethics and corporate social responsibility (CSR). Methods of measuring and reporting. The rise of corporate power, stakeholder analysis, corporate governance, sustainability, national and international pressures on CSR.

BUSI 5900 [0.5 credit]**Tutorials/Directed Studies in Business**

Tutorials or directed readings in selected areas of business, involving presentation of papers as the basis for discussion with the tutor.

Prerequisite(s): GPA of 10.0 or higher and permission of the School.

BUSI 5905 [0.5 credit]**Special Topics**

At the discretion of the School, a course dealing with selected topics of interest to students in the MBA Program. Topics will vary from year to year, and will be announced in advance of the registration period.

Prerequisite(s): Permission of the School.

BUSI 5906 [0.25 credit]**Special Topics**

At the discretion of the School, a course dealing with selected topics of interest to students in the MBA program. Topics will vary from year to year, and will be announced in advance of the registration period.

Prerequisite(s): permission of the School.

BUSI 5907 [0.5 credit]**M.B.A. Thesis Tutorial**

A seminar designed to help the student formulate and evaluate specific research topics. The successful submission of a thesis proposal is necessary for the completion of the course.

Prerequisite(s): admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5908 [1.0 credit]**M.B.A. Research Project**

Includes: Experiential Learning Activity

Prerequisite(s): admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5909 [1.5 credit]**M.B.A. Thesis Research**

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5907 and admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5980 [0.5 credit]**Foundations of Management Theory and Research**

Exploration of foundational works in management theory and research. Review of the foundational thinking of scholars that influenced and shaped the management discipline.

Also offered, with different requirements, as BUSI 6910, for which additional credit is precluded.

BUSI 5981 [0.5 credit]**Statistics for Business Research**

In-depth examination and critique of statistical inference. Linear regression. Statistical computing software will be used.

BUSI 5982 [0.5 credit]**Research Methodology in Business**

The study of research techniques commonly used in research on business and management issues. The development of knowledge of these methodologies and their application, and their possible use in the thesis research of the student.

Also offered, with different requirements, as BUSI 6902, for which additional credit is precluded.

BUSI 5983 [0.5 credit]**Qualitative Research Design**

The use of qualitative data in business research. Discussion of research design, data collection, analysis and interpretation techniques; overview of philosophy of science debates regarding epistemological and ontological stance, with practical experience.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5982.

Also offered, with different requirements, as BUSI 6903, for which additional credit is precluded.

BUSI 5984 [0.5 credit]**Quantitative Research Design**

In-depth study of theories and assumptions of quantitative research design methodologies in management; exploration of alternative research designs; conceptual understanding and application of statistical methods for data analysis; critique of research from a variety of practice settings applying quantitative design methods; design a research project.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5982.

Also offered, with different requirements, as BUSI 6904, for which additional credit is precluded.

BUSI 5989 [2.0 credits]**M.Sc. Thesis**

M.Sc. Thesis.

Includes: Experiential Learning Activity

BUSI 5992 [0.25 credit]**Tutorials/Directed Studies in Business**

Tutorials or directed readings in selected areas of business, involving presentation of papers as the basis for discussion with the tutor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School of Business.

BUSI 5997 [0.5 credit]**Project Based Service Learning**

An experiential work environment in which students serve as consultants for a real-world client. Various types of projects are possible depending on the company and their goals/needs. Clients may be internal (Carleton, Sprott) or external (large firm, start-up, individual entrepreneur, not-for-profit).

Includes: Experiential Learning Activity

Prerequisite(s): Permission of the School of Business.

Also offered at the undergraduate level, with different requirements, as BUSI 4800, for which additional credit is precluded.

BUSI 5998 [0.0 credit]**MBA Skills Workshop**

Provides preparation for the MBA program, as well as professional and career development. The course is graded SAT/UNSAT based on attendance and engagement.

Includes: Experiential Learning Activity

BUSI 5999 [1.0 credit]**Internship**

A degree requirement for students with less than two years of relevant experience within a professional environment. Focus on the application of MBA course knowledge and building management skills in a business environment.

Includes: Experiential Learning Activity

Prerequisite(s): successful completion of two academic terms; subject to approval by the MBA Office.

Minimum 480 hours.

BUSI 6000 [0.5 credit]**Seminar in Accounting I**

Foundations in accounting theory and research methods in financial accounting, management accounting, taxation and assurance.

Also offered, with different requirements, as BUSI 5080, for which additional credit is precluded.

BUSI 6001 [0.5 credit]**Seminar in Accounting II**

Research methods, theory and practice in reporting, performance measurement, control, risk management and governance.

Also offered, with different requirements, as BUSI 5081, for which additional credit is precluded.

BUSI 6009 [0.5 credit]**Special Topics in Accounting**

Designed to expose students to new and emerging issues in selected areas of accounting research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6100 [0.5 credit]**Seminar in Management I: Modern Organization Theory**

The development of post-structuralist organization theory is examined. Theories of organizational culture and symbolism, political theories of organization, ethnomethodological, decision-based and population ecology approaches are investigated. The social, economic, and intellectual forces shaping organization theory provides a major focus.

Also offered, with different requirements, as BUSI 5180, for which additional credit is precluded.

BUSI 6101 [0.5 credit]**Seminar in Management II: Current Topics in Organizational Behaviour**

Current topics and debates in the research on organizational behaviour. Potential topics include motivation, learning, communication, decision-making, small group behaviour, leadership, careers, power and conflict.

Also offered, with different requirements, as BUSI 5181, for which additional credit is precluded.

BUSI 6103 [0.5 credit]**Seminar in Strategic Management**

Current topics and debates in the research on strategic management, sustainable business development and corporate governance. Foundational theories to be reviewed may include agency, institutional, network, resource-based view, resource dependence, stakeholder, stewardship and transaction cost economics theories.

Precludes additional credit for BUSI 6803 (no longer offered).

BUSI 6104 [0.5 credit]**Managing the Change Process**

The process of organizational change and the external forces which drive such changes. Topics include both micro and macro theories of change and issues around change management such as leadership and resistance to change.

Precludes additional credit for BUSI 6704 (no longer offered).

BUSI 6105 [0.5 credit]**Women in Management**

An exploration of the research and organizational challenges arising from changing gender roles. Topics include: the sex segregation of work, gender differences in management styles, work-family conflict, women's careers, managing sexual harassment, employment equity and pay equity.

Precludes additional credit for BUSI 6802 (no longer offered).

BUSI 6109 [0.5 credit]**Special Topics in Management**

Designed to expose students to new and emerging issues in selected areas of management research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6200 [0.5 credit]**Seminar in Marketing I: Management and Strategy**

Marketing theory, history, and developments through the analysis, synthesis, and extension of theoretical and empirical papers on marketing management and strategy including all aspects of the marketing mix plus alliances, competitive advantage, global marketing strategies and segmenting, targeting and positioning.

Also offered, with different requirements, as BUSI 5280, for which additional credit is precluded.

BUSI 6201 [0.5 credit]**Seminar in Marketing II: Consumer Behaviour**

Consumer decision making theory and practice including information processing, behavioural decision theory and consumer culture theory perspectives.

Also offered, with different requirements, as BUSI 5281, for which additional credit is precluded.

BUSI 6209 [0.5 credit]**Special Topics in Marketing**

Designed to expose students to new and emerging issues in selected areas of marketing research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6300 [0.5 credit]**Seminar in Management of Production/Operations I: Strategic Management of Production Systems**

Developing a firm's strategies with respect to facilities, locations, technologies, vertical integration and sourcing arrangements. Recent developments in management policies and practices that enable production systems to excel and grow in the era of innovation-, cost-, time- and quality-based competition.

Also offered, with different requirements, as BUSI 5380, for which additional credit is precluded.

BUSI 6301 [0.5 credit]**Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface**

The evolution and management of process innovation; management of productivity and sustainability using process technologies; integration of production strategy and technology; and supply chain interactions with development chain. Topics include process reengineering, quality function deployment, supply chain restructuring and the deployment of process innovations.

Also offered, with different requirements, as BUSI 5381, for which additional credit is precluded.

BUSI 6303 [0.5 credit]**Systems Optimization: Methods and Models**

Management science approaches in modeling systems for decision-making under certainty and uncertainty.

Linear programming, network flows problems and applications, discrete optimization models, heuristics and metaheuristics, dynamic programming, nonlinear programming, simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 6703.

Prerequisite(s): permission of the School.

Also offered, with different requirements, as BUSI 5383, for which additional credit is precluded.

BUSI 6304 [0.5 credit]**Management of Innovation and Technology**

Introduction to issues in the management of technology.

Topics include: technology strategy and policy, technology forecasting and planning, the process of technology innovation from concept to market, research and development management, technology adoption, diffusion and implementation, technology transfer, and technology and social issues.

Precludes additional credit for BUSI 6801 (no longer offered).

BUSI 6306 [0.5 credit]**Advanced Methods and Models of Management Science**

Advanced study of decision-making under certainty and uncertainty. Preprocessing and reformulation methods, optimization theory for large scale problems; stochastic programming; metaheuristics; multicriteria analysis; simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 6906 (no longer offered).

Prerequisite(s): BUSI 6303 or permission of the School.

BUSI 6309 [0.5 credit]**Special Topics in Operations Management**

Designed to expose students to new and emerging issues in selected areas of operations management research.

The topics covered vary from year to year according to varied research expertise among the area faculty.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

BUSI 6400 [0.5 credit]**Seminar in Information Systems I: Research Issues**

Research themes, approaches, and methods prevalent in the Information Systems area. Students will engage in examining research issues in IS and perform critical analyses of the research methodologies used to investigate and report on them.

Also offered, with different requirements, as BUSI 5480, for which additional credit is precluded.

BUSI 6401 [0.5 credit]**Seminar in Information Systems II: Current Trends**

Theory and practice in current information systems research.

Also offered, with different requirements, as BUSI 5481, for which additional credit is precluded.

BUSI 6409 [0.5 credit]**Special Topics in Information Systems**

Designed to expose students to new and emerging issues in selected areas of information systems research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6500 [0.5 credit]**Seminar in Finance I: Topical issues in Investments**

Selected topics in financial theory. Topics chosen according to new developments in the theory and with the interests of the students in mind and may include theory of derivatives, pricing theory, information asymmetries, agency theory, economic efficiency, and empirical methods.

Prerequisite(s): graduate-level finance courses or permission of the School.

Also offered, with different requirements, as BUSI 5580, for which additional credit is precluded.

BUSI 6501 [0.5 credit]**Seminar in Finance II: Theories and Empirical Methods in Corporate Finance**

Foundations for empirical research methodologies used in selected papers in finance; informational issues and their impact on capital market efficiency; economics of mergers and acquisitions, dividend and information; and emerging areas in finance such as market failures, corporate governance, financial crisis, and behavioural finance.

Prerequisite(s): graduate-level finance courses or permission of the School.

Also offered, with different requirements, as BUSI 5581, for which additional credit is precluded.

BUSI 6509 [0.5 credit]**Special Topics in Finance**

Designed to expose students to new and emerging issues in selected areas of finance research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6600 [0.5 credit]**Entrepreneurship**

An examination of research in entrepreneurship focusing on theory building and empirical testing of factors that shapes the identification, evaluation and exploitation of opportunities and the creation of new organizations. Precludes additional credit for BUSI 6806 (no longer offered).

BUSI 6700 [0.5 credit]**Seminar in International Business I: International Markets and Strategy**

An advanced examination of contemporary theory on the international expansion of the firm: Globalization, trade and investment flows, trade blocs, and free trade zones; consumers and culture; key actors in global markets; sequential internationalization, expansion modes, and location theory; strategy by firm size.

Precludes additional credit for BUSI 6804 (no longer offered).

Also offered, with different requirements, as BUSI 5780, for which additional credit is precluded.

BUSI 6705 [0.5 credit]**Seminar in International Business II: Managing in a Global Environment**

The role of culture, cognition, and behaviour as it relates to management theory and practices. Issues related to globalization, technology, and workplace diversity are explored through an investigation of cultural theories and their implications for cognition, behaviour, and management.

Also offered, with different requirements, as BUSI 5781, for which additional credit is precluded.

BUSI 6709 [0.5 credit]**Special Topics in International Business**

Designed to expose students to new and emerging issues in selected areas of international business research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6900 [0.5 credit]**Directed Readings**

Directed readings in selected areas of business, involving presentation of papers as the basis for discussion. A part of the requirement for the course may be participation in an advanced course at the undergraduate/graduate level.

Prerequisite(s): permission of the School.

BUSI 6901 [0.5 credit]**Special Topics**

Designed to expose students to new and emerging issues in selected areas of business research. Integrative problems involving two or more areas of business research are also explored. The topics covered may vary from year to year.

Prerequisite(s): permission of the School.

BUSI 6902 [0.5 credit]**Research Methodology in Business**

Research techniques commonly used in research on business and management issues. The development of knowledge of these methodologies and their application, and their possible use in the thesis research of the student.

Also offered, with different requirements, as BUSI 5982, for which additional credit is precluded.

BUSI 6903 [0.5 credit]**Qualitative Research Design**

The use of qualitative data in business research. Discussion of research design, data collection, analysis and interpretation techniques; overview of philosophy of science debates regarding epistemological and ontological stance; with practical experience.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 6902.

Also offered, with different requirements, as BUSI 5983, for which additional credit is precluded.

BUSI 6904 [0.5 credit]**Quantitative Research Design**

In-depth study of theories and assumptions of quantitative research design methodologies in management; exploration of alternative research designs; conceptual understanding and application of statistical methods for data analysis; critique of research from a variety of practice settings applying quantitative design methods; design a research project.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 6902.

Also offered, with different requirements, as BUSI 5984, for which additional credit is precluded.

BUSI 6905 [0.5 credit]**Advanced Statistical Methods for Business Research**

A practical introduction to advanced statistical methods used in business research, with particular focus on discrete categorical data. Topics include the analysis of two-way and three-way tables; loglinear modeling; logistic regression; generalized linear models. Students will analyze real data using appropriate software packages. Includes: Experiential Learning Activity

BUSI 6907 [0.5 credit]**Ph.D. Thesis Tutorial**

An intensive preparation for Ph.D. thesis research, under the direction of one or more members of the School. The successful submission of a thesis proposal is necessary for the completion of the course.

BUSI 6908 [0.0 credit]**Ph.D. Comprehensives**

Preparation for comprehensive examinations.

BUSI 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

BUSI 6910 [0.5 credit]**Foundations of Management Theory and Research**

Exploration of foundational works in management theory and research. Review of the foundational thinking of scholars that influenced and shaped the management discipline.

Also offered, with different requirements, as BUSI 5980, for which additional credit is precluded.

Financial Management (FINA) Courses**FINA 5501 [0.25 credit]****Financial Management**

Overview of finance from the perspective of the financial manager. Corporate governance issues, financial markets, time value of money, valuation and yields of financial securities, capital budgeting, financial statement analysis, and the trade-off between risk and return.

Precludes additional credit for BUSI 5504.

Prerequisite(s): ACCT 5001 and BUSI 5801.

FINA 5502 [0.25 credit]**Corporate Finance**

Aspects of corporate finance of most concern to managers: investment, financing and payout decisions, corporate restructuring. Case studies will be used.

Includes: Experiential Learning Activity

Prerequisite(s): FINA 5501.

FINA 5511 [0.25 credit]**Investments**

The analytical foundations and tools necessary for successful decision making by investment managers and analysts and by individual investors. Includes a significant hands-on component.

Prerequisite(s): FINA 5502.

FINA 5512 [0.25 credit]**Valuation**

Valuation techniques needed for enterprise valuation. The identification of value drivers, insights into the valuation of companies in different settings. Step-by-step procedures for valuing businesses. Includes a team case analysis and presentation.

Includes: Experiential Learning Activity

Prerequisite(s): FINA 5502.

FINA 5513 [0.25 credit]**Mergers and Acquisitions**

Theory and practice of mergers and acquisitions. Skills needed to be effective in mergers and acquisitions. Best practices in deal origination, design, implementation and post merger integration.

Precludes additional credit for BUSI 5500.

Prerequisite(s): FINA 5512.

FINA 5514 [0.25 credit]**International Finance**

Issues encountered by the multinational financial manager in making financing and investment decisions within a global context. Foreign exchange markets, parity conditions, currency quotation methods, management of foreign exchange/political risk and international capital budgeting.

Prerequisite(s): FINA 5502.

FINA 5515 [0.5 credit]**Micro Finance**

Introduces students to the theory and practice of microfinance. Provides students with a comprehensive understanding of microfinance, its achievements, its current challenges, and the basic skills needed to manage microfinance institutions (MFIs). Serves as a forum to reflect on the future of microfinance and of.

Includes: Experiential Learning Activity

Prerequisite(s): FINA 5501, FINA 5502.

Also offered at the undergraduate level, with different requirements, as BUSI 4515, for which additional credit is precluded.

FINA 5521 [0.25 credit]**Financial Management Concentration Integration**

Integrates and applies all the accounting and finance concentration coursework. Critical thinking is stressed via the case study approach. Focuses on complex problems and allows students to gain a deeper understanding of the salient issues discussed within the financial management concentration.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5500.

Prerequisite(s): FINA 5501, FINA 5502, FINA 5512 and FINA 5513.

Information Systems (ITIS) Courses

ITIS 5401 [0.25 credit]

Managing Information Systems in Organizations

Key issues in managing of information systems in organizations. Business and information technology challenges faced by managers and how decisions are made about acquiring, deploying, and using information technologies to achieve business objectives.

Includes: Experiential Learning Activity

ITIS 5403 [0.25 credit]

ICT for Development

Conceptual frameworks to understand the prospects and challenges and roles of information and of information and communications technologies (ICTs) in social and economic development; knowledge and skills to help in the effective planning, development, implementation and management of ICT for development initiatives; case studies.

Includes: Experiential Learning Activity

ITIS 5408 [0.5 credit]

Social Analytics

The process, tools and techniques necessary to acquire, clean, and analyze text that has been generated on social platforms. Social network analysis, sentiment analysis, topic extraction, and co-occurrence analysis.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5401, MKTG 5200, BUSI 5801.

Also offered at the undergraduate level, with different requirements, as BUSI 4408, for which additional credit is precluded.

ITIS 5411 [0.25 credit]

IT Service Support

Management of IT processes crucial to business operations. IT service management (ITSM) best practices including service desk management, incident management, problem management, change management, release management, and configuration management.

Prerequisite(s): ITIS 5401.

ITIS 5412 [0.25 credit]

IT Service Delivery

Service level management, services reporting, service continuity and availability management, budgeting and accounting for IT services, capacity management and information security management. Service level agreements (SLAs) and information technology security techniques or subjects.

Prerequisite(s): ITIS 5401.

ITIS 5413 [0.25 credit]

Enterprise Architecture and Governance

Exploration and analysis of enterprise architecture frameworks used to guide organizations in aligning business and IT strategies and goals while enhancing organizational efficiency in the adoption and use of IT. Models of IT Governance.

Prerequisite(s): ITIS 5401.

ITIS 5414 [0.25 credit]

Emerging Information Technologies and Business Innovation

Examines the emerging information technology trends and how new technologies can be incorporated to drive process innovation and improve operational performance. Prerequisite(s): ITIS 5401, or ITIS 5403 for students in the International Development Management Concentration.

ITIS 5421 [0.25 credit]

Strategic Management of Technology Concentration Integration

Components and aspects of technology strategy formulation and its successful implementation in an organization. Technology strategy from a general management perspective, designing and developing technology strategy for sustaining competitiveness. Project-based course.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5401, ITIS 5411, ITIS 5412, ITIS 5413.

ITIS 5431 [0.25 credit]

Business Analytics for Managers

Decision support systems in organizations; moving from business intelligence to business analytics; big data trends in organizations; theories and trends in data analytics.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5401 or permission of the School of Business.

ITIS 5432 [0.25 credit]

Business Analytics Methods

Tools for data analytics; analyzing data beyond statistics; data mining and predictive modeling; time series analysis and forecasting; neural networks algorithms in business analytics.

Includes: Experiential Learning Activity

Precludes additional credit for ITIS 5433.

Prerequisite(s): ITIS 5431 and BUSI 5801 (or equivalent).

ITIS 5433 [0.5 credit]

Business Analytics Methods

Tools for data analytics; analyzing data beyond statistics; data mining and predictive modeling; decision trees; logistic regression; neural networks; time series analysis and forecasting; algorithms for business analytics.

Includes: Experiential Learning Activity

Precludes additional credit for ITIS 5432.

Prerequisite(s): ITIS 5431 and BUSI 5801 or equivalent.

ITIS 5434 [0.25 credit]

Data Visualization for Business Analytics

Principles, techniques, technology and applications of data visualization for decision making; cognition and visual perception; types of visual analysis; interactive dashboards; story telling; infographics.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5431 or permission of the School.

International Business (IBUS) Courses

IBUS 5701 [0.25 credit]

International Business

Managerial and strategic implications of differing international environments for a variety of business functions including structure and control, managing human resources, marketing, finance and logistics. Complexities of working across political and cultural boundaries.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5300 (no longer offered).

IBUS 5711 [0.25 credit]

International Marketing and Trade

Product adaptation, distribution networks, promotion practices, cross-border pricing strategy and regulatory and other limitations. Trade trends and the macro and micro effects of culture provide connecting themes.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5301 (no longer offered).

Prerequisite(s): IBUS 5701.

IBUS 5712 [0.25 credit]

Business and Government in Emerging Economies

Projects in emerging economies often involve partnerships between businesses, local governments and foreign donors. Emerging forms of cooperation which address issues of poverty, infrastructure and education. The role of international firms in the process of economic transition.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5300 (no longer offered).

Prerequisite(s): IBUS 5701.

IBUS 5713 [0.25 credit]

Doing Business in the United States

The role of the United States as Canada's most important foreign trade partner. The U.S. as a distinct business environment. Regulatory structures, competitive environment, and cross-regional buyer behaviour within the U.S. Comparative view of the business culture in the U.S. and Canada.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5300 (no longer offered).

Prerequisite(s): IBUS 5701.

IBUS 5714 [0.25 credit]

Buyer Behaviour in International Markets

Globalization and the divergent, crossvergent and convergent paradigms are used to explain and analyze the behaviour of buyers across different markets and cultures. Socio-cultural, psychological, organizational and other factors that guide purchase decision-making behavior in consumer and B2B markets are examined.

Includes: Experiential Learning Activity

Prerequisite(s): IBUS 5701.

IBUS 5715 [0.25 credit]

Foreign Markets: Selection, Assessment and Entry Strategies

Selection and assessment of foreign markets suitable to corporate capabilities. Factors affecting the internationalization of firms, from SMEs and born globals to large multinationals. Methods for foreign market entry and service, from exporting, licensing, and franchising to JVs, M&A's and greenfield investment.

Includes: Experiential Learning Activity

Prerequisite(s): IBUS 5701.

IBUS 5716 [0.25 credit]

Management of International Business

Operating organizations across national and cultural boundaries adds complexity to the tasks that confront managers and requires specific skills. Topics discussed include motivation, leadership, communication and negotiation in a cross-cultural context as well as the pervasive effects of culture on interactions within and across firms.

Includes: Experiential Learning Activity

Prerequisite(s): IBUS 5701.

IBUS 5721 [0.25 credit]

Regional and Global Business Strategies Concentration Integration

Regional and global business expansion strategies and how global interdependence and regional trade groups affect international investment and marketing strategies. Environmental and political factors that influence policy within and between trade blocs and how businesses participate in these processes.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5301 (no longer offered).

Prerequisite(s): IBUS 5701 and successful completion of all courses in the International Business concentration.

International Development Mgmt (IDMG) Courses

IDMG 5610 [0.25 credit]

Introduction to International Development

Overview of the theoretical and practical underpinnings of international development management. Covering macro and micro level perspectives, the course offers rich insights into current approaches and debates in international development management.

Includes: Experiential Learning Activity

Management (MGMT) Courses

MGMT 5100 [0.5 credit]

Managing People and Organizations

Organizations and the relationships that define them. Theories, concepts and experiential exercises help students understand their own values, attitudes and goals and those of others how to motivate, communicate, teach and lead others; and how to apply these concepts to improving personal and organizational performance.

Includes: Experiential Learning Activity

Precludes additional credit for MGMT 5101 (no longer offered) and MGMT 5102 (no longer offered).

Prerequisite(s): enrolment in the MBA program in the Sprott School of Business or permission of the School.

MGMT 5111 [0.25 credit]

Conflict and Negotiation

Conflict, negotiation and bargaining. The bargaining process, conflict handling and how to analyze, plan and implement successful negotiations. Management and labour objectives and strategies that lead to conflict.

Prerequisite(s): MGMT 5100.

MGMT 5112 [0.25 credit]

Power and Influence

The role of power and influence in organizations. Sources of power, the effectiveness of various influence tactics, the implications of powerlessness, types of empowerment, organizational politics and fostering constructive versus destructive political behaviour in organizations.

Precludes additional credit for BUSI 5101 (no longer offered).

Prerequisite(s): MGMT 5100.

MGMT 5113 [0.25 credit]

Managing Teams

Factors affecting team performance. Team development, the impact of team size, team processes, organizational practices that support teams, potential team interventions and the unique challenges faced by virtual teams.

Prerequisite(s): MGMT 5100.

MGMT 5114 [0.25 credit]

Managing Diversity

Exploration of issues arising from diversity within organizations including the implications of cultural differences for motivation, communication, conflict and leadership. Identification of practices that facilitate the effective management of diversity.

Prerequisite(s): MGMT 5100.

MGMT 5115 [0.25 credit]

Leadership

Post-heroic leadership theories, with a practical emphasis on developing and honing leadership skills in practicing managers. A highly self-reflective course, requiring students to question and share their own leadership styles and situational antecedents.

Prerequisite(s): MGMT 5100.

MGMT 5116 [0.25 credit]

Managing Performance

Principles and techniques relating to the development, support, and evaluation of employee performance in organizations. Models of individual and organizational performance; identifying high performing employees; methods of measuring performance; employee development and incentive systems.

Prerequisite(s): MGMT 5100.

MGMT 5117 [0.25 credit]

Knowledge Management

Knowledge as a resource; methodologies for managing ongoing and future knowledge needs in businesses.

As required knowledge is dispersed and developed throughout the globe, international dimensions of knowledge management.

Prerequisite(s): MGMT 5100.

MGMT 5120 [0.5 credit]

Fundamentals of Leading and Managing Organizational Change

How individuals, groups and organizations respond to change; overview of key change models and change strategy. At the micro level how individuals respond to change, how change should be managed, change management competencies and changing organizational culture.

Includes: Experiential Learning Activity

Prerequisite(s): MGMT 5100 and 0.5 credit from MGMT 5111, MGMT 5113 or MGMT 5115; and registration in the Management and Change concentration or a grade of A- or better in MGMT 5100.

MGMT 5128 [0.25 credit]

Ethical Issues in Managing Arts and Culture Organizations

Ethical issues in the management and governance of arts and culture organizations including cultural appropriation, rights of production and reproduction, artistic ownership, and censorship.

Prerequisite(s): BUSI 5802.

MGMT 5129 [0.5 credit]

Managing the Arts

The challenges of managing arts organizations with emphasis on the changing environment of arts consumption and funding. The tensions arising from blending artistic and aesthetic dimensions with functional considerations when judging organizational and personal issues form a continuing theme.

Also offered at the undergraduate level, with different requirements, as BUSI 4129, for which additional credit is precluded.

Marketing (MKTG) Courses

MKTG 5200 [0.5 credit]

Marketing Strategy

Essential concepts for cultivating and maintaining successful buyer-seller relationships, customer and competitor analysis, segmentation, targeting, and positioning. Translation of target market and positioning decisions into actionable marketing plans, including product, pricing, channel/promotional decisions, and tools for forecasting/evaluating success. Organizational capstone project required.

MKTG 5211 [0.25 credit]

Technology Marketing

Marketing in technology-intensive environments, with focus on business buying processes. Buyer behaviour, competitive and environmental analysis, planning and implementation of product and service innovations, targeting and positioning in the early stages of introduction, management through the growth stages, tracking success and contingency planning.

MKTG 5229 [0.5 credit]

Marketing in the Arts and Culture Sectors

Advanced study of marketing within the arts and culture sectors. Facilitates sophisticated understanding of the knowledge and skills required for marketing managers to respond to changing market environments in order to bring arts and culture offerings to their target audiences.

Prerequisite(s): MKTG 5200.

Also offered at the undergraduate level, with different requirements, as BUSI 4229, for which additional credit is precluded.

Strategic Management (STGY) Courses

STGY 5900 [0.5 credit]

Corporate and Business Strategy

Strategic management focuses on evaluation of opportunities and threats in external environments in light of an organization's strengths and weaknesses, in order to determine a sustainable competitive advantage. Emphasis on corporate and business level strategic analysis and formulation. Organizational capstone project required.

Includes: Experiential Learning Activity

Prerequisite(s): all other MBA core courses.

STGY 5903 [0.5 credit]

Strategic Concepts

An overview of business models and key strategic concepts facing firms in a global environment. Core functional area concepts in accounting, marketing, operations and HR are introduced and integrated through simulation. Skills in managing teams, meetings, business planning and presenting business plans.

Includes: Experiential Learning Activity

Technology Management (TOMS) Courses

TOMS 5301 [0.25 credit]

Modeling Business Decisions

Quantitative methods for strategic, tactical, and operational business decision making. Optimization, simulation, project management, decision analysis, and multi-criteria analysis. Underlying ideas, model formulation, computer implementation, and analysis of model results, with applications from various business functions.

Includes: Experiential Learning Activity

TOMS 5302 [0.25 credit]

Operations Management

The provision of services and goods to customers, with focus on efficiency, effectiveness, and productivity. Planning and control of processes involving products, workers, equipment, suppliers, and customers. Effects of variation and uncertainty on lead time, inventory, quality, and customer service.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5600 (no longer offered).

Prerequisite(s): BUSI 5801.

TOMS 5303 [0.25 credit]

Managing Projects

Foundations and core principles of managing projects with an emphasis on supporting techniques, practices, and methods as means for structuring, analyzing, scoping, planning, executing, monitoring, controlling, and reporting.

Includes: Experiential Learning Activity

TOMS 5305 [0.25 credit]

International Development Projects Preparation and Formulation

Processes, assessment methodologies and tools, and practices for designing international development projects, developing funding proposals, managing calls for proposals, organizing procurement, and evaluating the implementation of the project's activities.

Includes: Experiential Learning Activity

TOMS 5311 [0.25 credit]

Quality Management

Defining quality, quality improvement, six sigma, lean enterprise, benchmarking and control charts; quality audits, ISO 9000, ISO 20000 and the progressive excellence program; role of quality assurance in service and product development; Process management and performance excellence.

Precludes additional credit for BUSI 5805 (no longer offered).

Prerequisite(s): BUSI 5801, TOMS 5301 and TOMS 5302.

TOMS 5312 [0.25 credit]
Technology Development

Transformation of knowledge and ideas into products, processes and services. Development/innovation process models, successful and efficient integrated product/process/service development, cross functional teams, quality function deployment, lead-user approach, open innovations paradigm, disruptive innovations, and intellectual property management. Precludes additional credit for BUSI 5805 (no longer offered). Prerequisite(s): TOMS 5301 and TOMS 5302.

TOMS 5313 [0.25 credit]
Technology Adoption for Services

Adoption and implementation of technology- driven products and processes for enhanced services. Technology forecasting and scanning; transfer of technologies including technology sourcing, pricing, transfer modes, and success factors; selection of appropriate technology, its vendor and consultant; risk management; managing change. Precludes additional credit for BUSI 5700 (no longer offered). Prerequisite(s): TOMS 5301 and TOMS 5302.

TOMS 5314 [0.25 credit]
Supply Chain Management

Organizational, strategic and operational aspects of managing supply chain from domestic and international perspectives. Outsourcing strategies, supplier relationship and information sharing, supplier networks, contracting and procurement management, logistic integration, role of information technology, and supply chain performance and metrics. Includes: Experiential Learning Activity. Precludes additional credit for BUSI 5601 (no longer offered). Prerequisite(s): BUSI 5801.

Canadian Studies

This section presents the requirements for programs in:

- M.A. Canadian Studies
- M.A. Canadian Studies with Specialization in Digital Humanities
- Ph.D. Canadian Studies
- Ph.D. Canadian Studies with Specialization in Political Economy

Program Requirements

M.A. Canadian Studies (5.0 credits)

Requirements - coursework option (5.0 credits)

1. 0.5 credit in:	0.5
CDNS 5001 [0.5] M.A. Core Seminar: Conceptualizing Canada	

2. 4.5 credits in additional coursework chosen from available elective courses. Subject to the approval of the Graduate Supervisor, 1.0 credit may be taken outside the program in a related discipline.	4.5
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Total Credits	5.0
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Requirements - research essay option (5.0 credits)

1. 1.0 credit in M.A. Research Essay	1.0
CDNS 5908 [1.0] Research Essay	

2. 0.5 credit in:	0.5
CDNS 5001 [0.5] M.A. Core Seminar: Conceptualizing Canada	

3. 3.5 credits in additional coursework chosen from available elective courses. Subject to the approval of the Graduate Supervisor, 1.0 credit may be taken outside the program in a related discipline.	3.5
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Total Credits	5.0
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Requirements - thesis option (5.0 credits)

1. 2.0 credits in M.A. Thesis	2.0
CDNS 5909 [2.0] M.A. Thesis	

2. 0.5 credit in:	0.5
CDNS 5001 [0.5] M.A. Core Seminar: Conceptualizing Canada	

3. 2.5 credits in additional coursework chosen from available elective courses. Subject to the approval of the Graduate Supervisor, 1.0 credit may be taken outside the program in a related discipline.	2.5
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Total Credits	5.0
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Thesis/Research Essay Proposal

At the time of declaring their option, thesis/research essay students are encouraged to declare a preliminary topic and tentative list of potential supervisors. Thesis/research essay students must submit a research proposal to the School that has been approved by their thesis/research essay supervisor prior to registering in CDNS 5908 [1.0] or CDNS 5909 [2.0].

NOTE: Students in the thesis or research essay option are restricted to a maximum of 0.5 credit in a Directed Studies course (CDNS 5901 [0.5]).

Language Requirement

The School requires a reading knowledge of French. This is a program requirement and not an admission requirement. This requirement may be satisfied in the following ways:

- Successful completion of FINS 3105 or its equivalent (with a grade of B- or better).
- Successful completion of a French language examination.
- Alternatively, a student may fulfill this requirement with a demonstrated knowledge of an Aboriginal language.
- The School conducts the French language examinations in September and January. Students choosing the first option should note that examination results in these courses form part of their record, although they are additional to the course requirements for the degree.

M.A. Canadian Studies with Specialization in Digital Humanities (5.0 credits)

Requirements - coursework option (5.0 credits)

1. 1.0 credit in:		1.0
CDNS 5001 [0.5]	M.A. Core Seminar: Conceptualizing Canada	
DIGH 5000 [0.5]	Issues in the Digital Humanities	
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
2. 1.0 credit in approved Digital Humanities elective courses.		1.0
3. 3.0 credits in approved elective courses, Internship/ Practicum, or Directed Studies.		3.0
Total Credits		5.0

Requirements - research essay option (5.0 credits)

1. 1.0 credit in:		1.0
CDNS 5908 [1.0]	Research Essay	
2. 0.5 credit in:		0.5
CDNS 5001 [0.5]	M.A. Core Seminar: Conceptualizing Canada	
3. 0.5 credit from:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
4. 1.0 credit in approved Digital Humanities elective courses.		1.0
5. 2.0 credits in approved elective courses, Internship/ Practicum, or Directed Studies.		2.0
Total Credits		5.0

Requirements - thesis option (5.0 credits)

1. 2.0 credits in:		2.0
CDNS 5909 [2.0]	M.A. Thesis	
2. 0.5 credit in:		0.5
CDNS 5001 [0.5]	M.A. Core Seminar: Conceptualizing Canada	
3. 0.5 credit from:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
4. 1.0 credit in approved Digital Humanities elective courses.		1.0
5. 1.0 credit in approved elective courses, Internship/ Practicum, or Directed Studies.		1.0
Total Credits		5.0

Thesis/Research Essay Proposal

At the time of declaring their option, thesis/research essay students are encouraged to declare a preliminary topic and tentative list of potential supervisors. Thesis/research essay students must submit a research proposal to the School that has been approved by their thesis/research essay supervisor prior to registering in CDNS 5908 or CDNS 5909.

Language Requirement

The School requires a reading knowledge of French. This is a program requirement and not an admission

requirement. This requirement may be satisfied in the following ways:

- Successful completion of FINS 3105 or its equivalent (with a grade of B- or better).
- Successful completion of a French language examination.
- Alternatively, a student may fulfill this requirement with a demonstrated knowledge of an Aboriginal language.
- The School conducts the French language examinations in September and January. Students choosing the first option should note that examination results in these courses form part of their record, although they are additional to the course requirements for the degree.

Ph.D. Canadian Studies (3.0 credits)

Requirements:

1. 1.0 credit in:		1.0
CDNS 6900 [1.0]	Ph.D. Core Seminar: Interdisciplinarity in Canadian Studies: Concepts, Theories and Methods	
2. 1.0 credit in 5000- or 6000-level courses or tutorials (or the equivalent) offered by the School (or approved by the Graduate Supervisor); a GPA of 9.0 or better must be obtained in these courses for students to be allowed to proceed to the comprehensive examinations.		1.0
3. 1.0 credit in the successful completion of two 0.5-credit written comprehensive examinations. Students will be examined in two areas of research. (See note)		1.0
4. Language requirement: satisfactory demonstration of an understanding of a language other than English. Although French is the preferred second language, students may be permitted to substitute an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interests.		
5. A public defence, in English, of a written thesis proposal. Following the completion of their comprehensives, students will be expected to defend a proposal of the research and analysis they plan to undertake in completing their Ph.D. thesis. The thesis proposal defence should normally occur within six months after completion of a student's comprehensive examinations and within the first 27 months of registration in the program. The thesis committee will be composed of three faculty members, always including one from each university.		
6. 0.0 credits in a Thesis, which must be successfully defended in English at an oral examination:		0.0
CDNS 6909 [0.0]	Ph.D. Thesis	
Total Credits		3.0

Note - Comprehensive Examinations: Full-time students are expected to complete their comprehensive examinations within 24 months of their initial registration in the Ph.D. program. Part-time Ph.D. students should finish their comprehensive examinations within 36 months of completing course work. Both full-time and part-time students should complete their comprehensive examinations before defending their dissertation proposal. Candidates are required to take an oral examination after each written examination.

Language Requirement

All doctoral students are required to pass the Ph.D. program's language test. The language test entails the translation into English of a French text (or a text in another approved language such as an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interest). The language test is two hours long, and students are permitted to use a dictionary. Grades for the language test are Pass or Fail.

Students who have taken a language test as a requirement for their M.A. cannot use it to meet the Ph.D. language requirement. In order to establish equal treatment of all students, all doctoral candidates will be required to pass the Ph.D. language test.

Ph.D. Canadian Studies with Specialization in Political Economy (3.0 credits)

Requirements:

1. 0.5 credit in:	0.5
PECO 6000 [0.5] Political Economy: Core Concepts	
2. 0.5 credit in a relevant political economy course from the approved list or the comprehensive in the major field of Policy, Economy and Society.	0.5
3. 1.0 credit in:	1.0
CDNS 6900 [1.0] Ph.D. Core Seminar: Interdisciplinarity in Canadian Studies: Concepts, Theories and Methods	
4. 1.0 credit in the successful completion of two 0.5-credit written comprehensive examinations. Students will be examined in two areas of research. (See note)	1.0
5. Language requirement: satisfactory demonstration of an understanding of a language other than English. Although French is the preferred second language, students may be permitted to substitute an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interests.	
6. A public defence, in English, of a written thesis proposal. Following the completion of their comprehensives, students will be expected to defend a proposal of the research and analysis they plan to undertake in completing their Ph.D. thesis. The thesis proposal defence should normally occur within six months after completion of a student's comprehensive examinations and within the first 27 months of registration in the program. The thesis committee will be composed of three faculty members, always including one from each university.	
7. 0.0 credits in a Thesis (in the specialization which must be successfully defended in English at an oral examination):	0.0
CDNS 6909 [0.0] Ph.D. Thesis	
Total Credits	3.0

Note - Comprehensive Examinations: full-time students are expected to complete their comprehensive examinations within 24 months of their initial registration in the Ph.D. program. Part-time Ph.D. students should finish their comprehensive examinations within 36 months of completing course work. Both full-time and part-time students should complete their comprehensive

examinations before defending their dissertation proposal.

Candidates are required to take an oral examination after each written examination.

Language Requirement

All doctoral students are required to pass the Ph.D. program's language test. The language test entails the translation into English of a French text (or a text in another approved language such as an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interest). The language test is two hours long, and students are permitted to use a dictionary. Grades for the language test are Pass or Fail.

Students who have taken a language test as a requirement for their M.A. cannot use it to meet the Ph.D. language requirement. In order to establish equal treatment of all students, all doctoral candidates will be required to pass the Ph.D. language test.

Regulations

The minimum requirements for the master's program are outlined in the General Regulations section of this Calendar.

The School of Indigenous and Canadian Studies specifies that all candidates must select one of the following three program patterns:

- 4.0 credits of coursework
- 3.0 credits plus a 1.0 credit research essay
- 2.0 credits plus a 2.0 credit thesis

Students must declare their option as coursework, thesis, or research essay no later than the end of the second term of registration for students enrolled full-time, and no later than the end of the fifth term of registration for students enrolled part-time. For students beginning their program in September the deadline is the following April 30, and for students starting in January the deadline is the following August 31.

Regulations

Consult the General Regulations section of this Calendar.

Doctoral candidates must successfully complete 10.0 credits. Candidates with deficiencies in certain areas may be admitted to the Ph.D. program, but normally will be required to complete additional work.

Academic Standing

All Ph.D. candidates must obtain at least B+ standing or better (GPA 9.0) in each course counted towards the degree. Comprehensive examinations (which will be graded on a Satisfactory, Unsatisfactory or Pass with Distinction basis) are exempted from this required standing.

Admission

Applicants to the M.A. Canadian Studies are required to hold a B.A. Honours (or the equivalent), with at least high honours standing.

Accelerated Pathway

The accelerated pathway in the M.A. in Canadian Studies is a flexible and individualized plan of graduate study for students in their final year of a Carleton M.A. in Canadian Studies.

Students in their third-year of study in the B.A. Honours Canadian Studies degree or the B.A. Combined Honours in Indigenous Studies degree should consult with both the Undergraduate Supervisor and the Graduate Supervisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. CDNS courses at the 5000-level with a grade of B+ or higher
2. Minimum overall CGPA of A-

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Qualifying Year

Applicants who do not qualify for direct admission to the master's program may, in exceptional cases, be admitted to a qualifying-year program. However, admission to the qualifying-year program does not imply automatic admission to the master's program. At the end of the qualifying-year program the student will be required to apply for entry into the master's program, at which time the School will determine the student's eligibility to enter the program.

Proficiency in English

Proficiency in English is necessary to pursue graduate studies at Carleton University. All applicants whose first language is not English must satisfy this requirement by presenting a TOEFL score of 600 or higher.

Language Requirement

The School requires a reading knowledge of French. This is a program requirement and not an admission requirement. This requirement may be satisfied in the following ways:

- Successful completion of FINS 3105 or its equivalent (with a grade of B- or better).
- Successful completion of a French language examination.
- Alternatively, a student may fulfill this requirement with a demonstrated knowledge of an Aboriginal language.
- The School conducts the French language examinations in September and January. Students choosing the first option should note that examination results in these courses form part of their record, although they are additional to the course requirements for the degree.

Admission

Admission to the Ph.D. Canadian Studies requires a master's degree (or equivalent), with at least high honours standing in Canadian Studies or one of the disciplines represented in the School. Applicants should note,

however, that meeting the admission requirement does not guarantee admission to the program.

The Ph.D. program in Canadian Studies normally will be undertaken on a full-time basis. In cases of exceptional merit, the School will accept a few candidates for the degree on a part-time basis.

Language Requirement

All doctoral students are required to pass the Ph.D. program's language test. The language test entails the translation into English of a French text (or a text in another approved language such as an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interest). The language test is two hours long, and students are permitted to use a dictionary. Grades for the language test are Pass or Fail.

Students who have taken a language test as a requirement for their M.A. cannot use it to meet the Ph.D. language requirement. In order to establish equal treatment of all students, all doctoral candidates will be required to pass the Ph.D. language test.

Canadian Studies (CDNS) Courses

CDNS 5001 [0.5 credit]

M.A. Core Seminar: Conceptualizing Canada
Interdisciplinary perspectives on theoretical and methodological approaches to Canadian Studies.
Prerequisite(s): Graduate standing in the School.

CDNS 5002 [0.5 credit]

Interdisciplinary Methods

A survey of the issues raised by problem-directed methodologies; critiques of existing methodology including from the standpoints of feminist and Aboriginal scholarship.

CDNS 5003 [0.5 credit]

Selected Topics in Canadian Studies

Topic varies from year to year.

CDNS 5101 [0.5 credit]

Indigenous Peoples, Canada and the North

Interdisciplinary seminar exploring selected Indigenous issues as they relate to historical and ongoing changes in material, social, and cultural phenomena and relationships.

Precludes additional credit for CDNS 5100.

CDNS 5102 [0.5 credit]

Indigenous Politics and Resurgence in Canada

Interdisciplinary seminar exploring selected themes in Indigenous politics, experience, and philosophy since the 1960s.

Precludes additional credit for CDNS 5100.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 5201 [0.5 credit]**Critical Perspectives on Canadian Feminism**

Interdisciplinary seminar examining Canadian contributions to feminist and gender theory as well as developments in women's movements in a Canadian context.

Precludes additional credit for CDNS 5200.

CDNS 5202 [0.5 credit]**Gendering Canada: Selected Contemporary Debates**

Interdisciplinary seminar focusing on specific themes that define Canadian women's and gender studies. Themes change yearly but past topics have included sexuality and sexual practices, health and reproductive rights, the body, motherhood and work.

Precludes additional credit for CDNS 5200.

CDNS 5301 [0.5 credit]**Canadian Cultural Studies**

The arts, belief systems, institutions and communicative practices in Canada in relation to other social and historical structures.

Precludes additional credit for CDNS 5300.

CDNS 5302 [0.5 credit]**Canadian Cultural Policy**

Evolution of Canadian cultural policy from its origins through to the contemporary search for cultural cohesion within a global context, emphasizing developments since the Massey Commission.

Precludes additional credit for CDNS 5300.

CDNS 5401 [0.5 credit]**Heritage Conservation I: History, Principles, and Concepts**

History of heritage conservation theory in Canada and abroad, as it affects both tangible and intangible heritage; development of the field's conceptual frameworks and operational principles for understanding, evaluating, conserving and managing significant Canadian places of heritage value.

Precludes additional credit for CDNS 5400.

Prerequisite(s): students registering in this course are strongly encouraged to register in CDNS 5402.

CDNS 5402 [0.5 credit]**Heritage Conservation II: Theory in Practice**

Application of heritage conservation theory to practice. Models for conservation and management of heritage resources in Canada. Research, planning, development, interpretation and the interplay of disciplines within these conservation domains. Frameworks for evaluating programs and policies. Field exercises and visits.

Includes: Experiential Learning Activity

Precludes additional credit for CDNS 5400.

Prerequisite(s): CDNS 5401 or permission of the School of Indigenous and Canadian Studies.

CDNS 5403 [0.5 credit]**Heritage Conservation and Sustainability**

Exploration of the recent shift in heritage conservation discourse that embraces objectives of environmental, social, and economic sustainability. Investigation of synergies and gaps between natural and cultural conservation ideas. Introduction to theory, principles and practices through analysis of Canadian and international research, policy and projects.

Also offered at the undergraduate level, with different requirements, as CDNS 4403, for which additional credit is precluded.

Seminar three hours per week.

CDNS 5501 [0.5 credit]**Decolonizing Canada: Cultural Politics and Collective Identities**

Interdisciplinary examination of the politics of race, gender, class and cultural pluralism in Canada. Critical theoretical exploration of nationalism, regionalism, multiculturalism, neoliberalism, Aboriginal politics, diaspora and global human rights regimes and claims.

CDNS 5601 [0.5 credit]**Constructing Canada: The Politics of National Identity**

Interdisciplinary examination of national identity, public opinion, and public policy; the intersection of national visions of Canada and public policy; and the articulation of Canadian distinctiveness and sovereignty on the world stage. Topics include nationalism and national identity, branding Canada, and selected policy fields.

CDNS 5700 [0.5 credit]**Arctic Passages: The Changing Dynamics of Canada's North**

Interdisciplinary exploration of changing political, economic, and cultural relationships between Inuit and non-Inuit interests in the Canadian Arctic. Emphasis on the role of global processes, such as the rise of the circumpolar movement and environmental change, in mediating these relationships.

CDNS 5800 [1.0 credit]**Internship/Practicum**

Internships or practicum placements are set in an institutional setting outside of the University. Students in the research essay option are restricted to a maximum of 0.5 credits in an Internship/Practicum. Students must complete a formal written paper in addition to their internship/practicum activities.

Includes: Experiential Learning Activity

Prerequisite(s): completion of one full credit of coursework in Canadian Studies and prior approval of the School of Indigenous and Canadian Studies. For students in the coursework option only.

CDNS 5801 [0.5 credit]**Internship/Practicum**

Internships or practicum placements are set in an institutional setting outside of the University. Students in the research essay option are restricted to a maximum of 0.5 credits in an Internship/Practicum. Students must complete a formal written paper in addition to their internship/practicum activities.

Includes: Experiential Learning Activity

Prerequisite(s): completion of one full credit of coursework in Canadian Studies and prior approval of the School of Indigenous and Canadian Studies. For students in the coursework or research essay option only.

CDNS 5900 [1.0 credit]**Directed Studies**

Reading and research tutorials supervised by a qualified adviser, in an area not covered by an existing seminar. Directed Studies are organized by individual students with a faculty member.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 5901 [0.5 credit]**Directed Studies**

Reading and research tutorials supervised by a qualified adviser, in an area not covered by an existing seminar. Directed Studies are organized by individual students with a faculty member.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 5908 [1.0 credit]**Research Essay**

Approval of the Research Essay Proposal is required prior to registration in this course.

CDNS 5909 [2.0 credits]**M.A. Thesis**

Approval of the Thesis Proposal is required prior to registration in this course.

Includes: Experiential Learning Activity

CDNS 6900 [1.0 credit]**Ph.D. Core Seminar: Interdisciplinarity in Canadian Studies: Concepts, Theories and Methods**

Available only to Ph.D. students in Canadian Studies. An examination of the complex theoretical and methodological issues associated with the discourse on an interdisciplinary study of Canada. Offered at Carleton and Trent through a combination of joint sessions at both universities and regular electronic communication. Prerequisite(s): enrolment in the Canadian Studies Ph.D. program.

CDNS 6901 [0.5 credit]**Ph.D. Tutorial**

Available only to Ph.D. students in Canadian Studies. Reading and research tutorials. A program of research and written work in an area not covered by an existing graduate seminar.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6902 [0.5 credit]**Ph.D. Tutorial**

Available only to Ph.D. students in Canadian Studies. Reading and research tutorials. A program of research and written work in an area not covered by an existing graduate seminar.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6905 [0.5 credit]**Ph.D. Comprehensive Examination**

Available only to Ph.D. students in Canadian Studies. Students will receive a grade of Satisfactory, Unsatisfactory or Pass with Distinction.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6907 [0.5 credit]**Ph.D. Comprehensive Examination**

Available only to Ph.D. students in Canadian Studies. Students will receive a grade of Satisfactory, Unsatisfactory or Pass with Distinction.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

Chemical and Environmental Toxicology

This section presents the requirements for programs in:

- M.Sc. Biology with Specialization in Chemical and Environmental Toxicology
- M.Sc. Chemistry with Specialization in Chemical and Environmental Toxicology
- M.Sc. Earth Sciences with Specialization in Chemical and Environmental Toxicology
- Ph.D. Biology with Specialization in Chemical and Environmental Toxicology
- Ph.D. Chemistry with Specialization in Chemical and Environmental Toxicology
- Ph.D. Earth Sciences with Specialization in Chemical and Environmental Toxicology

Program Requirements

M.Sc. with Specialization in Chemical and Environmental Toxicology

The student is responsible for fulfilling both the Institute and departmental requirements for the Master's degree, and the requirements of the Collaborative Program. Consult the individual programs for detailed program requirements.

The minimum requirements of the Collaborative Program include completing at least three courses, which include:

1. A relevant introductory course in toxicology (The suitability of any introductory toxicology courses as a prerequisite for the Collaborative Program will be decided by the executive committee, comprised of the Coordinator and Associate Coordinator of the Collaborative Program. It is the student's responsibility to provide justification for an exemption. This can be either:
 - Prior to admission to the Collaborative Program in Chemical and Environmental Toxicology, or
 - By taking one of the two introductory courses, Principles of Toxicology (BIOL 6402/BIO 9101 - CHEM 5708/CHM 8156) or BIOL 6403/BIO 9104 while registered in the Collaborative Program.
2. The Seminar in Toxicology (BIOL 6405/BIO 9105 - CHEM 5805/CHM 8167).
3. Additional courses required by the Master's Program and approved by the Collaborative Program.
4. Thesis Requirement - a research thesis on a topic in toxicology supervised by a faculty member of the Collaborative Program in Chemical and Environmental Toxicology.

Note: In addition, the student's Advisory Committee may direct the student to take or audit further courses to complement the student's background and research program. Other courses offered in the programs of the primary academic units of biology or chemistry may be taken as options, with the permission of the student's supervisory committee, in addition to the basic requirements of the Collaborative Program in Chemical and Environmental Toxicology.

M.Sc. Biology with Specialization in Chemical and Environmental Toxicology (5.0 credits)

Requirements:

1. 1.5 credits in:	1.5
BIOL 6405/CHEM 5805 [0.5] Seminar in Toxicology	
BIOL 6402/CHEM 5 Principles of Toxicology or BIOL 6403/CHECototoxicology and 0.5 credit in additional approved coursework	
2. 3.5 credits in:	3.5
BIOL 5909 [4.0] M.Sc. Thesis (including successful oral defence)	
Total Credits	5.0

M.Sc. Chemistry with Specialization in Chemical and Environmental Toxicology (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
BIOL 6402/CHEM 5708 [0.5] Principles of Toxicology or BIOL 6403 [0.5] Ecotoxicology BIOL 6405/CHEM 5 Seminar in Toxicology	
2. 1.0 credit in:	1.0
CHEM 5801 [1.0] Seminar I	
3. 3.0 credits in:	3.0
CHEM 5909 [3.0] M.Sc. Thesis (in the specialization)	
Total Credits	5.0

M.Sc. Earth Sciences with Specialization in Chemical and Environmental Toxicology (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
BIOL 6402/CHEM 5708 [0.5] Principles of Toxicology or BIOL 6403 [0.5] Ecotoxicology or CHEM 5705 [0.5] Ecotoxicology	
2. 0.5 credit in:	0.5
BIOL 6405/CHEM 5805 [0.5] Seminar in Toxicology	
3. 0.5 credit in additional course work	0.5
4. 3.5 credits in:	3.5
ERTH 5909 [3.5] M.Sc. Thesis	
5. A pre-defence public lecture, preceding the oral examination, based on the thesis research	
6. 0.0 credit: participation in the OCGC Seminar Series. Each student gives a presentation of one lecture (open to all members of the OCGC) describing the candidate's research study within 16 months of the candidate's registration in the M.Sc. program.	
Total Credits	5.0

Ph.D. (Biology, Chemistry, or Earth Sciences) with Specialization in Chemical and Environmental Toxicology

Students are responsible for fulfilling both the Institute and Departmental requirements for the Ph.D. degree, and the requirements of the Collaborative Program. Consult the individual programs for detailed program requirements.

The requirements of the Collaborative Program are as follows:

1. All courses required by the primary program and approved by the Collaborative Program. If an introductory course (either Principles of Toxicology (BIOL 6402/BIO 9101/CHEM 5708/CHM 8156 or Ecotoxicology (BIOL 6403/BIO 9104/CHEM 5705/CHM 9109 [0.5 credit] , or an approved alternative) has not been completed prior to admission, it must be included among these courses.
2. The Seminar in Toxicology (BIOL 6405/BIO 9105 - CHEM 5805/CHM 8167 [0.5 credit] (see **Note**, below)
3. In addition, students may be directed by their Advisory Committee to take or audit further courses to complement their background and research

program. A list of approved electives is provided under 'Graduate Courses'.

4. Thesis Requirement - a research thesis on a topic in toxicology supervised by a faculty member of the Collaborative Program in Chemical and Environmental Toxicology.

Note: Item 2 above is not required for students who have already completed the Seminar in Toxicology for the Master's specialization.

Ph.D. Biology with Specialization in Chemical and Environmental Toxicology (1.5 credits)

Requirements:

1. 1.0 credit in:	1.0
BIOL 6405/CHEM 5805 [0.5] in Toxicology	
BIOL 6402/CHEM 5 Principles of Toxicology or BIOL 6403 [0.5] Ecotoxicology or CHEM 5705 [0.5] Ecotoxicology	
2. 0.5 credit in additional course work	0.5
2. 0.0 credits in:	0.0
BIOL 6909 [0.0] Ph.D. Thesis	
Total Credits	1.5

Ph.D. Chemistry with Specialization in Chemical and Environmental Toxicology (4.0 credits)

Requirements:

1. 1.5 credits from:	1.5
CHEM 5708/BIOL 6402 [0.5] Principles of Toxicology	
CHEM 5705/BIOL 6 Ecotoxicology	
CHEM 5805 [0.5] Seminar in Toxicology (not required for students who have already completed the Seminar in Toxicology for the Master's specialization)	
2. 2.0 credits in:	2.0
CHEM 5801 [1.0] Seminar I	
CHEM 5802 [1.0] Seminar II	
3. 0.5 credit in additional graduate courses	0.5
4. A two-part comprehensive examination in Chemistry (see Note below)	
5. 0.0 credits in:	0.0
CHEM 6909 [0.0] Ph.D. Thesis (in the specialization)	
6. At least three years of full-time study	
Total Credits	4.0

Ph.D. Earth Sciences with Specialization in Chemical and Environmental Toxicology (1.0 credit)

Requirements:

1. 0.0 credits in:	
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ERTH 6909 [0.0]	Ph.D. Thesis (a research thesis on a topic in toxicology supervised by a faculty member of the Collaborative Program in Chemical and Environmental Toxicology, defended at an oral examination before an examination board that includes an external examiner)
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2. A pre-defence public lecture, preceding the oral examination, based on the thesis research	
3. 1.0 credit in:	1.0
BIOL 6402 [0.5] Principles of Toxicology or CHEM 5708 [0.5] Principles of Toxicology	
BIOL 6405 [0.5] Seminar in Toxicology or CHEM 5805 [0.5] Seminar in Toxicology	
4. 0.0 credit in:	0.0
ERTH 6908 [0.0] Ph.D. Comprehensive Examination (Conducted by the thesis advisory committee. Includes the presentation of a thesis proposal)	
5. 0.0 credit in: participation in the OCGC Seminar Series. Each student gives a presentation of one lecture (open to all members of the OCGC) describing the candidate's research study within 16 months of the candidate's registration in the Ph.D. program.	0.0
6. Fulfilment of residence requirement: at least four terms of full-time study	0.0
Total Credits	1.0

Chemical and Environmental Toxicology Courses

Other courses listed in the calendar under the primary academic units of psychology, biology, or chemistry may be taken, with the approval of the student's advisory committee, as options in addition to the basic requirements of the degree in chemical and environmental toxicology.

BIOL 6402/CHEM 5708 [0.5] Principles of Toxicology (BIO 9101, CHM 8156, TOX 8156)
BIOL 6403/CHEM 5705 [0.5] Ecotoxicology (BIO 9104, CHM 9109, TOX 9104)
BIOL 6405/CHEM 5805 [0.5] Seminar in Toxicology (BIO 9105)
BIOL 5709/CHEM 5709 [0.5] Chemical Toxicology (BIO 8113)

Regulations

See the General Regulations section of this Calendar and the regulations of the primary participating unit for the degree.

Admission

Applications should be directed to the primary participating unit (i.e. departments of Biology, Chemistry, or Earth Sciences) that is the most appropriate to the student's research interests. Once sponsored and accepted into one of the Institutes, students must be sponsored into the Collaborative Program in Chemical and Environmental Toxicology by a faculty member involved in the program. This will normally be the student's supervisor.

The requirements for admission to the Master's in the Collaborative Program in Chemical and Environmental Toxicology are as follows:

1. Prior admission to the master's program in one of the supporting Institutes participating in the program.
2. A letter of recommendation from the participating faculty member of the collaborative program, which both recommends admission and indicates the willingness of the faculty member to supervise the candidate's research program in Chemical and/or Environmental Toxicology.

Admission

Applications should be directed to the primary participating unit that is the most appropriate to the student's research interests. Once accepted and registered in one of the Institutes, students must be sponsored into the Collaborative Program in Chemical and Environmental Toxicology by a faculty member involved in the program; this will normally be the student's thesis supervisor. Application forms and further information can be obtained by writing directly to any of the participating Institutes or Departments or to the program Coordinator.

The requirements for admission to the Collaborative Program in Chemical and Environmental Toxicology at the Ph.D. level are as follows:

1. Prior admission to the Ph.D. program in one of the supporting Institutes participating in the program.
2. A letter of recommendation from a participating faculty member who is a member of the Collaborative Program, which both recommends admission and indicates the willingness of the professor to supervise the candidate's research program in Chemical and Environmental Toxicology.

Chemistry

This section presents the requirements for programs in:

- M.Sc. Chemistry
- M.Sc. Chemistry with Collaborative Specialization in Biochemistry
- M.Sc. Chemistry with Specialization in Chemical and Environmental Toxicology
- M.Sc. Chemistry with Concentration in Food Science
- Ph.D. Chemistry
- Ph.D. Chemistry with Collaborative Specialization in Biochemistry
- Ph.D. Chemistry with Specialization in Chemical and Environmental Toxicology
- Ph.D. Chemistry with Concentration in Food Science

Program Requirements

M.Sc. Chemistry (5.0 credits)

Requirements:

- | | |
|---|------------|
| 1. 1.0 credit in: | 1.0 |
| CHEM 5801 [1.0] Seminar I | |
| 2. 1.0 credit in CHEM graduate courses | 1.0 |
| 3. 3.0 credits in: | 3.0 |

CHEM 5909 [3.0] M.Sc. Thesis	
Total Credits	5.0

M.Sc. Chemistry with Collaborative Specialization in Biochemistry (5.0 credits)

Requirements:

- | | |
|--|------------|
| 1. 1.0 credit in: | 1.0 |
| CHEM 5800 [0.5] Seminar in Biochemistry I | |
| CHEM 5806 [0.5] Advances in Applied Biochemistry | |
| 2. 1.0 credit in: | 1.0 |
| CHEM 5801 [1.0] Seminar I | |
| 3. 3.0 credits in: | 3.0 |
| CHEM 5909 [3.0] M.Sc. Thesis (in the Specialization) | |

Total Credits	5.0
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M.Sc. Chemistry with Specialization in Chemical and Environmental Toxicology (5.0 credits)

Requirements:

- | | |
|---|------------|
| 1. 1.0 credit in: | 1.0 |
| BIOL 6402/CHEM 5708 [0.5] Topics of Toxicology or BIOL 6403 [0.5] Ecotoxicology | |
| BIOL 6405/CHEM 5708 [0.5] Seminar in Toxicology | |
| 2. 1.0 credit in: | 1.0 |
| CHEM 5801 [1.0] Seminar I | |
| 3. 3.0 credits in: | 3.0 |
| CHEM 5909 [3.0] M.Sc. Thesis (in the specialization) | |

Total Credits	5.0
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M.Sc. Chemistry with Concentration in Food Science (5.0 credits)

Requirements:

- | | |
|---|------------|
| 1. 1.0 credit in: | 1.0 |
| FOOD 5801 [1.0] Seminar I | |
| 2. 0.5 credit in FOOD at the graduate level | 0.5 |
| 3. 0.5 credit in CHEM or FOOD at the graduate level, or, with permission of the department in another discipline | 0.5 |
| 4. 3.0 credits in: | 3.0 |
| FOOD 5909 [3.0] M.Sc. Thesis (in the concentration) | |

Total Credits	5.0
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Ph.D. Chemistry (4.0 credits)

Requirements:

- | | |
|--|------------|
| 1. 2.0 credits in: | 2.0 |
| CHEM 5801 [1.0] Seminar I | |
| CHEM 5802 [1.0] Seminar II | |
| 2. 2.0 credits in CHEM graduate courses | 2.0 |
| 3. A two-part comprehensive examination in Chemistry (see Note below) | 0.0 |
| 4. 0.0 credits in: | 0.0 |
| CHEM 6909 [0.0] Ph.D. Thesis | |

Total Credits	4.0
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Ph.D. Chemistry with Collaborative Specialization in Biochemistry (4.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CHEM 5806 [0.5] Advances in Applied Biochemistry	
CHEM 6800 [0.5] Seminar in Biochemistry II	
2. 2.0 credits in:	2.0
CHEM 5801 [1.0] Seminar I	
CHEM 5802 [1.0] Seminar II	
3. 1.0 credit in graduate courses	1.0
4. A two-part comprehensive in Chemistry (see Note below).	0.0
5. 0.0 credits in:	
CHEM 6909 [0.0] Ph.D. Thesis (in the specialization)	
6. At least three years of full-time study	
Total Credits	4.0

Ph.D. Chemistry with Specialization in Chemical and Environmental Toxicology (4.0 credits)

Requirements:

1. 1.5 credits from:	1.5
CHEM 5708/BIOLOG 6402 [0.5] Fundamentals of Toxicology	
CHEM 5705/BIOLOG 6 Ecotoxicology	
CHEM 5805 [0.5] Seminar in Toxicology (not required for students who have already completed the Seminar in Toxicology for the Master's specialization)	
2. 2.0 credits in:	2.0
CHEM 5801 [1.0] Seminar I	
CHEM 5802 [1.0] Seminar II	
3. 0.5 credit in additional graduate courses	0.5
4. A two-part comprehensive examination in Chemistry (see Note below)	
5. 0.0 credits in:	0.0
CHEM 6909 [0.0] Ph.D. Thesis (in the specialization)	
6. At least three years of full-time study	
Total Credits	4.0

Ph.D. Chemistry with Concentration in Food Science (4.0 credits)

Requirements:

1. 2.0 credits in:	2.0
FOOD 5801 [1.0] Seminar I	
FOOD 5802 [1.0] Seminar II	
2. 1.0 credit in FOOD at the graduate level	1.0
3. 1.0 credit in CHEM or FOOD at the graduate level, or, with permission of the department, in another discipline	1.0
4. A two-part comprehensive examination in Food Science	
5. 0.0 credits in:	0.0
FOOD 6909 [0.0] Ph.D. Thesis (in the concentration)	
Total Credits	4.0

Comprehensive examination Part 1 examines the depth and breadth of knowledge in the student's own research area.

Comprehensive examination Part 2 will involve the submission of a research proposal that is both novel and of a sound scientific basis that may be loosely related to the thesis research of the student but not a topic that the student has investigated in any manner. The research proposal will be submitted to a committee for oral defense.

Failure to pass either part of the comprehensive examination will result in deregistration from the graduate program.

Program Requirements from M.Sc. Chemistry

- Only one seminar course will be required if a grade of at least A- has been obtained in Seminar I (CHEM 5801 [1.0] or equivalent). In addition, credit for up to 1.0 credit of graduate courses may be given to reduce the requirement for graduate course credit from two to one, if a grade of at least an A- has been obtained in each of the courses taken during M.Sc. Students must complete their comprehensive examination within two years or be withdrawn from the program.

Regulations

See the General Regulations section of this Calendar.

Residence Requirement

At least one year of full-time study is required for the M.Sc. program.

Guidelines for Completion of Master's Degree

Full-time students in the master's program will normally complete the degree requirements in two years. Part-time students will normally complete the degree requirements in four years.

Regulations

See the General Regulations section of this Calendar.

Thesis Advisory Committee

Within four months of initial registration in the Ph.D. program, a Thesis Advisory Committee (TAC) will be appointed for each student. The committee will consist of a minimum of three members, including the thesis supervisor and, where practicable, at least one member will be from the other campus of OCCI. Committee membership may include adjunct faculty members of the Faculty of Graduate and Postdoctoral Studies (FGPS) at the University of Ottawa or the Faculty of Graduate Studies and Research at Carleton.

Once a year, the student will prepare a formal Thesis Progress Report. The report is not to exceed one page and will outline the problem, methodology used, results achieved, and aims for future research. The TAC will evaluate the report and indicate whether the student has made satisfactory progress. A meeting to discuss the student's progress may be held at any time at the request of either the student or the committee.

Admission

Honours B.Sc. degree in Chemistry, with a B+ average in the last two years and a B average overall.

Applicants who do not meet this requirement, or whose undergraduate degree is in another, closely related field, may be accepted into the program, but may be assigned extra courses.

Qualifying Year

Applicants who do not qualify for direct admission to the Master's program may be admitted to a qualifying-year program (see 2.3 under General Regulations).

5.0 credits must be completed within two consecutive fall and winter terms, including a 1.0 credit Research Project and Seminar course (CHEM 4908 [1.0]), and 4.0 credits in 0.5- and 0.25-credit courses, as assigned by the Graduate Supervisor. An average grade of A- over these five credits, with a minimum grade of B in each course must be presented to be considered for admission to the M.Sc. program.

Orientation Examinations

Students coming from outside Canada or the United States must write orientation examinations at approximately the third-year university level. Each student will be informed of this requirement upon admission. The examinations will be given in the first week of the term in September and January. Students can choose from any three examination modules in: organic, physical, inorganic/analytical and biochemistry.

In examination areas where the student shows unsatisfactory performance or deficiency, the Graduate Supervisor will assign undergraduate-level remedial courses. To be eligible to continue in the graduate program, the student must achieve a minimum grade of A- in each remedial course.

Admission

The normal requirement for admission to the Ph.D. program is an M.Sc. degree in Chemistry. Direct entrance from a B.Sc. degree in Chemistry will be considered in exceptional cases.

Orientation Examinations

Students coming from outside Canada or the United States must write orientation examinations at approximately the third-year university level. Each student will be informed of this requirement upon admission. The examinations will be given in the first week of the term in September and January. Students can choose from any three examination modules in: organic, physical, inorganic/analytical and biochemistry.

In examination areas where the student shows unsatisfactory performance or deficiency, the Graduate Supervisor will assign undergraduate-level remedial courses. To be eligible to continue in the graduate program, the student must achieve a minimum grade of A- in each remedial course.

Chemistry (CHEM) Courses

CHEM 5001 [0.25 credit] (CHM 8301)

Analytical Mass Spectrometry

The principles of ion sources and mass spectrometers and their applications to problems in chemistry and biochemistry. Introduction to the chemistry of gaseous ions. Ion optics. Special emphasis on interpreting mass spectra.

CHEM 5002 [0.25 credit] (CHM 8301)

Multinuclear Magnetic Resonance Spectroscopy

Principles of Nuclear Magnetic Resonance (NMR). NMR parameters studied: chemical shift, spin-spin coupling, electric quadrupole coupling, spin-spin, spin-lattice relaxation rates. NMR and the periodic table. Dynamic NMR. Applications in chemistry and biochemistry. The Fourier Transform technique. Pulse sequences. Basic principles/applications of two-dimensional NMR.

CHEM 5003 [0.25 credit] (CHM 8325)

Solid State NMR Spectroscopy

Brief introduction to solid state NMR spectroscopy. Topics include dipolar coupling interactions, chemical shielding anisotropy, the quadrupolar interaction and averaging techniques such as magic angle spinning.

CHEM 5004 [0.25 credit] (CHM 8326)

NMR Spectroscopy

Advanced NMR techniques for both proton and carbon spectra, various decoupling and related experiments. Interpretation of NOSY, COSY and related data.

CHEM 5005 [0.25 credit] (CHM 8327)

Physical Organic Chemistry

Hammett functions, transition state energies, stereochemistry of organic compounds, and mechanisms of organic reactions and their determination.

CHEM 5007 [0.25 credit] (CHM 8310)

Introduction to Photochemistry

Basic principles of photochemistry including selection rules, energy transfer processes and the properties of excited state reactions. Lasers and their applications to measurements of the dynamics of elementary reactions.

CHEM 5102 [0.25 credit] (CHM 8346)

Supercritical Fluids

Fundamental and practical aspects of the uses of supercritical fluids in the chemistry laboratory. Thermodynamic treatment of high pressure multicomponent phase equilibria, transport properties, solubilities, supercritical fluid extraction and chromatography for analytical purposes, reactions in supercritical fluids, equipment considerations, new developments.

Includes: Experiential Learning Activity

CHEM 5108 [0.5 credit] (CHM 8302)**Surface Chemistry and Nanostructures**

Surface structure, thermodynamics and kinetics, specifically regarding adsorption/desorption and high vacuum models. Nanoscale structures and their formation, reactivity and characterization. Thin films, carbon nanotubes, self-assembled monolayers and supramolecular aggregates.

Also offered at the undergraduate level, with different requirements, as CHEM 4103, for which additional credit is precluded.

CHEM 5109 [0.5 credit] (CHM 8302)**Advanced Applications in Mass Spectrometry**

Detailed breakdown of the physical, electrical and chemical operation of mass spectrometers. Applications in MS ranging from the analysis of small molecules to large biological macromolecules. Descriptions of the use of mass spectrometry in industry as well as commercial opportunities in the field.

Also offered at the undergraduate level, with different requirements, as CHEM 4304, for which additional credit is precluded.

CHEM 5110 [0.25 credit] (CHM 8176)**Chemistry Education and Chemistry Education Research**

Chemistry education including theories of learning, aligning intended outcomes with course activities and assessment, and troublesome areas of learning and teaching in chemistry. Key educational research areas are addressed, including types evidence, research methods, and central publications.

CHEM 5111 [0.25 credit] (CHM 8358)**Advanced Topics in Biomolecular Sciences**

Topics of current interest in biomolecular sciences and biological chemistry. Variable content from year to year.

CHEM 5112 [0.25 credit] (CHM 8359)**Advanced Topics in Materials Chemistry**

Topics of current interest in materials chemistry. Variable content from year to year.

CHEM 5113 [0.25 credit] (CHM 8165)**Stereoselective Synthesis**

Fundamentals of stereoselective synthesis and catalysis, including conformational analysis, substrate and catalyst control. Includes the use of allylic, chiral auxiliaries, directed reactions and chiral catalysts.

CHEM 5114 [0.25 credit] (CHM 8173)**Introduction to Molecular Simulation and Statistical Mechanics (Part A)**

Modern molecular simulation techniques including classical molecular dynamics and Monte Carlo simulations with the necessary statistical mechanics required to understand and interpret the results. Introduction to modern scientific computing environments via the Linux operating system.

CHEM 5115 [0.25 credit] (CHM 8175)**Introduction to Molecular Simulation and Statistical Mechanics (Part B)**

Modern molecular simulation techniques including classical molecular dynamics and Monte Carlo simulations with the necessary statistical mechanics required to understand and interpret the results. Introduction to modern scientific computing environments via the Linux operating system.

Prerequisite(s): CHEM 5114.

CHEM 5116 [0.25 credit] (CHM 8360)**Characterization Methods and Applications of Advanced Materials**

Physico-chemical techniques including thermal analysis, optical spectroscopy, electrochemistry, X-ray and electron diffraction, electron microscopy, electron spectroscopies, magnetic resonance, and general instrumental methods. Applications may include: field effect transistors, photovoltaics, light emitting devices, batteries and fuel cells.

CHEM 5117 [0.25 credit] (CHM 8361)**Chemical Biology (Part A)**

Chemical Biology of modern molecular science with applications to understanding biological mechanisms. Chemical and genetically encoded probes for genomics, proteomics, metabolomics as well as biorthogonal chemistry, chemical genetics and expanded genetic codes and alphabets in the context of understanding and engineering living systems.

CHEM 5118 [0.25 credit] (CHM 8363)**Chemical Biology (Part B)**

Chemical Biology of modern molecular science with applications to understanding biological mechanisms. Chemical and genetically encoded probes for genomics, proteomics, metabolomics as well as biorthogonal chemistry, chemical genetics and expanded genetic codes and alphabets in the context of understanding and engineering living systems.

Prerequisite(s): CHEM 5117.

CHEM 5119 [0.25 credit] (CHM 8362)**Molecular Magnetism I**

Introduction to the principals (Molecular Magnetism I) and advanced characterization of paramagnetic molecules (Molecular Magnetism II). Emphasis will be made on structure-property relationship. This course will contain variable content from year to year by discussing recent progress on molecular magnetism.

CHEM 5120 [0.25 credit] (CHM 8330)**Heterocyclic Chemistry**

Properties of heterocycles. Synthesis and reactivity of heterocyclic systems, with examples relevant to the synthesis of pharmaceuticals and natural products. Includes metal-catalyzed reactions.

CHEM 5121 [0.25 credit] (CHM 8364)
Molecular Magnetism II

Introduction to the principals (Molecular Magnetism I) and advanced characterization of paramagnetic molecules (Molecular Magnetism II). Emphasis will be made on structure-property relationship. This course will contain variable content from year to year by discussing recent progress on molecular magnetism.

CHEM 5202 [0.25 credit] (CHM 8323)
Chemistry of the Main Group Elements

Fundamental and applied aspects of main group element chemistry. Topics may include non-metal chemistry, main group organometallic chemistry, application of main group element compounds to solid state synthesis (e.g. CVD and/or sol gel processes), uses of main group element compounds in synthesis.

CHEM 5206 [0.5 credit] (CHM 8302)
Physical Methods of Nanotechnology

An overview of methods used in nanotechnology. Principles of scanning probe techniques ranging from surface physics to biology. State of the art methods to create nanostructures for future applications in areas such as nanolithography, nanoelectronics, nano-optics, data storage and bio-analytical nanosystems.

CHEM 5207 [0.25 credit] (CHM 8302)
Macromolecular Nanotechnology

Fundamentals of synthetic macromolecules related to nanoscale phenomena. Challenges and opportunities associated with polymers on the nanoscale. Topics include molecular recognition, self-assembled nanostructures, functional nanomaterials, amphiphilic architectures, nanocomposites, and nanomachines. Applications to sensing, drug delivery, and polymer based devices. Also offered at the undergraduate level, with different requirements, as CHEM 4201, for which additional credit is precluded.

CHEM 5208 [0.25 credit] (CHM 8302)
Bio Macromolecular Nanotechnology

Fundamentals of biological macromolecules related to nanoscale phenomena. Challenges and opportunities associated with natural polymers on the nanoscale. Topics include molecular recognition, self-assembled nanostructures, scaffolds and templates, functional nanomaterials, amphiphilic architectures, nanocomposites, and nanomachines. Applications to sensing, biomaterials, drug delivery, and devices. Also offered at the undergraduate level, with different requirements, as CHEM 4201, for which additional credit is precluded.

CHEM 5304 [0.25 credit] (CHM 8349)
Free Radicals in Chemistry and Biology

Oxidative stress induced by free radicals plays a significant role in fatal and chronic diseases. The chemistry of bio-radicals will be described and related to pathobiological processes such as lipid peroxidation and atherosclerosis, protein nitration and cross linking, and DNA scission.

CHEM 5306 [0.25 credit] (CHM 8338)
Unimolecular Reaction Dynamics: Experiment and Theory

Theoretical models that have been developed for the understanding of unimolecular reactions; statistical theories such as RRKM theory. Experimental techniques for exploring the kinetics and mechanism of unimolecular reactions, including mass spectrometry, coincidence spectroscopy and ZEKE spectroscopy.

CHEM 5406 [0.5 credit] (CHM 8164)
Organic Polymer Chemistry

Basic principles of industrial and synthetic polymers. Polymerization and polymer characterization. Topics to cover some important polymers with emphasis on synthesis, commodity plastics, engineering thermoplastics and specialty polymers. Prerequisite(s): CHEM 3201 and CHEM 3202 and/or CHEM 4203 or the equivalent. Students should have a basic knowledge of organic reaction mechanisms and stereochemistry.

Also offered at the undergraduate level, with different requirements, as CHEM 4204, for which additional credit is precluded.

CHEM 5407 [0.5 credit] (CHM 8134)
Spectroscopy for Organic Chemists

Use of NMR spectroscopy in the elucidation of organic structures, interpretation of ¹H, ¹³C and ¹⁹F NMR. Use of NMR in determining relative and absolute stereochemistry. Two-dimensional NMR. Also offered at the undergraduate level, with different requirements, as CHEM 4202, for which additional credit is precluded.

CHEM 5500 [0.25 credit] (CHM 8348)
Analytical Instrumentation

Principles of modern electronics, devices and instruments. Measurement of photonic and electrochemical signals. Conditioning of signals for feedback control and microcomputer interfacing. Computational data analysis techniques such as simplex optimization. Applications in chemical analysis include amperometric detector for capillary electrophoresis, and surface plasmon resonance immunosensor.

CHEM 5501 [0.25 credit] (CHM 8352)
Analytical Approach to Chemical Problems

Case study of analytical approach to various chemical problems in agricultural, biochemical, environmental, food processing, industrial, pharmaceutical and material sciences. Analytical methods include capillary electrophoresis, chemiluminescence, Fourier transform infrared spectroscopy, inductively coupled plasma emission spectroscopy, mass spectrometry, biochemical sensors, and fibre optics for remote sensing. Includes: Experiential Learning Activity

CHEM 5600 [0.25 credit] (CHM 8323)**Quantum Mechanical Methods - Theory**

A course dealing with the theory behind quantum mechanical methods (HF, MP2, CI, DFT).

CHEM 5606 [0.5 credit] (CHM 5606)**Environmental Chemistry and Toxicology**

Overview of environmental chemistry and toxicology principles including chemical sources, fate, and effects in the environment. Examining organic reactions occurring in abiotic environments and biological systems, study aspects of toxicant disposition and biotransformation. Emphasis on contemporary problems in human health and the environment.

Also offered at the undergraduate level, with different requirements, as CHEM 4305, for which additional credit is precluded.

CHEM 5705 [0.5 credit] (CHM 9109)**Ecotoxicology**

Concepts of ecotoxicology, emphasizing whole ecosystem response to hazardous contaminants. Impacts of chronic and acute exposure of ecosystems to toxicants, the methods of pesticide, herbicide and pollutant residue analysis and the concept of bound residues.

Also listed as BIOL 6403 [BIO 9104].

Prerequisite(s): BIOL 6402 (BIO 9101)/CHEM 5708 (CHM 8156).

CHEM 5708 [0.5 credit] (CHM 8156)**Principles of Toxicology**

Basic theorems of toxicology with examples of current research problems. Toxic risk is defined as the product of intensive hazard and research problems. Each factor is assessed in scientific and social contexts and illustrated with many types of experimental material.

Also listed as BIOL 6402 [BIO 9101].

CHEM 5709 [0.5 credit] (CHM 8157)**Chemical Toxicology**

Introduction to modeling chemical hazards and exposures at the cellular level. The properties of toxic substances are compared to the responses of enzymatic systems. These interactions are defined as Quantitative Structure-Activity Relationships and used to interpret hazardous materials under regulations such as WHMIS.

Also listed as BIOL 5709 [BIO 8113].

Prerequisite(s): BIOL 6402/CHEM 5708 (BIO 9101/CHM 8156).

CHEM 5800 [0.5 credit]**Seminar in Biochemistry I**

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.

Includes: Experiential Learning Activity

Also listed as BIOL 5002.

CHEM 5801 [1.0 credit] (CHM 8256)**Seminar I**

A seminar course in which students are required to present a seminar on a topic not related to their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.

Includes: Experiential Learning Activity

Also listed as FOOD 5801.

CHEM 5802 [1.0 credit] (CHM 8257S)**Seminar II**

A seminar course in which students are required to present a seminar on their Ph.D. research topic in their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.

Includes: Experiential Learning Activity

Also listed as FOOD 5802.

CHEM 5805 [0.5 credit] (CHM 8167)**Seminar in Toxicology**

This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in toxicology.

Includes: Experiential Learning Activity

Also listed as BIOL 6405.

CHEM 5806 [0.5 credit]**Advances in Applied Biochemistry**

A practical hands-on course in the field of Biochemistry. This course is run in a laboratory and will train students in highly specialized technique(s) in Biochemistry. The students will run experiments, gather data, assess and analyze the results and present the findings as a seminar.

Includes: Experiential Learning Activity

Also listed as BIOL 5004.

CHEM 5900 [0.5 credit] (CHM 8158)**Directed Special Studies**

Under the direction of an approved member of Faculty, the student will undertake advanced study of a field of chemistry unrelated to their thesis topic. Approval of the Associate Chair, Graduate and Postdoctoral Affairs Chemistry is required and will only be granted under unusual conditions.

CHEM 5901 [0.25 credit] (CHM 8304)**Advanced Topics in Organic Chemistry**

Topics of current interest in organic chemistry. The content of this course may vary from year to year.

CHEM 5902 [0.25 credit] (CHM 8302)**Advanced Topics in Inorganic Chemistry**

Topics of current interest inorganic chemistry. The content of this course may vary from year to year.

CHEM 5903 [0.25 credit] (CHM 8309)**Advanced Topics in Physical/Theoretical Chemistry**

Topics of current interest in physical/theoretical chemistry. The content of this course may vary from year to year.

CHEM 5904 [0.5 credit] (CHM 8104)**Scientific Data Processing and Evaluation**

Optimization of scientific measurements, calibration, uni-variate and multi-variate analysis of scientific data, "intelligent" spreadsheets for scientific data processing and presentation, noise reduction using spreadsheets, correction for signal drifts; examples from chemistry, spectroscopy and other scientific disciplines.

Prerequisite(s): CHEM 4301, or permission from the Department.

Also offered at the undergraduate level, with different requirements, as CHEM 4303, for which additional credit is precluded.

CHEM 5905 [0.5 credit] (CHM 5105)**Radiochemistry**

A study of nuclear stability and decay; chemical studies of nuclear phenomena. Applications of radioactivity.

Prerequisite(s): permission of the Department.

Also offered at the undergraduate level, with different requirements, as CHEM 4502, for which additional credit is precluded.

CHEM 5909 [3.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

CHEM 6800 [0.5 credit]**Seminar in Biochemistry II**

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.

Includes: Experiential Learning Activity

Also listed as BIOL 6102.

Lecture three hours a week.

CHEM 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Food Science (FOOD) Courses**FOOD 5100 [0.5 credit]****Advanced Food Processing and Technology**

Major techniques used in food processing and preservation of raw agricultural materials. Targeted food groups include dairy, cereal grains and oilseeds.

FOOD 5101 [0.5 credit]**Advanced Nutrition and Metabolism**

Metabolism of macronutrients in the human body. Detailed catabolic and anabolic reactions of carbohydrates, lipids and proteins. Regulatory control points in healthy and diseased states. Discussion of the literature pertaining to nutrition, metabolism and disease.

Also offered at the undergraduate level, with different requirements, as FOOD 4201, for which additional credit is precluded.

FOOD 5102 [0.5 credit]**Food Biotechnology**

Developments in biotechnology related to food production and quality. Traditional food biotechnology and novel biotechnological methods related to the production of food; the use of traditional food crops in other bio-industries. Aspects of microbiology and genetic engineering.

FOOD 5103 [0.5 credit]**Cellular Redox in Health and Disease**

Crucial interactions of free radicals with biomolecules in living organisms. Procedures for detecting cellular and DNA damage, lipid and protein oxidation products; the link between oxidative stress and chronic diseases.

FOOD 5104 [0.5 credit]**Theory and Principles of Food Quality and Control**

Sampling plans and statistical methods. Physical, chemical, biological and microbiological tests in quality control as it relates to food safety and regulation.

Also offered at the undergraduate level, with different requirements, as FOOD 4001, for which additional credit is precluded.

FOOD 5105 [0.5 credit]**Functional Foods and Natural Health Products**

Bioactive components of functional foods and natural health products, for improvement of health and nutrition. Sources and chemistry of bioactives, mechanisms of actions, process technology, efficacy and safety. Role of research and development in industry in commercialization of new products.

Also offered at the undergraduate level, with different requirements, as FOOD 4203, for which additional credit is precluded.

FOOD 5801 [1.0 credit]**Seminar I**

A seminar course in which students are required to present a seminar on a topic not related to their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.

Includes: Experiential Learning Activity

Also listed as CHEM 5801.

FOOD 5802 [1.0 credit]**Seminar II**

A seminar course in which students are required to present a seminar on their Ph.D. research topic in their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.

Includes: Experiential Learning Activity

Also listed as CHEM 5802.

Prerequisite(s): enrolment in the Ph.D. program.

FOOD 5909 [3.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

FOOD 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Civil Engineering

This section presents the requirements for programs in:

- M.A.Sc. Civil Engineering
- M. Eng. Civil Engineering
- Ph.D. Civil Engineering

Program Requirements

Study at the master's level can be pursued through either a thesis leading to a M.A.Sc., a project option leading to a M.Eng., or a course work option leading to a M.Eng. Requirements are stated in terms of Carleton University credits.

M.A.Sc. Civil Engineering (5.0 credits)**Requirements - Master's degree by thesis (5.0 credits)**

- | | |
|--|-----|
| 1. 2.5 credits in courses | 2.5 |
| 2. 2.5 credits in: | 2.5 |
| CIVE 5909 [2.5] M.A.Sc. Thesis | |
| 3. Participation in the graduate student seminar series: | |
| CIVE 5901 [0.0] Master's Seminar | |
| 4. Successful oral defence of the thesis | |

Total Credits 5.0**M. Eng. Civil Engineering (5.0 credits)****Requirements - Master's degree by project (5.0 credits)**

- | | |
|--|-----|
| 1. 4.0 credits in courses | 4.0 |
| 2. 1.0 credit in: | 1.0 |
| CIVE 5900 [1.0] Civil Engineering Project | |

Total Credits 5.0**Requirements - Master's degree by course work (5.0 credits)**

- | | |
|---------------------------|-----|
| 1. 5.0 credits in courses | 5.0 |
|---------------------------|-----|

Ph.D. Civil Engineering (2.0 credits)

Requirements are stated in terms of Carleton University credits.

Requirements:

- | | |
|---|-----|
| 1. 2.0 credits in courses | 2.0 |
| 2. Participation in the graduate student seminar series: | 0.0 |
| CIVE 6901 [0.0] Ph.D. Seminar | |
| 3. Successful completion of written and oral comprehensive examinations in subject areas determined by the student's advisory committee: | 0.0 |
| CIVE 6902 [0.0] Ph.D. Comprehensive Examination | |
| 4. Successful completion of a thesis proposal examination | 0.0 |
| 5. 0.0 credits in: | 0.0 |
| CIVE 6909 [0.0] Ph.D. Thesis | |
| 6. Successful oral defence of the thesis. The examination board for all theses will include an external examiner, and, when possible, professors from both departments. | 0.0 |

Total Credits 2.0**Note**

- Subject to approval of his/her advisory committee, a Ph.D. student may take, or be required to take, courses in other disciplines.

Graduate Courses

In all programs, the student may choose graduate courses from either university with the approval of the adviser or the advisory committee. Graduate courses are listed below, grouped by subject area. Course descriptions may be found in the departmental section of the calendar concerned. All courses are of one term duration. The codes given in parentheses are those used by the University of Ottawa. Courses beginning with "CIVE" and 'ENVE' are offered at Carleton University and those beginning with "CIVJ" and 'ENVJ' are offered at the University of Ottawa. Not all courses listed are necessarily given during one academic year. Courses taken outside the Institute will not count towards the degree requirements unless approved by the adviser or the advisory committee and the program's Associate Chair (graduate affairs). In all programs, at least one half of the course work must be taken from the Institute.

Geotechnical Engineering

CIVE 5209 (CVG 7100)	Geotechnical Case Studies
CIVE 5300 (CVG 7101)	Advanced Soil Mechanics
CIVE 5500 (CVG 7104)	Earth Retaining Structures
CIVE 5501 (CVG 7105)	Advanced Foundation Engineering
CIVE 5502 (CVG 7106)	In-Situ Geotechnique
CIVE 5503 (CVG 7107)	Numerical Methods in Geomechanics
CIVE 5505 (CVG 7109)	Geotechnical Earthquake Engineering
CIVE 5800 (CVG 7305)	Topics in Geotechnique
CIVE 5801 (CVG 7306)	Topics in Geotechnique
CIVE 5802 (CVG 7307)	Topics in Geotechnique
CIVE 5803 (CVG 7308)	Topics in Geotechnique
CIVE 5804 (CVG 7309)	Topics in Geotechnique
CIVJ 5000 (CVG 5100)	Deep Foundations
CIVJ 5006 (CVG 5106)	Site Improvements
CIVJ 5008 (CVG 5108)	Pile Dynamics
CIVJ 5105 (CVG 5175)	Numerical Methods for Geotechnical Engineering
CIVJ 5106 (CVG 5161)	Mechanics of Unsaturated Soils
CIVJ 5107 (CVG 5177)	Offshore Geotechnique

CIVJ 5108 (CVG 5178)	Ice Mechanics
CIVJ 5109 (CVG 5109)	Geotechnical Hazards

Structural Engineering

CIVE 5101 (CVG 7120)	Solid Mechanics
CIVE 5102 (CVG 7121)	Advanced Elasticity
CIVE 5103 (CVG 7122)	Finite Element Analysis 1
CIVE 5104 (CVG 7123)	Earthquake Engineering and Analysis
CIVE 5105 (CVG 7124)	Finite Element Analysis 2
CIVE 5106 (CVG 7137)	Dynamics of Structures
CIVE 5107 (CVG 5321)	Finite Elements in Field Problems
CIVE 5108 (CVG 7181)	Nonlinear Analysis and Design of Advanced Earthquake-Resistant Structures
CIVE 5200 (CVG 7138)	Masonry Behaviour and Design
CIVE 5203 (CVG 7125)	Theory of Structural Stability
CIVE 5204 (CVG 7126)	Advanced Steel Structures
CIVE 5205 (CVG 7127)	Advanced Structural Analysis
CIVE 5206 (CVG 7128)	Prestressed Concrete
CIVE 5208 (CVG 7130)	Advanced Reinforced Concrete
CIVE 5507 (CVG 7184)	Blast Load Effects on Structures
CIVE 5600 (CVG 7131)	Project Management
CIVE 5601 (CVG 7140)	Engineering, Statistics, and Probabilities
CIVE 5602 (CVG 7141)	Advanced Computer-Aided Design
CIVE 5603	Advanced Building Characterization, Conservation and Rehabilitation
CIVE 5605 (CVG 7143)	Design of Steel Bridges
CIVE 5606 (CVG 7144)	Design of Concrete Bridges
CIVE 5607 (CVG 7145)	Introduction to Bridge Design
CIVE 5705 (CVG 7300)	Topics in Structures
CIVE 5706 (CVG 7301)	Topics in Structures
CIVE 5707 (CVG 7302)	Topics in Structures
CIVE 5708 (CVG 7303)	Topics in Structures
CIVE 5709 (CVG 7304)	Topics in Structures

CIVJ 5201 (CVG 5142)	Advanced Structural Dynamics
CIVJ 5202 (CVG 5143)	Advanced Structural Steel Design
CIVJ 5300 (CVG 5144)	Advanced Reinforced Concrete Design
CIVJ 5203 (CVG 5145)	Theory of Elasticity
CIVJ 5302 (CVG 5146)	Numerical Methods of Structural Analysis
CIVJ 5204 (CVG 5147)	Theory of Plates and Shells
CIVJ 5305 (CVG 5148)	Prestressed Concrete Design
CIVJ 5304 (CVG 5149)	Structural Stability
CIVJ 5206 (CVG 5150)	Advanced Concrete Technology
CIVJ 5209 (CVG 5153)	Wind Engineering
CIVJ 5306 (CVG 5155)	Earthquake Engineering
CIVJ 5301 (CVG 5156)	Finite Element Methods I
CIVJ 5303 (CVG 5157)	Finite Element Methods II
CIVJ 5307 (CVG 5158)	Elements of Bridge Engineering
CIVJ 5308 (CVG 5154)	Random Vibrations
CIVJ 5309 (CVG 5159)	Long Span Structures
CIVJ 5310 (CVG 5311)	Bridge Design
CIVJ 5311 (CVG 5312)	Durability of Concrete Structures
CIVJ 5312 (CVG 5313)	Seismic Analysis and Design of Concrete Structures

Fire Safety Engineering

CIVE 5609 (CVG 7170)	Fundamentals of Fire Safety Engineering
CIVE 5610 (CVG 7171)	Fire Dynamics I
CIVE 5611 (CVG 7173)	People in Fires
CIVE 5612 (CVG 7174)	Fire Modeling
CIVE 5613 (CVG 7172)	Fire Dynamics II
CIVE 5614 (CVG 7175)	Design for Fire Resistance
CIVE 5615 (CVG 5320)	Fire Behaviour of Materials
CIVE 5616	Wood Structures and Fire
CIVE 5810 (CVG 7185)	Topics in Fire Safety

Transportation Engineering

CIVE 5303 (CVG 7103)	Pavements and Materials
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CIVE 5304 (CVG 7150)	Intercity Transportation	ENVE 5003 (EVG 7143)	Advanced Ultraviolet Processes
CIVE 5305 (CVG 7151)	Traffic Engineering	ENVE 5004 (EVG 7144)	Advanced Wastewater Treatment
CIVE 5306 (CVG 7152)	Highway Materials	ENVE 5101 (EVG 7101)	Air Pollution Control
CIVE 5307 (CVG 7153)	Urban Transportation	ENVE 5102 (EVG 7161)	Traffic-Related Air Pollution
CIVE 5308 (CVG 7154)	Highway Geometric Design	ENVE 5103 (EVG 7162)	Air Quality Modeling
CIVE 5309 (CVG 7155)	Transportation Supply	ENVE 5104 (EVG 7104)	Indoor Environmental Quality
CIVE 5310	Road Safety Analysis	ENVE 5105 (EVG 7105)	Atmospheric Aerosols
CIVE 5401 (CVG 7156)	Transportation Economics	ENVE 5106 (EVG 7106)	Atmospheric Chemical Transport Modelling
CIVE 5402 (CVG 7159)	Transportation Terminals	ENVE 5200 (EVG 7200)	Climate Change and Engineering
CIVE 5403 (CVG 7158)	Airport Planning	ENVE 5201 (EVG 7201)	Geo-Environmental Engineering
CIVE 5404 (CVG 7182)	Introduction to Infrastructure Management	ENVE 5203 (EVG 5203)	Hazardous and Radioactive Wastes
CIVE 5805 (CVG 7310)	Topics in Transportation	ENVE 5204 (EVG 7134)	Resource Industry Waste Management
CIVE 5806 (CVG 7311)	Topics in Transportation	ENVE 5205 (EVG 7132)	Sludge Treatment and Disposal
CIVE 5807 (CVG 7312)	Topics in Transportation	ENVE 5301 (EVG 7301)	Contaminant Hydrogeology
CIVE 5808 (CVG 7313)	Topics in Transportation	ENVE 5302 (EVG 7163)	Case Studies in Hydrogeology
CIVE 5809 (CVG 7314)	Topics in Transportation	ENVE 5303 (EVG 7303)	Multiphase Flow in Soils
Water Resources Engineering		ENVE 5402 (EVG 7402)	Finite Elements in Field Problems
CIVJ 5501 (CVG 5111)	Hydraulic Structures	ENVE 5701 (EVG 7001)	Topics in Environmental Engineering
CIVJ 5502 (CVG 5112)	Computational Hydrodynamics	ENVE 5702 (EVG 7002)	Topics in Environmental Engineering
CIVJ 5803 (CVG 5119)	Computational Hydraulics	ENVE 5703 (EVG 7003)	Topics in Environmental Engineering
CIVJ 5506 (CVG 5120)	Water Resources Systems	ENVE 5704 (EVG 7004)	Topics in Environmental Engineering
CIVJ 5509 (CVG 5123)	Advanced Topics in Hydrology	ENVE 5705 (EVG 7005)	Topics in Environmental Engineering
CIVJ 5605 (CVG 5124)	Coastal Engineering	ENVJ 5700 (EVG 5139)	Environmental Assessment of Civil Engineering Projects
CIVJ 5601 (EVG 5125)	Statistical Methods in Hydrology	ENVJ 5900 (EVG 5130)	Wastewater Treatment Process Design
CIVJ 5602 (CVG 5126)	Stochastic Hydrology	ENVJ 5901 (EVG 5132)	Unit Operations of Water Treatment
CIVJ 5603 (CVG 5127)	Hydrologic Systems Analysis	ENVJ 5902 (EVG 5138)	Advanced Water Treatment
CIVJ 5604 (CVG 5128)	Water Resources Planning and Policy	ENVJ 5903 (EVG 5331)	Sludge Utilization and Disposal
CIVJ 5503 (CVG 5160)	Sediment Transport	ENVJ 5905 (EVG 5137)	Water and Wastewater Treatment Process Analysis
CIVJ 5504 (CVG 5162)	River Hydraulics	ENVJ 5906 (EVG 5133)	Solid Waste Management
Environmental Engineering		ENVJ 5907 (EVG 5134)	Chemistry for Environmental Engineering
ENVE 5001 (CVG 7160)	Biofilm Processes		

ENVJ 5908 (EVG 5179)	Anaerobic Digestion
ENVJ 5909	Biological Nutrient Removal

Studies and Seminars

CIVE 5901 (CVG 7314)	Master's Seminar
CIVE 5906 (CVG 6108)	Directed Studies 1
CIVE 6906 (CVG 6109)	Directed Studies 2
CIVJ 6000 (CVG 6300)	Special Topics in Civil Engineering
CIVJ 6001 (CVG 6301)	Special Topics in Civil Engineering
CIVJ 6002 (CVG 6302)	Special Topics in Civil Engineering
CIVJ 6003 (CVG 6303)	Special Topics in Civil Engineering
CIVJ 6004 (CVG 6304)	Special Topics in Civil Engineering
CIVJ 6005 (CVG 6305)	Special Topics in Civil Engineering
CIVJ 6006 (CVG 6306)	Special Topics in Civil Engineering
CIVJ 6007 (CVG 6307)	Special Topics in Civil Engineering
CIVJ 6008 (CVG 6308)	Special Topics in Civil Engineering
CIVJ 6009 (CVG 6309)	Special Topics in Civil Engineering
CIVJ 6010 (CVG 6310)	Special Topics in Civil Engineering
CIVJ 6011 (CVG 6311)	Special Topics in Civil Engineering
CIVJ 6012 (CVG 6312)	Special Topics in Civil Engineering
CIVJ 6013 (CVG 6313)	Special Topics in Civil Engineering
CIVJ 6014 (CVG 6314)	Special Topics in Civil Engineering
CIVJ 6015 (CVG 6315)	Special Topics in Civil Engineering
CIVJ 6016 (CVG 6316)	Special Topics in Civil Engineering
CIVJ 6017 (CVG 6317)	Special Topics in Civil Engineering
CIVJ 6018 (CVG 6318)	Special Topics in Civil Engineering
CIVJ 6019 (CVG 6019)	Special Topics in Civil Engineering
CIVJ 6020 (CVG 6320)	Special Topics in Civil Engineering
CIVE 6901	Ph.D. Seminar

Projects and Theses

CIVE 5900 (CVG 6000)	Civil Engineering Project
CIVE 5909 (CVG 5909)	M.A.Sc. Thesis
CIVE 6902 (CVG 9998)	Ph.D. Comprehensive Examination

CIVE 6909 (CVG 9999)	Ph.D. Thesis
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Admission

The normal requirement for admission to a master's program is a bachelor's degree with at least high honours standing in civil engineering.

1. Graduates from engineering programs other than civil engineering, or Honours science programs with a mathematics content equivalent to the civil engineering program will have to take a minimum of four qualifying undergraduate civil engineering courses in their area of graduate specialty.
2. Graduates from other science programs will have to take all the core engineering undergraduate mathematics courses in addition to the requirements specified in (1) above.

The undergraduate courses required will be specified in the Certificate of Admission.

Undergraduate civil engineering courses will not be accepted towards a graduate degree. Graduate students may still be required to take undergraduate courses for credit to fulfil the admission requirements.

No more than one half of the program credit requirements or that stipulated in the regulations of the university in which the student is registered, whichever is less, can be transferred at admission.

Accelerated Pathway

The accelerated pathway in Civil Engineering is a flexible and individualized plan of graduate study. Students in the final year of Bachelor of Engineering in Civil, Environmental, or Architectural Conservation and Sustainability Engineering with demonstrated excellent aptitude for graduate studies and research may qualify for this option.

Students with a CGPA of 10.0 or higher, going into their final year of undergraduate study, and intending to apply to a Master's degree in Civil Engineering in the following academic year should consult with both the Undergraduate and Graduate Associate Chairs to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses.

Upon approval for the accelerated pathway, students will replace a maximum of 1.0 credit of their engineering electives with 5000 level CIVE or ENVE courses. Students will receive advanced standing for the approved 5000 level courses in which they receive a grade of A- or higher.

Admission

The normal requirement for admission into the Ph.D. program is a master's degree with thesis in civil engineering. Students who have been admitted to a master's program may be permitted to transfer into the Ph.D. program if they demonstrate:

1. outstanding academic performance by completing at least 2.5 credits of course work with a CGPA of A- or higher, and

2. significant promise for advanced research and the ability to defend their Ph.D. proposal in the first year of their Ph.D. program.

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.Eng. Civil Engineering is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Civil Engineering - Joint (CIVJ) Courses

CIVJ 5000 [0.5 credit] (CVG 5100)

Deep Foundations

CIVJ 5003 [0.5 credit]

Dam Engineering

CIVJ 5005 [0.5 credit]

Adsorption Separation Process

CIVJ 5006 [0.5 credit] (CVG 5106)

Site Improvements

CIVJ 5008 [0.5 credit] (CVG 5108)

Pile Dynamics

CIVJ 5102 [0.5 credit]

Behaviour of Soil and Rock

CIVJ 5104 [0.5 credit]

Soil Plasticity

CIVJ 5105 [0.5 credit] (CVG 5175)

Numerical Methods for Geotechnical Engineering

CIVJ 5106 [0.5 credit] (CVG 5161)

Mechanics of Unsaturated Soils

CIVJ 5107 [0.5 credit] (CVG 5177)

Offshore Geotechnique

CIVJ 5108 [0.5 credit] (CVG 5178)

Ice Mechanics

CIVJ 5109 [0.5 credit] (CVG 5109)

Geotechnical Hazards

CIVJ 5110 [0.5 credit] (CVG 5187)

Rock Mechanics

Rock exploration, laboratory and in-situ testing, rock mass classification, deformation and strength, failure criteria, stresses in rock, foundations on rock.

CIVJ 5182 [0.5 credit] (CVG 5182)

Water Resources Management

Global water supply and demand, integrated water resources management, modeling and optimization of water resources systems, reservoir management, uncertainty modeling, climate change and water, decision under uncertainty.

Also listed as ENVJ 5182.

CIVJ 5184 [0.5 credit] (CVG 5184)

Construction Cost Estimating

General overview of construction cost estimating. Techniques and construction cost estimating process; elements of project cost; conceptual and detailed cost estimation methods; risk assessment and range estimating; work breakdown structure applied in building projects. Computer applications in building construction cost estimating and infrastructure projects.

CIVJ 5185 [0.5 credit] (CVG 5185)

Construction Life Cycle Analysis

General overview of analyzing the economics of construction projects by applying the concept of time value of money. Financing strategies for construction projects and profitability analysis; correlation between value engineering, life cycle cost analysis and assessment for construction projects. Breakeven, sensitivity and risk analysis.

CIVJ 5186 [0.5 credit] (CVG 5186)

Project Information Management

Topics in contractual relationships between construction project teams. Different type of construction contracts and their application. Preparation of project documents. Evaluation of different types of project organization structure and associated project delivery systems. Bidding strategies. Network analysis using deterministic and stochastic methods for construction-time.

CIVJ 5188 [0.5 credit] (CVG 5188)

Loads on structures

Overview of loads on buildings according to Canadian codes and standards. Dead and live loads, snow loads, wind loads, earthquake loads, loads on non-structural components; vibrations. Selected topics in the practical design of building structures.

CIVJ 5189 [0.5 credit] (CVG5189)

Blast Engineering

Overview of explosives and blast loads on structural and non-structural infrastructure components; dynamic analysis of elements under blast-induced shock waves and dynamic pressures; elastic and inelastic response; incremental equation of motion and nonlinear analysis; development of resistance functions; pressure-impulse (P-I) diagrams; blast-resistant building design.

CIVJ 5190 [0.5 credit] (CVG 5190)

Rehabilitation of Concrete Structures

Durability of concrete bridges and building structures in Canada; assessment and evaluation of damaged concrete structures; repair, rehabilitation and strengthening techniques; applicable design codes and guidelines; monitoring technologies for structures; implications for infrastructure management.
Lecture three hours a week

CIVJ 5191 [0.5 credit] (CVG 5191)

Diagnosis and Prognosis of Concrete Infrastructure

Condition assessment of concrete infrastructure using experimental (i.e. visual, nondestructive, microscopic and mechanical) and analytical approaches; overview of repair and maintenance techniques according to damage type and extent; Serviceability performance and appraisal guides for aging infrastructure; design for durability through performance based design approaches.

Lecture three hours a week

CIVJ 5192 [0.5 credit] (CVG 5192)

Characterization Methods for Materials

Modern materials characterization techniques especially with respect to civil engineering materials. Choosing the right characterization methods in order to determine the properties of materials such as chemical composition, atomic structure, and surface properties used in their research. Interpreting the results of each method.

CIVJ 5193 [0.5 credit] (CVG 5193)

Instrumentation and Experimental Design for Civil Engineering

Introduction to instrumentation in civil engineering applications. Instrument types and performance, strain gauges, transducers, measurement of position, velocity, acceleration, force, pressure, temperature and flow. Data collection and data acquisition systems; diagnostics and calibration, closed versus open-loop control; servomotor types and servo-valves.

CIVJ 5201 [0.5 credit] (CVG 5142)

Advanced Structural Dynamics

CIVJ 5202 [0.5 credit] (CVG 5143)

Advanced Structural Steel Design

CIVJ 5203 [0.5 credit] (CVG 5145)

Theory of Elasticity

CIVJ 5204 [0.5 credit] (CVG 5147)

Theory of Plates and Shells

CIVJ 5206 [0.5 credit] (CVG 5150)

Advanced Concrete Technology

CIVJ 5209 [0.5 credit] (CVG 5153)

Wind Engineering

CIVJ 5300 [0.5 credit] (CVG 5144)

Advanced Reinforced Concrete Design

CIVJ 5301 [0.5 credit] (CVG 5156)

Finite Element Methods I

CIVJ 5302 [0.5 credit] (CVG 5146)

Numerical Methods of Structural Analysis

CIVJ 5303 [0.5 credit] (CVG 5157)

Finite Element Methods II

CIVJ 5304 [0.5 credit] (CVG 5149)

Structural Stability

CIVJ 5305 [0.5 credit] (CVG 5148)

Prestressed Concrete Design

CIVJ 5306 [0.5 credit] (CVG 5155)

Earthquake Engineering

CIVJ 5307 [0.5 credit] (CVG 5158)

Elements of Bridge Engineering

CIVJ 5308 [0.5 credit] (CVG 5154)

Random Vibrations

CIVJ 5309 [0.5 credit] (CVG 5159)

Long Span Structures

Includes: Experiential Learning Activity

CIVJ 5310 [0.5 credit] (CVG 5311)

Bridge Design

CIVJ 5311 [0.5 credit] (CVG 5312)

Durability of Concrete Structures

CIVJ 5312 [0.5 credit] (CVG 5313)

Seismic Analysis and Design of Concrete Structures

Includes: Experiential Learning Activity

CIVJ 5500 [0.5 credit]

Deep Foundations

CIVJ 5501 [0.5 credit] (CVG 5111)

Hydraulic Structures

CIVJ 5502 [0.5 credit] (CVG 5112)

Computational Hydrodynamics

CIVJ 5503 [0.5 credit] (CVG 5160)

Sediment Transport

CIVJ 5504 [0.5 credit] (CVG 5162)

River Hydraulics

CIVJ 5506 [0.5 credit] (CVG 5120)

Water Resources Systems

Includes: Experiential Learning Activity

CIVJ 5508 [0.5 credit]

Groundwater and Seepage

CIVJ 5509 [0.5 credit] (CVG 5123)

Advanced Topics in Hydrology

CIVJ 5601 [0.5 credit] (EVG 5125)

Statistical Methods in Hydrology

CIVJ 5602 [0.5 credit] (CVG 5126)

Stochastic Hydrology

CIVJ 5603 [0.5 credit] (CVG 5127)

Hydrologic Systems Analysis

CIVJ 5604 [0.5 credit] (CVG 5128)

Water Resources Planning and Policy

CIVJ 5605 [0.5 credit] (CVG 5124)
Coastal Engineering

CIVJ 5607 [0.5 credit]
Irrigation and Drainage

CIVJ 5803 [0.5 credit] (CVG 5119)
Computational Hydraulics

CIVJ 5901 [0.5 credit]
Unit Op of Water Treatment

CIVJ 5904 [0.5 credit]
Water and Wastewater Labs

CIVJ 5905 [0.5 credit]
Water and Wastewater Proc

CIVJ 5906 [0.5 credit]
Solid Waste Disposal

CIVJ 5907 [0.5 credit]
Chemistry of Enviro Engin

CIVJ 6000 [0.5 credit] (CVG 6300)
Special Topics in Civil Engineering

CIVJ 6001 [0.5 credit] (CVG 6301)
Special Topics in Civil Engineering

CIVJ 6002 [0.5 credit] (CVG 6302)
Special Topics in Civil Engineering

CIVJ 6003 [0.5 credit] (CVG 6303)
Special Topics in Civil Engineering

CIVJ 6004 [0.5 credit] (CVG 6304)
Special Topics in Civil Engineering

CIVJ 6005 [0.5 credit] (CVG 6305)
Special Topics in Civil Engineering

CIVJ 6006 [0.5 credit] (CVG 6306)
Special Topics in Civil Engineering

CIVJ 6007 [0.5 credit] (CVG 6307)
Special Topics in Civil Engineering

CIVJ 6008 [0.5 credit] (CVG 6308)
Special Topics in Civil Engineering

CIVJ 6009 [0.5 credit] (CVG 6309)
Special Topics in Civil Engineering

CIVJ 6010 [0.5 credit] (CVG 6310)
Special Topics in Civil Engineering

CIVJ 6011 [0.5 credit] (CVG 6311)
Special Topics in Civil Engineering

CIVJ 6012 [0.5 credit] (CVG 6312)
Special Topics in Civil Engineering

CIVJ 6013 [0.5 credit] (CVG 6313)
Special Topics in Civil Engineering

CIVJ 6014 [0.5 credit] (CVG 6314)
Special Topics in Civil Engineering

CIVJ 6015 [0.5 credit] (CVG 6315)
Special Topics in Civil Engineering

CIVJ 6016 [0.5 credit] (CVG 6316)
Special Topics in Civil Engineering

CIVJ 6017 [0.5 credit] (CVG 6317)
Special Topics in Civil Engineering

CIVJ 6018 [0.5 credit] (CVG 6318)
Special Topics in Civil Engineering

CIVJ 6019 [0.5 credit] (CVG 6019)
Special Topics in Civil Engineering

CIVJ 6020 [0.5 credit] (CVG 6320)
Special Topics in Civil Engineering

Civil Engineering (CIVE) Courses

CIVE 5101 [0.5 credit] (CVG 7120)

Solid Mechanics

Cartesian tensor notation; stresses and strains in a continuum; transformations, invariants; equations of motion; constitutive relations; generalized Hooke's Law, bounds for elastic constant; strain energy, superposition, uniqueness; formulation of plane stress and plane strain problems; energy principles, variational methods; plasticity.

CIVE 5102 [0.5 credit] (CVG 7121)

Advanced Elasticity

Continuation of topics introduced in CIVE 5101. Complex variable solutions: torsional and thermal stresses; axially symmetric three-dimensional problems, Love's strain potential, Boussinesq-Galerkin stress functions; problems related to infinite and semi-infinite domains. Introduction to numerical methods of stress analysis, comparison of solutions.

Prerequisite(s): CIVE 5101 or permission of the Department.

CIVE 5103 [0.5 credit] (CVG 7122)

Finite Element Analysis 1

Advanced finite element methods for linear systems. The relationship with variational and Galerkin formulations, system of linear equations, polynomial interpolation, numerical integration, and theory of elasticity is explored. Isoparametric formulations for structural and continuum elements are examined. Introduction to linear dynamics and nonlinear problems.

CIVE 5104 [0.5 credit] (CVG 7123)**Earthquake Engineering and Analysis**

Advanced vibration analysis techniques; Rayleigh-Ritz procedure; subspace iteration; derived Ritz coordinates; proportional and non-proportional damping; introduction to seismology; earthquake response analysis via time and frequency domain; response spectrum approach; multiple input excitations; design considerations and code requirements; other advanced topics in earthquake engineering.

Prerequisite(s): CIVE 5106 or permission of the Department.

CIVE 5105 [0.5 credit] (CVG 7124)**Finite Element Analysis 2**

Variational and Galerkin formulations: assumed displacement, assumed stress and hybrid elements; plate bending: convergence, completeness and conformity, patch test, Kirchhoff and Mindlin plate theories, nonlinear elasticity and plasticity; geometric non-linearity, Eulerian and Lagrangian formulations; incremental and iterative schemes, finite elements in dynamics.

Prerequisite(s): CIVE 5103 or permission of the Department.

CIVE 5106 [0.5 credit] (CVG 7137)**Dynamics of Structures**

Structural dynamics, single and multi-degree-of-freedom systems, formulation of equations of motion, methods of analytical mechanics, free and forced vibrations, normal mode analysis, numerical methods for the response analyses of single and multiple-degree-of-freedom systems.

CIVE 5107 [0.5 credit] (CVG 5321)**Finite Elements in Field Problems**

Use of Galerkin and Ritz finite element formulation to solve one and two dimensional field problems. Steady state and time-dependent phenomena involving potentials, heat transfer, fluid flow, diffusion, and dispersion with emphasis on practical applications. Basic knowledge of third year-level undergraduate engineering mathematics/physics required.

Also listed as ENVE 5402.

CIVE 5108 [0.5 credit] (CVG 7181)**Nonlinear Analysis and Design of Advanced Earthquake-Resistant Structures**

Design and construction of nonlinear structural models. Accounting for mass, material behaviour, damping, and nonlinear geometry. Use of pushover and time history analysis methods. Design and modelling of structural systems using passive damping devices and isolation systems.

CIVE 5200 [0.5 credit] (CVG 7138)**Masonry Behaviour and Design**

Properties of masonry materials and assemblages. Behaviour and design of walls, columns and lintels. Treatment of specialized design and construction topics. Design of lowrise and highrise structures. Discussion of masonry problems. Emphasis on a practice-oriented approach.

Also offered at the undergraduate level, with different requirements, as CIVE 4403, for which additional credit is precluded.

CIVE 5203 [0.5 credit] (CVG 7125)**Theory of Structural Stability**

Elastic and inelastic behaviour of beam-columns; elastic and inelastic buckling of frames; application of energy methods to buckling problems; lateral-torsional buckling of columns and beams; buckling of plates; local buckling of columns and beams.

Prerequisite(s): CIVE 5205 or equivalent.

CIVE 5204 [0.5 credit] (CVG 7126)**Advanced Steel Structures**

Limit states design philosophy; material behaviour; tension members; plate buckling; torsion; lateral torsional buckling; beams, axially loaded columns and beam-column behaviour; brittle fracture and fatigue; frame stability and second order effects.

CIVE 5205 [0.5 credit] (CVG 7127)**Advanced Structural Analysis**

Matrix structural analysis; force and displacement method of analysis for planar and space structures; symmetric and anti-symmetric structures; analysis of nonlinear structures: geometric and material nonlinearities; large displacement theory and iteration strategy.

CIVE 5206 [0.5 credit] (CVG 7128)**Prestressed Concrete**

Behaviour and analysis of prestressed concrete elements subjected to axial loads, flexure and shear: material properties; prestressing systems; linear and non-linear behaviour; deflections; compression-field approaches; disturbed regions; restraint of deformations; design requirements; applications to pressure vessels, bridges and frames.

CIVE 5208 [0.5 credit] (CVG 7130)**Advanced Reinforced Concrete**

The research background, development, and limitations in current building code provisions for reinforced concrete; yield line theory of slabs; safety and limit state design; computer design of concrete structures.

CIVE 5209 [0.5 credit] (CVG 7100)**Geotechnical Case Studies**

The critical study of case histories relating to current procedures of design and construction in geotechnical engineering. The importance of instrumentation and monitoring field behaviour will be stressed. In-situ testing. Includes: Experiential Learning Activity

CIVE 5300 [0.5 credit] (CVG 7101)**Advanced Soil Mechanics**

Effective stress, pore pressure parameters, saturated and partially saturated soils; seepage; permeability tensor, solutions of the Laplace equation; elastic equilibrium; anisotropy, non-homogeneity, consolidation theories; shear strength of cohesive and cohesionless soils; failure and yield criteria.

CIVE 5303 [0.5 credit] (CVG 7103)**Pavements and Materials**

An analysis of the interaction of materials, traffic, and climate in the planning, design construction, evaluation, maintenance, and rehabilitation of highway and airport pavements.

CIVE 5304 [0.5 credit] (CVG 7150)**Intercity Transportation**

Current modal and intermodal issues, including energy. Framework and process of intercity transport planning and management. Recent trends and system development. Passenger and freight demand and service characteristics. Future prospects and possibilities.

CIVE 5305 [0.5 credit] (CVG 7151)**Traffic Engineering**

Introduction to principles of traffic engineering. Basic characteristics of drivers, vehicles, and traffic. Volume, speed, and delay studies. Traffic stream characteristics and queuing theory. Capacity analysis of roads and intersections. Safety.

CIVE 5306 [0.5 credit] (CVG 7152)**Highway Materials**

Materials characterization and strength evaluation of soils, stabilized soils, aggregates, and asphalt concrete. Effects of low temperatures and frost on materials behaviour.

CIVE 5307 [0.5 credit] (CVG 7153)**Urban Transportation**

Urban transportation systems, planning and management. Urban development models, an introduction. Urban transportation policy.

CIVE 5308 [0.5 credit] (CVG 7154)**Highway Geometric Design**

Principles of highway geometric design. Components of the highway system, their interrelationships, abilities, limitations, and their relations with the design elements. Safety and human factors, and their interaction with the highway elements. New and evolving concepts.

CIVE 5309 [0.5 credit] (CVG 7155)**Transportation Supply**

Advanced treatment of transportation planning and management concepts and techniques: transport supply issues, capacity and costs, evaluation of system improvements and extensions, transportation and development, policy impact analysis.

CIVE 5310 [0.5 credit]**Road Safety Analysis**

Fundamental analytical techniques for road safety analysis, background of traffic safety analysis, network screening, before and after analysis, and surrogate measures of safety.

CIVE 5401 [0.5 credit] (CVG 7156)**Transportation Economics**

Transportation, economic analysis framework. Transport industry output. Carrier operations. Issue of resource utilization, measurement, economics, supply of infrastructure, pricing; subsidies, externalities. Transport policy in Canada.

CIVE 5402 [0.5 credit] (CVG 7159)**Transportation Terminals**

Framework for passenger terminal planning and design. Theory: the transfer function and network modeling; pedestrian flow characteristics; capacity of corridors, stairs, escalators, and elevators; layout planning. Practical applications: air, rail, metro, bus, ferry, and multi-modal terminals.

CIVE 5403 [0.5 credit] (CVG 7158)**Airport Planning**

Framework for airport planning and design. Aircraft characteristics; demand forecasting; airport site selection; noise, airside capacity; geometric design; the passenger terminal complex; cargo area; general aviation; ground transportation; land use planning.

CIVE 5404 [0.5 credit] (CVG 7182)**Introduction to Infrastructure Management**

Infrastructure management and its relationship to facility and asset management; challenges facing infrastructure managers; tools for effective IM; concept of total quality management; economic analysis of maintenance, rehabilitation and reconstruction; use of life cycle cost analysis in decision making, development and use of IM systems.

CIVE 5500 [0.5 credit] (CVG 7104)**Earth Retaining Structures**

Approaches to the theoretical and semi-empirical analysis of earth retaining structures. Review of the earth pressure theories. Analysis and design methods for rigid and flexible retaining walls, braced excavations, and tunnels. Instrumentation and performance studies.

CIVE 5501 [0.5 credit] (CVG 7105)**Advanced Foundation Engineering**

Review of methods of estimating compression and shear strength of soils. Bearing capacity of shallow and deep foundations. Foundations in slopes. Pile groups. Use of in-situ testing for design purposes.

CIVE 5502 [0.5 credit] (CVG 7106)**In-Situ Geotechnique**

Subsurface exploration program. Soil and rock sampling. Geo-physical methods. Mechanical and hydraulic properties of soil and rock. Determination of strength and deformability. Critical evaluation of vane, pressuremeter, screw plate, dilatometer, borehole shear and plate load tests. Pumping, recharge and packer tests. In-situ stress measurements.

CIVE 5503 [0.5 credit] (CVG 7107)**Numerical Methods in Geomechanics**

Advanced theories of soil and rock behaviour. Plasticity models. Generalized failure criteria. Critical state and cap models. Dilatancy effects. Associative and non-associative flow rules. Hardening rules. Consolidation, visco-elasticity, creep behaviour. Finite element formulation. Iterative schemes. Time marching schemes. Solution of typical boundary value problems.

Prerequisite(s): CIVE 5101, CIVE 5103, or permission of the Department.

CIVE 5504 [0.5 credit] (CVG 7183)**Seepage Through Soils**

Surface-subsurface water relations. Steady flow. Flownet techniques. Numerical techniques. Seepage analogy models. Anisotropic and layered soils. Water retaining structures. Safety against erosion and piping. Filter design. Steady and non-steady flow towards wells. Multiple well systems. Subsidence due to ground water pumping. Precludes additional credit for ENVE 5301.

CIVE 5505 [0.5 credit] (CVG 7109)**Geotechnical Earthquake Engineering**

Seismic hazards, earthquakes and ground motion, wave propagation, ground response analysis, soil properties for dynamic analysis: laboratory tests, in-situ tests, modulus and damping curves, liquefaction susceptibility, post liquefaction response, seismic effects on slope stability, retaining structures.

Precludes additional credit for CIVE 5801 (2001-2003).

CIVE 5507 [0.5 credit] (CVG 7184)**Blast Load Effects on Structures**

Threats, risk analysis, vulnerability assessment; explosives: types and mechanisms; load determination; response of structural elements under blast loads, analysis and design for blast loads; blast mitigation, retrofit of structures; post-event assessment.

Also listed as IPIS 5507.

CIVE 5600 [0.5 credit] (CVG 7131)**Project Management**

Managing building development, design, and construction including interrelationships among owners, developers, financing sources, designers, contractors, and users; project manager role and tasks; project objectives; feasibility analyses; budgets and financing; government regulations; environmental and social constraints; cost, time, and content quality controls and processes; human factors.

CIVE 5601 [0.5 credit] (CVG 7140)**Engineering, Statistics, and Probabilities**

Review of basic concepts in statistics and probabilities. Bayes' Theorem. Distributions. Parameter estimation. Goodness-of-fit. Regression and correlation. OC curves. Monte Carlo simulation. ANOVA. Probability-based design criteria. System reliability. Selected applications in structures, transportation and geomechanics. Use of computer software. Emphasis on problem solving.

CIVE 5602 [0.5 credit] (CVG 7141)**Advanced Computer-Aided Design**

Representation and processing of design constraints (such as building codes and other design rules); decision tables; constraint satisfaction. Automatic integrity and consistency maintenance of design databases; integrated CAD systems. Introduction to geometric modeling. Introduction to artificial intelligence.

Also offered at the undergraduate level, with different requirements, as CIVE 4500, for which additional credit is precluded.

CIVE 5603 [0.5 credit]**Advanced Building Characterization, Conservation and Rehabilitation**

Supporting concepts and techniques for the identification, documentation, and conservation of heritage and existing buildings; advanced workshops by experts from key disciplines and practice areas in heritage conservation. Includes: Experiential Learning Activity

CIVE 5604 [0.5 credit]**Probability, Statistics, Stochastic Processes and Statistical Inference in Engineering**

Fundamental of probability and statistics, (robust and ridge) regression, generalised linear models, sparse models, mixture models, stochastic processes, statistical inference and applications.

Includes: Experiential Learning Activity

CIVE 5605 [0.5 credit] (CVG 7143)**Design of Steel Bridges**

Basic features of steel bridges, design of slab-on-girder, box girder and truss bridges. Composite and non-composite design. Introduction to long span suspension and cable-stayed bridges. Discussion of relevant codes and specifications.

CIVE 5606 [0.5 credit] (CVG 7144)**Design of Concrete Bridges**

Concrete and reinforcing steel properties, basic features of concrete bridges, design of superstructure in reinforced concrete slab, slab-on-girder and box girder bridges, introduction to prestressed concrete bridges, design of bridge piers and abutments. In all cases the relevant provisions of Canadian bridge codes are discussed.

CIVE 5607 [0.5 credit] (CVG 7145)**Introduction to Bridge Design**

Limit states design of highway bridges; methods of analysis, design and evaluation procedures of superstructure components; design codes; design loads and load factors; concrete deck design; load distributions; computer analysis; impact and dynamics; fatigue and brittle fracture; construction bracing; load capacity rating of existing bridges.

CIVE 5609 [0.5 credit] (CVG 7170)**Fundamentals of Fire Safety Engineering**

The fire safety system, including social, economic and environmental issues; description of the fire safety regulatory system and the governing building codes and standards. This includes the global fire safety system in a facility and active fire protection systems; detection, suppression, smoke management.

Precludes additional credit for CIVE 5707 (2001-2002).

CIVE 5610 [0.5 credit] (CVG 7171)**Fire Dynamics I**

Fundamentals of combustion including material and energy balances, chemical thermodynamics, kinetics, premixed and diffusive burning. Advanced topics in the theory of combustion, flame propagation, efficiency of combustion, and the physico-chemical properties of combustible material.

Precludes additional credit for CIVE 5705 (2001-2003).

CIVE 5611 [0.5 credit] (CVG 7173)**People in Fires**

Review of the work presented by the founders in the field of human behaviour in fire. Introduction to the basic notions of perception, cognition, information processing, decision-making and problem solving. Behavioural concepts such as panic, commitment, affiliation, familiarity and role are discussed.

Precludes additional credit for CIVE 5708 (2001-2003).

CIVE 5612 [0.5 credit] (CVG 7174)**Fire Modeling**

Fire modeling and its role in fire safety engineering. Review of the main modeling techniques used in Fire Safety Engineering: network, zone and Computational Fluid Dynamics (CFD).

Precludes additional credit for CIVE 5802 (2002-2003).

CIVE 5613 [0.5 credit] (CVG 7172)**Fire Dynamics II**

Fire dynamics from ignition through heat transfer to growth and spread of fires and their suppression. Factors such as containment and its role in the dynamics of fires and explosions are covered.

Precludes additional credit for CIVE 5803 (2002-2003).

Prerequisite(s): CIVE 5610 Fire Dynamics I.

CIVE 5614 [0.5 credit] (CVG 7175)**Design for Fire Resistance**

Behaviour of materials and structures at elevated temperatures; fire-resistance tests; fire-resistance ratings; building code requirements; real-world fires; assessing the fire resistance of steel, concrete and wood building assemblies.

Precludes additional credit for CIVE 5709 (2001-2003).

CIVE 5615 [0.5 credit] (CVG 5320)**Fire Behaviour of Materials**

Fundamentals and scientific aspects of materials behaviour during fires, material specifications, thermal and mechanical properties, fire hazards of materials, structural fire response, residual strength, failure criteria, mechanisms of flame retardancy, and standards and testing protocols.

CIVE 5616 [0.5 credit]**Wood Structures and Fire**

Introduction to fire-safe design of wood buildings, brief review of wood products and wood design, prescriptive code requirements, determination of fire-resistance of wood structures through different methods.

Includes: Experiential Learning Activity

CIVE 5617 [0.5 credit]**Practical Applications of Fire Protection**

Introduction to the practical application of fire protection engineering from a consulting and a regulatory perspective. Main highlights include performance-based design, fire forensics, emergency preparedness and firefighting.

Includes: Experiential Learning Activity

CIVE 5705 [0.5 credit] (CVG 7300)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5706 [0.5 credit] (CVG 7301)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5707 [0.5 credit] (CVG 7302)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5708 [0.5 credit] (CVG 7303)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5709 [0.5 credit] (CVG 7304)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5800 [0.5 credit] (CVG 7305)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5801 [0.5 credit] (CVG 7306)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5802 [0.5 credit] (CVG 7307)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5803 [0.5 credit] (CVG 7308)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5804 [0.5 credit] (CVG 7309)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5805 [0.5 credit] (CVG 7310)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5806 [0.5 credit] (CVG 7311)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5807 [0.5 credit] (CVG 7312)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5808 [0.5 credit] (CVG 7313)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5809 [0.5 credit] (CVG 7314)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5810 [0.5 credit] (CVG 7185)**Topics in Fire Safety**

Courses in special topics related to fire safety, not covered by other graduate courses.

CIVE 5900 [1.0 credit] (CVG 6000)**Civil Engineering Project**

Students enrolled in the program M.Eng. by project will conduct an engineering study, analysis, or design project under the general supervision of a member of the Department.

Includes: Experiential Learning Activity

CIVE 5901 [0.0 credit] (CVG 7314)**Master's Seminar**

The series consists of presentations by graduate students or external speakers. Graduate students in the Civil Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

CIVE 5906 [0.5 credit] (CVG 6108)**Directed Studies 1**

Prerequisite(s): open only to students in a Civil Engineering Master's program.

CIVE 5909 [2.5 credits] (CVG 5909)**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

CIVE 6901 [0.0 credit]**Ph.D. Seminar**

The series consists of presentations by graduate students or external speakers. Graduate students in the Civil Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

CIVE 6902 [0.0 credit] (CVG 9998)**Ph.D. Comprehensive Examination**

Graduate students at the Doctoral level in the Civil Engineering program are required to successfully complete written and oral comprehensive examinations in subject areas determined by the student's advisory committee.

CIVE 6906 [0.5 credit] (CVG 6109)**Directed Studies 2**

Prerequisite(s): open only to students in the Civil Engineering Ph.D. program.

CIVE 6909 [0.0 credit] (CVG 9999)**Ph.D. Thesis**

Includes: Experiential Learning Activity

Climate Change (Collaborative Program)

This section presents the requirements for programs in:

- M.A. Anthropology with Collaborative Specialization in Climate Change
- M.A. Communication with Collaborative Specialization in Climate Change
- M.A. English with Collaborative Specialization in Climate Change
- M.A. Sociology with Collaborative Specialization in Climate Change
- M.A.Sc. Aerospace Engineering with Collaborative Specialization in Climate Change
- M.A.Sc. Electrical and Computer Engineering with Collaborative Specialization in Climate Change
- M.A.Sc. Environmental Engineering with Collaborative Specialization in Climate Change

- M.A.Sc. Materials Engineering with Collaborative Specialization in Climate Change
- M.A.Sc. Mechanical Engineering with Collaborative Specialization in Climate Change
- M.B.A. with Collaborative Specialization in Climate Change
- M.Eng. Electrical and Computer Engineering with Collaborative Specialization in Climate Change
- M.Eng. Environmental Engineering with Collaborative Specialization in Climate Change
- M.Eng. Sustainable Energy with Collaborative Specialization in Climate Change
- M.Sc. Management with Collaborative Specialization in Climate Change

Program Requirements

M.A. Anthropology with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Thesis pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
ANTH 5401 [0.5] Theories and Methods I	
ANTH 5402 [0.5] Theories and Methods II	
4. 1.0 credit in approved electives, chosen in consultation with the student's advisor	1.0
5. 2.0 credits in:	2.0
ANTH 5909 [2.0] M.A. Thesis (in the specialization)	
Total Credits	5.0

Requirements - Research essay pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
ANTH 5401 [0.5] Theories and Methods I	
ANTH 5402 [0.5] Theories and Methods II	
4. 2.0 credit in approved electives, chosen in consultation with the student's advisor	2.0
5. 1.0 credit in:	1.0
ANTH 5908 [1.0] M.A. Research Essay (in the specialization)	
Total Credits	5.0

M.A. Communication with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Research essay pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in:	1.5

COMS 5101 [1.0] Foundations of Communication Studies	
COMS 5605 [0.5] Approaches to Communication Research	
4. 1.0 credit in:	1.0
COMS 5908 [1.0] Research Essay (in the specialization)	
5. 1.5 credits from the list of optional courses	1.5
Total Credits	5.0

Requirements - Thesis pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in:	1.5
COMS 5101 [1.0] Foundations of Communication Studies	
COMS 5605 [0.5] Approaches to Communication Research	
4. 2.0 credits in:	2.0
COMS 5909 [2.0] M.A. Thesis (in the specialization)	
5. 0.5 credit from the list of optional courses	0.5
Total Credits	5.0

M.A. English with Collaborative Specialization in Climate Change (4.5 credits)

Requirements - Coursework option (4.5 credits)

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 2.5 credits in ENGL at the 5000-level (excluding ENGL 5908 and ENGL 5909)	2.5
4. 0.5 credit in a graduate seminar with sufficient Climate Change content in ENGL or another department, as approved by the Coordinator of the Climate Change Specialization.	0.5
5. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
Total Credits	4.5

Requirements - Research Essay option (4.5 credits)

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
4. 2.0 credits in ENGL at the 5000 level (excluding ENGL 5908)	2.0
5. 1.0 credit in:	1.0
ENGL 5908 [1.0] Research Essay (in the specialization)	
Total Credits	4.5

Requirements - Thesis option (4.5 credits)

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	

2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in ENGL at the 5000-level (excluding ENGL 5909)	1.0
4. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
5. 2.0 credits in:	2.0
ENGL 5909 [2.0] M.A. Thesis (in the specialization)	
Total Credits	4.5

M.A. Sociology with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Thesis pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
4. 1.0 credit in approved electives, chosen in consultation with the student's advisor	1.0
5. 2.0 credits in:	2.0
SOCI 5909 [2.0] M.A. Thesis (in the specialization)	
Total Credits	5.0

Requirements - Research essay pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
4. 2.0 credit in approved electives, chosen in consultation with the student's advisor	2.0
5. 1.0 credit in:	1.0
SOCI 5908 [1.0] M.A. Research Essay (in the specialization)	
Total Credits	5.0

M.A.Sc. Aerospace Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in courses offered by the OCIMAE.	1.5
4. Participation in the Mechanical and Aerospace Engineering seminar series	
5. 2.5 credits in:	2.5

MECH 5909 [2.5] M.A.Sc. Thesis (in the specialization)	
Total Credits	5.0

M.A.Sc. Electrical and Computer Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	0.0
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in courses	1.5
4. 2.5 credits in:	2.5
SYSC 5909 [2.5] M.A.Sc. Thesis (in the area of climate change)	
Total Credits	5.0

M.A.Sc. Environmental Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in courses, with at least 0.5 credit from two different areas of study listed below outside the area of EIA, Sustainability and Climate Change	1.5
4. 0.0 credit in:	
ENVE 5800 [0.0] Master's Seminar (participation in the graduate student seminar series)	
5. 2.5 credits in:	2.5
ENVE 5909 [2.5] Master's Thesis (in the specialization)	
Total Credits	5.0

M.A.Sc. Materials Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in courses offered by the OCIMAE.	1.5
4. Participation in the Mechanical and Aerospace Engineering seminar series	
5. 2.5 credits in:	2.5
MECH 5909 [2.5] M.A.Sc. Thesis (in the specialization)	
Total Credits	5.0

M.A.Sc. Mechanical Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
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CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		
CLIM 5800 [0.0]	Climate Seminar Series	
3. 1.5 credits in	courses offered by the OCIMAE.	1.5
4.	Participation in the Mechanical and Aerospace Engineering seminar series	
5. 2.5 credits in:		2.5
MECH 5909 [2.5]	M.A.Sc. Thesis (in the specialization)	
Total Credits		5.0

M.B.A. with Collaborative Specialization in Climate Change (8.5 credits)

Requirements:

1. 1.0 credit in		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		
CLIM 5800 [0.0]	Climate Seminar Series	
3. 0.25 credit in		0.25
BUSI 5108 [0.25]	Sustainable Business Development	
4. 1.0 credit in	elective specialization courses designated as having sufficient climate change content, within the School of Business or elsewhere, with permission of the School of Business.	1.0
5. 4.25 credits in	compulsory core courses	4.25
6. 1.0 credit in	elective courses	1.0
7. 1.0 credit in:		1.0
BUSI 5999 [1.0]	Internship ¹	
8. 0.0 credit in		
BUSI 5998 [0.0]	MBA Skills Workshop ²	
Total Credits		8.5

¹ Students with less than two (2) years of professional employment experience must successfully complete BUSI 5999 [1.0] Internship in order to graduate. Students with two or more years work experience may apply for an exemption.

² Non-credit required skills workshop.

M.Eng. Electrical and Computer Engineering with Collaborative Specialization in Climate Change (4.5 credits)

Requirements - by Project (4.5 credits)

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		0.0
CLIM 5800 [0.0]	Climate Seminar Series	
3. 0.5 credit in:		0.5
ELEC 5302 [0.5]	Renewable and Distributed Energy Resource Technologies	
SERG 5001 [0.5]	Sustainable Energy Policy for Engineers	
SERG 5003 [0.5]	Energy Evaluation and Assessment Tools	
SYSC 5005 [0.5]	Optimization Theory and Methods	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	

	or approved Advanced Topic in the area of climate change	
4. 2.5 credits in	courses	2.5
5. 0.5 credit in:		0.5
SYSC 5900 [0.5]	Systems Engineering Project (in the area of climate change)	
Total Credits		4.5

Requirements - by Coursework (4.5 credits)

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		0.0
CLIM 5800 [0.0]	Climate Seminar Series	
3. 0.5 credit in:		0.5
ELEC 5302 [0.5]	Renewable and Distributed Energy Resource Technologies	
SERG 5001 [0.5]	Sustainable Energy Policy for Engineers	
SERG 5003 [0.5]	Energy Evaluation and Assessment Tools	
SYSC 5005 [0.5]	Optimization Theory and Methods	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
	or approved Advanced Topic in the area of climate change	
4. 3.0 credits in	courses	3.0
Total Credits		4.5

M.Eng. Environmental Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Project pathway

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		
CLIM 5800 [0.0]	Climate Seminar Series	
3. 0.5 credit from:		0.5
ENVE 5105 [0.5]	Atmospheric Aerosols	
ENVE 5200 [0.5]	Climate Change and Engineering	
ENVE 5201 [0.5]	Geo-Environmental Engineering	
ENVE 5205 [0.5]	Sludge Treatment and Disposal	
ENVJ 5908 [0.5]	Anaerobic Digestion	
ENVJ 5212 [0.5]	Climate Change Impacts on Water Resources	

	or approved Special Topics in the area of climate change	
4. 2.5 credits in	courses, with at least 0.5 credit from two different areas of study listed below outside the area of EIA, Sustainability and Climate Change	2.5
5. 0.0 credit in:		
ENVE 5800 [0.0]	Master's Seminar	
6. 1.0 credit in:		1.0
ENVE 5900 [1.0]	Environmental Engineering Project (in the specialization)	
Total Credits		5.0

Requirements - Coursework pathway

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		

CLIM 5800 [0.0]	Climate Seminar Series	
3. 1.5 credits from:		1.5
ENVE 5105 [0.5]	Atmospheric Aerosols	
ENVE 5200 [0.5]	Climate Change and Engineering	
ENVE 5201 [0.5]	Geo-Environmental Engineering	
ENVE 5205 [0.5]	Sludge Treatment and Disposal	
ENVJ 5908 [0.5]	Anaerobic Digestion	
ENVJ 5212 [0.5]	Climate Change Impacts on Water Resources	
or approved Special Topics in the area of climate change		
4. 2.5 credits in courses, with at least 0.5 credit from two different areas of study listed below outside the area of EIA, Sustainability and Climate Change		2.5
Total Credits		5.0

M.Eng. Sustainable Energy with Collaborative Specialization in Climate Change (5.0 Credits)

Requirements:

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		
CLIM 5800 [0.0]	Climate Seminar Series	
3. 2.0 credits in:		2.0
SERG 5001 [0.5]	Sustainable Energy Policy for Engineers	
SERG 5003 [0.5]	Energy Evaluation and Assessment Tools	
SERG 5004 [1.0]	Applied Interdisciplinary Project	
4. 0.0 credit in:		
SERG 5800 [0.0]	Sustainable Energy Seminar	
5. 2.0 credits in:		2.0
Mechanical Engineering focus: Graduate-level MECH courses		
or		
Electrical Engineering focus: Graduate level ELEC, SYSC or EACJ courses		
Total Credits		5.0

M.Sc. Management with Collaborative Specialization in Climate Change (5.0 credits)

Requirements (5.0 credits):

1. 1.0 credit from:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		
CLIM 5800 [0.0]	Climate Seminar Series	
3. 1.5 credits in:		1.5
BUSI 5980 [0.5]	Foundations of Management Theory and Research	
BUSI 5981 [0.5]	Statistics for Business Research	
BUSI 5982 [0.5]	Research Methodology in Business	
4. 0.5 credit from:		0.5
BUSI 5983 [0.5]	Qualitative Research Design	
BUSI 5984 [0.5]	Quantitative Research Design	
5. Completion of the Research Tutorial		
6. 2.0 credits in:		2.0

BUSI 5989 [2.0]	M.Sc. Thesis (in the specialization)	
Total Credits		5.0

Regulations

See the General Regulations section of this Calendar and the regulations of the participating unit.

Admission

Admission to the collaborative master's program in Climate Change is available to master's students who are admitted in one of the participating master's programs. To apply to one of the participating master's programs, please visit the Faculty of Graduate and Postdoctoral Affairs Admissions page.

Climate Change (CLIM) Courses

CLIM 5000 [1.0 credit]

Climate Collaboration

A seminar on the climate crisis from an interdisciplinary perspective. Drawing on a range of disciplinary approaches from the humanities, social sciences, public policy, engineering and natural science, students will engage with the many factors bearing on the climate crisis and how to address it.

CLIM 5800 [0.0 credit]

Climate Seminar Series

A series of seminars presented by researchers and practitioners in the area of climate change. To complete this course, a student must attend six seminars.

Cognitive Science

This section presents the requirements for programs in:

- Master of Cognitive Science
- Master of Cognitive Science with Specialization in Data Science
- Master of Cognitive Science with Specialization in Digital Humanities
- Ph.D. Cognitive Science

Program Requirements

Master of Cognitive Science (5.0 credits)

Requirements - Research Project option (5.0 credits)

1. 0.5 credit in:		0.5
CGSC 5100 [0.5]	Issues in Cognitive Science	
2. 0.5 credit in:		0.5
CGSC 5101 [0.5]	Experimental Methods and Statistics	
	or CGSC 5103 [0.5]	Formal Methods
3. 1.5 credits from:		1.5
CGSC 5001 [0.5]	Cognition and Artificial Cognitive Systems	
CGSC 5002 [0.5]	Experimental Research in Cognition	
CGSC 5003 [0.5]	Language and Cognition	
CGSC 5004 [0.5]	Cognition and Conceptual Issues	
CGSC 5005 [0.5]	Cognition and Neuroscience	
4. 1.0 credit in:		1.0
CGSC 5908 [1.0]	Research Project	

5. **1.5 credits** in cognitive science or other courses selected with approval of the project supervisor and graduate supervisor. 1.5

6. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year)

Total Credits 5.0

Requirements - Thesis option (5.0 credits)

1. **0.5 credit in:** 0.5
CGSC 5100 [0.5] Issues in Cognitive Science

2. **0.5 credit from:** 0.5
CGSC 5101 [0.5] Experimental Methods and Statistics
or CGSC 5103 [0.5] Formal Methods

3. **1.5 credits** in cognitive science or other courses, from at least two different cognitive disciplines, selected with approval of the thesis supervisor and the graduate supervisor. 1.5

4. **2.5 credits in:** 2.5
CGSC 5909 [2.5] M. Cog. Thesis

5. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year).

Total Credits 5.0

Guidelines for Completion of the M.Cog.Sc. Degree
The degree is expected to take no more than six terms to complete. Students will enroll in courses while also conducting research.

Master of Cognitive Science with Specialization in Data Science (5.0 credits)

Requirements - Thesis Option (5.0 credits)

1. **0.5 credit in:** 0.5
DATA 5000 [0.5] Data Science Seminar

2. **0.5 credit in:** 0.5
CGSC 5100 [0.5] Issues in Cognitive Science

3. **0.5 credit in:** 0.5
CGSC 5101 [0.5] Experimental Methods and Statistics

4. **1.0 credit** in CGSC or other approved courses, from two different cognitive disciplines, selected in consultation with the graduate supervisor. 1.0

5. **2.5 credits in:** 2.5
CGSC 5909 [2.5] M. Cog. Thesis (The thesis must be approved as fulfilling the data science requirement and be supervised by a faculty member working in a data science related field.)

6. Preparation of research for presentation at the Carleton Cognitive Science Spring Conference.

Total Credits 5.0

Requirements - Research Project Option (5.0 credits)

1. **0.5 credit in:** 0.5
DATA 5000 [0.5] Data Science Seminar

2. **0.5 credit in:** 0.5
CGSC 5100 [0.5] Issues in Cognitive Science

3. **0.5 credit in:** 0.5

CGSC 5101 [0.5] Experimental Methods and Statistics

4. **1.5 credits from:** 1.5

CGSC 5001 [0.5] Cognition and Artificial Cognitive Systems

CGSC 5002 [0.5] Experimental Research in Cognition

CGSC 5003 [0.5] Language and Cognition

CGSC 5004 [0.5] Cognition and Conceptual Issues

CGSC 5005 [0.5] Cognition and Neuroscience

5. **1.0 credit** in CGSC or other approved courses selected in consultation with the graduate supervisor. 1.0

6. **1.0 credit in:** 1.0

CGSC 5908 [1.0] Research Project (Project must be approved as fulfilling the data science requirement and be supervised by a faculty member working in a data science related field.)

7. Preparation of research for presentation at the Cognitive Science Spring Conference.

Total Credits 5.0

Master of Cognitive Science with Specialization in Digital Humanities (6.0 credits)

Requirements - Research Project pathway (6.0 credits)

1. **0.5 credit in:** 0.5
CGSC 5100 [0.5] Issues in Cognitive Science

2. **0.5 credit in:** 0.5
CGSC 5101 [0.5] Experimental Methods and Statistics
or CGSC 5103 [0.5] Formal Methods

3. **1.5 credits from:** 1.5
CGSC 5001 [0.5] Cognition and Artificial Cognitive Systems

CGSC 5002 [0.5] Experimental Research in Cognition

CGSC 5003 [0.5] Language and Cognition

CGSC 5003 [0.5] Language and Cognition

CGSC 5004 [0.5] Cognition and Conceptual Issues

CGSC 5005 [0.5] Cognition and Neuroscience

4. **1.5 credits** in CGSC or other courses selected with approval of the project supervisor and graduate supervisor. 1.5

5. **0.5 credit in:** 0.5
DIGH 5000 [0.5] Issues in the Digital Humanities

6. **0.5 credit from:** 0.5
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities

DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities

or annually-listed DIGH course

7. **0.0 credit in:**
DIGH 5800 [0.0] Digital Humanities: Professional Development

8. **1.0 credit in:** 1.0
CGSC 5908 [1.0] Research Project (in the specialization)

9. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year)

Total Credits 6.0

Requirements - Thesis pathway (6.0 credits)

1. 0.5 credit in: 0.5

CGSC 5100 [0.5] Issues in Cognitive Science

2. 0.5 credit from: 0.5

CGSC 5101 [0.5] Experimental Methods and Statistics

or CGSC 5103 [0.5] Formal Methods

3. 1.5 credits in CGSC or other courses, from at least two different cognitive disciplines, selected with approval of the thesis supervisor and the graduate supervisor. 1.5

4. 0.5 credit in: 0.5

DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit from: 0.5

DIGH 5011 [0.5] Graduate Practicum in Digital Humanities

DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities

or annually-listed DIGH course

6. 0.0 credit in:

DIGH 5800 [0.0] Digital Humanities: Professional Development

7. 2.5 credits in: 2.5

CGSC 5909 [2.5] M. Cog. Thesis (in the specialization)

8. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year)

Total Credits 6.0

Ph.D. Cognitive Science (3.5 credits)

Requirements:

1. 0.5 credit in: 0.5

CGSC 5100 [0.5] Issues in Cognitive Science

2. 0.5 credit in: 0.5

CGSC 6801 [0.5] Proseminar in Cognitive Science

3. 0.5 credit in: 0.5

CGSC 6002 [0.5] Methodology Rotation I

4. 0.5 credit in: 0.5

CGSC 6003 [0.5] Methodology Rotation II

5. 0.0 credits in: 0.0

CGSC 6909 [0.0] Ph.D. Thesis

6. 1.5 credits in cognition from two different cognitive disciplines, including at least 0.5 credit in cognitive neuroscience if not already completed. 1.5

Total Credits 3.5

- Students are expected to present their research at the Cognitive Science Student Spring Conference during the first three years of their program.
- Course selection is with the approval of the Thesis Supervisor and the Graduate Supervisor of Cognitive Science.
- Any student planning a dissertation with an applied cognitive emphasis is required to work for at least one term at a facility approved by the student's research

supervisor and the Director of the Cognitive Science Program. Such a facility may include any institution, governmental laboratory, corporation, hospital or educational centre conducting research in the area of the student's specialization. Students should complete this work while registered in either option:

Methodology Rotation

CGSC 6002 [0.5] Methodology Rotation I

CGSC 6003 [0.5] Methodology Rotation II

Ph.D. Thesis

CGSC 6909 [0.0] Ph.D. Thesis

Methodology Rotation

The methodology rotation consists of two parts. Students spend one term in each of two laboratories or other research venues using two different methods for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific).

The purpose of the methodology rotation is to give students sufficient background in two different approaches to cognition to allow the student to use work from these approaches in his or her own research.

Assignments will be as specified by each rotation supervisor. Each rotation will be graded separately by the rotation supervisor as either Satisfactory(S)/Unsatisfactory (U). In the event of a grade of U the student may repeat a rotation only once.

Prospectus, Prospectus Defence, Thesis and Defence

When a student is ready to begin work on a thesis, the Graduate Supervisor approves a thesis committee which includes the thesis supervisor or co-supervisors, plus at least two additional members. The committee should include members from at least two different approaches to cognition. The Director of the Institute of Cognitive Science is an ex officio member of the committee. Preparation of the thesis has two stages. First the student prepares a prospectus, which is examined at a prospectus defence on the subject matter of the thesis. Then the student prepares the thesis, which is defended at a public oral examination.

Prospectus

The prospectus must describe the proposed research and review the relevant literature in the field of the research. The prospectus must be sufficiently detailed to allow the examining committee to judge the likelihood of a successful thesis ensuing from it. Preparation of the prospectus will follow the practices common in the Thesis Supervisor's area of research. The committee may add further requirements.

Prospectus Defence

The prospectus is examined orally by a board consisting of the members of the thesis committee. The committee may add further examiners. The examination is a comprehensive examination of the thesis subject matter, to ensure that the student has a sound understanding of the context of his or her proposed research, and of appropriate methods, ethical considerations, and so on. The examining board will also consider the research that the student is proposing, which must be of sufficiently

high quality and described in sufficient detail to allow the committee to judge whether, if completed successfully, it would be likely that the student would be awarded the degree. Should a student's prospectus be unacceptable, or the student fails the prospectus defence, the student may resubmit the prospectus and be reexamined once.

Thesis

The completed thesis is examined orally by an examining board consisting at minimum of the thesis committee, an examiner at arm's length to the project from within Carleton University (the internal examiner) and an examiner from another university who is at arm's length to the student and the committee and who is a recognized expert in the area of the thesis (the external examiner). All university regulations apply.

Residence Requirement

All Ph.D. candidates must be registered full-time in a minimum of six terms to satisfy the residence requirement.

Language Requirement

A second language is required when relevant to the student's program of research. Whether a second language is required and the level of proficiency expected is determined at the time of admission, based on the student's description of his or her proposed area of thesis research.

Milestones (to be completed by the end of the specified year)

First year: Completion of CGSC 6801* and CGSC 5100, and elective coursework. Spring Conference presentation.

Second year: Completion of remaining program coursework and the methodology rotations (CGSC 6002) and (CGSC 6003). Begin work on Prospectus. Spring Conference presentation.

Third year: Prospectus defence. Continue to work on thesis CGSC 6909 Ph.D. Thesis. Spring Conference Presentation.

4th Year: Thesis completion (CGSC 6909 Ph.D. Thesis) and defence.

*Please note CGSC 6801 is offered in alternate years. Course to be completed in second year if it is not offered in the first year of program.

Regulations

See the General Regulations section of this Calendar.

Admission

The requirement for admission into the M.Cog.Sc. program is an Honours degree with an average of at least A-.

Applicants whose first language is not English, or who have not completed a previous degree at an English-language university, must demonstrate fluency in English as outlined in the General Regulations.

To be admitted, a candidate must submit a description of his or her research interests in the area of Cognitive Science.

Admission

- Master's degree (or the equivalent) from one of the participating disciplines. An average of at least A- in courses in cognition is normally required.
- Applicants with a master's degree in one of the participating disciplines are normally admitted to a 10.0-credit program.
- Students eligible for admission to the 10.0 -credit program but with deficiencies may be required to take additional courses or may be directed to apply for the M. Cog.Sc.
- An overall score of 70 on the Canadian Academic English Language (CAEL) Assessment
- A TOEFL score of 230 CBT (computer-based test) or 580; or 86 IBT overall with a minimum score in each component of writing (22), speaking (22), reading (20) and listening (20).
- An overall IELTS score of 6.5, with a minimum of 6.0 in each band score; or
- An acceptable certification that the language of instruction in your most recently completed undergraduate or graduate degree was English.
- To be admitted, a candidate must submit a description of his or her proposed area of thesis research and a member of the core faculty must indicate in writing that he or she is willing to supervise the student.

Cognitive Science (CGSC) Courses

CGSC 5001 [0.5 credit]

Cognition and Artificial Cognitive Systems

An introduction to the contribution of artificial intelligence and computer modeling of cognitive processes to cognitive science.

CGSC 5002 [0.5 credit]

Experimental Research in Cognition

An introduction to the contribution of experimental psychology to cognitive science.

CGSC 5003 [0.5 credit]

Language and Cognition

An introduction to the contribution of theoretical linguistics and linguistic research to cognitive science.

Includes: Experiential Learning Activity

Also listed as ALDS 5301 and LING 5608.

CGSC 5004 [0.5 credit]

Cognition and Conceptual Issues

An introduction to the contribution of philosophy of mind, philosophy of language, and other conceptual investigations to cognitive science.

CGSC 5005 [0.5 credit]

Cognition and Neuroscience

An introduction to the contribution of neuroscience to cognitive science.

CGSC 5100 [0.5 credit]**Issues in Cognitive Science**

A survey of the central problems and issues of cognitive research to start the process of acquiring the interdisciplinary breadth required to understand research in cognitive science.

CGSC 5101 [0.5 credit]**Experimental Methods and Statistics**

An introduction to the design of experiments and the statistics needed to interpret data in cognitive science. Also listed as HCIN 5400.

CGSC 5103 [0.5 credit]**Formal Methods**

The class introduces students to various formal methods relevant to cognitive science, possibly including (but not limited to) formal logic, the theory of computation, probability theory, decision theory.

Precludes additional credit for CGSC 5102.

Prerequisite(s): permission of the department. Seminar.

CGSC 5303 [0.5 credit]**Linguistic Analysis, Culture and Cognition**

Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

CGSC 5601 [0.5 credit]**Cognitive Modelling for Cognitive Science**

Introduction to the field of cognitive modelling. Different modelling systems and how to evaluate them against human data; how to create cognitive models using the ACT-R cognitive architecture.

Precludes additional credit for CGSC 5106 (no longer offered), CGSC 6004 (no longer offered).

CGSC 5901 [0.5 credit]**Special Topics in Cognitive Science**

Seminar on current, important issues related to Cognition and Neuroscience, Philosophy, Computer Science, Linguistics and/or Psychology. Topics will vary from year to year.

CGSC 5907 [0.5 credit]**Independent Research**

Permission to register and approval of research plan must be obtained from the graduate supervisor. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

Includes: Experiential Learning Activity

CGSC 5908 [1.0 credit]**Research Project**

Students may enroll in multiple sections of this course (as necessary) to complete their Research credits.

Includes: Experiential Learning Activity

CGSC 5909 [2.5 credits]**M. Cog. Thesis**

Includes: Experiential Learning Activity

CGSC 6002 [0.5 credit]**Methodology Rotation I**

Students spend one term in a laboratory or other research venue using a method for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific). Assignments will be as specified by each rotation supervisor.

Includes: Experiential Learning Activity

CGSC 6003 [0.5 credit]**Methodology Rotation II**

Students spend one term in a laboratory or other research venue using a different method for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific). Assignments will be as specified by each rotation supervisor.

Includes: Experiential Learning Activity

CGSC 6501 [0.5 credit]**Special Topics in Cognitive Science**

Seminar course on a topic of interest to students in Cognitive Science. Topics will vary from year to year. Lectures three hours per week.

CGSC 6801 [0.5 credit]**Proseminar in Cognitive Science**

A survey of the central problems and issues of natural and artificial cognition and a brief examination of contemporary neuroscience. Compulsory in the first year of registration. Precludes additional credit for CGSC 6800 (no longer offered).

CGSC 6901 [0.5 credit]**Directed Studies in Cognitive Science I****CGSC 6902 [0.5 credit]****Directed Studies in Cognitive Science II****CGSC 6909 [0.0 credit]****Ph.D. Thesis**

Includes: Experiential Learning Activity

Communication

This section presents the requirements for programs in:

- M.A. Communication
- M.A. Communication with Collaborative Specialization in Climate Change
- M.A. Communication with Specialization in African Studies
- M.A. Communication with Specialization in Data Science

- Ph.D. Communication
- Ph.D. Communication with Specialization in Political Economy

Program Requirements

M.A. Communication (5.0 credits)

Each student, in consultation with the supervisor of graduate studies, will be required to follow a thesis, research essay or a coursework program for a total of 5.0 credits. Two of the four areas of concentration must be chosen. Students in the M.A. program are restricted to one directed studies course, COMS 5808. Students may take one optional course (0.5 credit) outside the program, with permission of the supervisor of graduate studies.

Requirements - Thesis program (5.0 credits)

1. 1.0 credit in:	1.0
COMS 5101 [1.0] Foundations of Communication Studies	
2. 0.5 credit in:	0.5
COMS 5605 [0.5] Approaches to Communication Research	
3. 2.0 credits in:	2.0
COMS 5909 [2.0] M.A. Thesis	
4. 1.5 credits from the list of optional courses below	1.5
Total Credits	5.0

Requirements - Research Essay program (5.0 credits)

1. 1.0 credit in:	1.0
COMS 5101 [1.0] Foundations of Communication Studies	
2. 0.5 credit in:	0.5
COMS 5605 [0.5] Approaches to Communication Research	
3. 1.0 credit in:	1.0
COMS 5908 [1.0] Research Essay	
4. 2.5 credits chosen from the list of optional courses	2.5
Total Credits	5.0

Requirements - Coursework program (5.0 credits)

1. 1.0 credit in:	1.0
COMS 5101 [1.0] Foundations of Communication Studies	
2. 0.5 credit in:	0.5
COMS 5605 [0.5] Approaches to Communication Research	
3. 3.5 credits chosen from the list of optional courses	3.5
Total Credits	5.0

Optional Courses

COMS 5200 [0.5] Civic Media	
COMS 5202 [0.5] Persuasion	
COMS 5203 [0.5] Communication, Technology, Society	
COMS 5206 [0.5] Communication, Culture, Regulation	
COMS 5207 [0.5] Communication and Racialization	
COMS 5208 [0.5] Audiences, Consumption, Reception	
COMS 5212 [0.5] History, Time, Memory	
COMS 5214 [0.5] The Local and the Global	

COMS 5218 [0.5] Special Studies of Media and Communication	
COMS 5219 [0.5] Regional Studies of Media	
COMS 5220 [0.5] Visual Culture	
COMS 5221 [0.5] Science and the Making of Knowledge	
COMS 5222 [0.5] Cultural Intersections	
COMS 5223 [0.5] Work in the Contemporary Media Environment	
COMS 5224 [0.5] Internet, Infrastructure, Materialities	
COMS 5225 [0.5] Critical Data Studies	
COMS 5509 [0.5] Gender, Sexuality, Culture	
COMS 5808 [0.5] Directed Studies	

Note: students may take up to 0.5 credit outside the program with permission of the supervisor of graduate studies.

M.A. Communication with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Research essay pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in:	1.5
COMS 5101 [1.0] Foundations of Communication Studies	
COMS 5605 [0.5] Approaches to Communication Research	
4. 1.0 credit in:	1.0
COMS 5908 [1.0] Research Essay (in the specialization)	
5. 1.5 credits from the list of optional courses	1.5
Total Credits	5.0

Requirements - Thesis pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in:	1.5
COMS 5101 [1.0] Foundations of Communication Studies	
COMS 5605 [0.5] Approaches to Communication Research	
4. 2.0 credits in:	2.0
COMS 5909 [2.0] M.A. Thesis (in the specialization)	
5. 0.5 credit from the list of optional courses	0.5
Total Credits	5.0

M.A. Communication with Specialization in African Studies (5.0 credits)

Requirements - Research Essay program (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0

AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
COMS 5101 [1.0]	Foundations of Communication Studies	
4. 0.5 credit in:		0.5
COMS 5605 [0.5]	Approaches to Communication Research	
5. 1.0 credit in:		1.0
COMS 5908 [1.0]	Research Essay	
6. 2.0 credits chosen from the list of optional courses.		2.0
Total Credits		5.0

Requirements - Thesis program (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
COMS 5101 [1.0]	Foundations of Communication Studies	
4. 0.5 credit in:		0.5
COMS 5605 [0.5]	Approaches to Communication Research	
5. 2.0 credits in:		2.0
COMS 5909 [2.0]	M.A. Thesis	
6. 1.0 credits from the list of optional courses.		1.0
Total Credits		5.0

Selection of Courses - African Studies

The courses listed below are relevant to students of African Studies and could, with the approval of the specific requirements of the units involved, be used as courses to help fulfil degree requirements. There are also often graduate courses and 4000-level courses in a number of units at Carleton that are offered on an ad hoc basis that have significant content appropriate to African Studies. To have any such course count towards their degree requires approval of the Director of the Institute of African Studies when it is being offered.

African Studies

AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
AFRI 5050 [0.5]	Selected Topics in African Studies
AFRI 5100 [0.5]	African Studies Abroad
AFRI 5700 [0.5]	Directed Readings in African Studies
AFRI 5900 [0.5]	Placement
AFRI 5800 [0.0]	Scholarly Preparation in African Studies

Anthropology

ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa

ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment
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English

ENGL 5008 [0.5]	Studies in African Literature
ENGL 5010 [0.5]	Studies in Caribbean Literature

French

FREN 5212 [0.5]	Littératures francophones
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International Affairs

INAF 5603 [0.5]	Issues in Development in Africa
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Law

LAWS 5007 [0.5]	Race, Ethnicity and the Law
LAWS 5603 [0.5]	International Law: Theory and Practice

Political Science

PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5203 [0.5]	Southern Africa After Apartheid

Sociology

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
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Women's and Gender Studies

WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II
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M.A. Communication with Specialization in Data Science (5.0 credits)

Requirements - Coursework Option (5.0 credits)

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 1.0 credit in:		1.0
COMS 5101 [1.0]	Foundations of Communication Studies	
3. 0.5 credit in:		0.5
COMS 5605 [0.5]	Approaches to Communication Research	
4. 0.5 credit in:		0.5
COMS 5225 [0.5]	Critical Data Studies	
5. 0.5 credit from:		0.5
COMS 5203 [0.5]	Communication, Technology, Society	
COMS 5221 [0.5]	Science and the Making of Knowledge	
COMS 5224 [0.5]	Internet, Infrastructure, Materialities	
6. 2.0 credits in electives		2.0
Total Credits		5.0

Requirements - Research Essay Option (5.0 credits)

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 1.0 credit in:		1.0
COMS 5101 [1.0]	Foundations of Communication Studies	

3. 0.5 credit in: **0.5**
 COMS 5605 [0.5] Approaches to Communication Research

4. 0.5 credit in: **0.5**
 COMS 5225 [0.5] Critical Data Studies

5. 1.0 credit in: **1.0**
 COMS 5908 [1.0] Research Essay

Research Essay on a Data Science topic approved by the Advisory Board representative from Communication in consultation with the graduate Committee of the Institute of Data Science.

6. 1.5 credits in electives. **1.5**

Total Credits **5.0**

Requirements - Thesis Option (5.0 credits)

1. 0.5 credit in: **0.5**
 DATA 5000 [0.5] Data Science Seminar

2. 1.0 credit in: **1.0**
 COMS 5101 [1.0] Foundations of Communication Studies

3. 0.5 credit in: **0.5**
 COMS 5605 [0.5] Approaches to Communication Research

4. 0.5 credit in: **0.5**
 COMS 5225 [0.5] Critical Data Studies

5. 2.0 credits in: **2.0**
 COMS 5909 [2.0] M.A. Thesis

M.A. Thesis on a Data Science topic approved by the Advisory Board representative from Communication in consultation with the Graduate Committee of the Institute of Data Science.

6. 0.5 credit in electives **0.5**

Total Credits **5.0**

Ph.D. Communication (5.0 credits)

Requirements:

1. 1.0 credit in: **1.0**
 COMS 6000 [1.0] Doctoral Seminar in Communication Studies

2. 2.0 credits from the list of electives below; up to 0.5 credit may be taken in a relevant discipline outside of the School; students in the Ph.D. program are restricted to one (0.5 credit) directed studies course: **2.0**

COMS 6010 [0.5] Directed Studies

3. 2.0 credits in: **2.0**
 COMS 6900 [1.0] Comprehensive Examination I
 COMS 6901 [1.0] Comprehensive Examination II

4. 0.0 credits in: **0.0**
 COMS 6909 [0.0] Ph.D. Thesis (must be successfully defended at an oral examination)

Total Credits **5.0**

Ph.D. Communication with Specialization in Political Economy (5.0 credits)

Requirements:

1. 1.0 credit in: **1.0**
 COMS 6000 [1.0] Doctoral Seminar in Communication Studies

2. 1.0 additional credit from the list of optional courses below: up to 0.5 credit may be taken in a relevant discipline outside of the School; students in the Ph.D. program are restricted to 0.5 credit in directed studies: COMS 6010 Directed Studies **1.0**

3. 2.0 credits in: **2.0**

COMS 6900 [1.0] Comprehensive Examination I

COMS 6901 [1.0] Comprehensive Examination II

4. 0.5 credit in: **0.5**

PECO 6000 [0.5] Political Economy: Core Concepts

5. 0.5 credit in: **0.5**

A relevant political economy course from the approved list.

6. 0.0 credits in: **0.0**

COMS 6909 [0.0] Ph.D. Thesis (In the Specialization. Must be successfully defended at an oral examination.)

Total Credits **5.0**

Elective Courses

All doctoral candidates must complete 2.0 additional credits from the list of electives below; 0.5 credit may be taken in a relevant discipline outside of the School, particularly those that address central theoretical and/or methodological issues within the student's chosen field of concentration. Students in the Ph.D. program are restricted to one (0.5 credit) directed studies course (COMS 6010 Directed Studies).

COMS 5200 [0.5] Civic Media 0.5

COMS 5202 [0.5] Persuasion 0.5

COMS 5203 [0.5] Communication, Technology, Society 0.5

COMS 5206 [0.5] Communication, Culture, Regulation 0.5

COMS 5207 [0.5] Communication and Racialization 0.5

COMS 5208 [0.5] Audiences, Consumption, Reception 0.5

COMS 5212 [0.5] History, Time, Memory 0.5

COMS 5214 [0.5] The Local and the Global 0.5

COMS 5218 [0.5] Special Studies of Media and Communication 0.5

COMS 5219 [0.5] Regional Studies of Media 0.5

COMS 5220 [0.5] Visual Culture 0.5

COMS 5221 [0.5] Science and the Making of Knowledge 0.5

COMS 5222 [0.5] Cultural Intersections 0.5

COMS 5223 [0.5] Work in the Contemporary Media Environment 0.5

COMS 5224 [0.5] Internet, Infrastructure, Materialities 0.5

COMS 5225 [0.5] Critical Data Studies 0.5

COMS 5509 [0.5] Gender, Sexuality, Culture 0.5

COMS 5605 [0.5] Approaches to Communication Research 0.5

COMS 6001 [0.5] Selected Topics in Communication 0.5

COMS 6005 [0.5] Communication and History 0.5

COMS 6006 [0.5] Political Economy of Communication 0.5

COMS 6007 [0.5] Communication, Discourse, and Representation 0.5

COMS 6010 [0.5] Directed Studies 0.5

JOUR 5401 [0.5]	Journalism Law	0.5
JOUR 5500 [0.5]	Journalism and Society II	0.5

Refer to the General Regulations section of this Calendar for regulations governing the qualifying year.

Comprehensive Examinations

In addition to their course requirements, doctoral candidates are required to write two comprehensive examinations each worth 1.0 credit. The first comprehensive examination (COMS 6900) is closely related to the course materials in the doctoral seminar (COMS 6000) and is conducted by the instructors of COMS 6000 in May following completion of the seminar. To be eligible for the first comprehensive, candidates must have a GPA of 9.0 or higher on their previous course work, including COMS 6000. Students who fail the first comprehensive may be asked to withdraw from the program.

The second comprehensive examination (COMS 6901) is normally completed during the second year of the program and tests the student's in-depth knowledge of one field of study. It is conducted by the student's supervisor and advisory committee and involves examination of an approved project related to the chosen field. Before taking the second comprehensive examination, students must have completed all of their course work with a GPA of 9.0 or higher and have satisfactorily completed COMS 6900. The second comprehensive is expected to be completed no later than two years or six terms after initial full-time registration, or four years or 12 terms after initial part-time registration. Students who do not fulfill this requirement within the prescribed time period may be asked to withdraw from the program.

Regulations

See the General Regulations section of this Calendar.

A standing of B- or better must be obtained in each credit counted towards the master's degree.

Regulations

See the General Regulations section of this Calendar.

A standing of B- or better must be obtained in each course counted towards the Ph.D. degree.

Admission

The minimum requirement for admission to the master's program is a B.A.(Honours) degree or the equivalent, with high honours standing in communication or a related discipline. Related disciplines may include sociology, political science, film studies, and Canadian studies.

Applicants without a background in communication studies may be required to take certain designated courses from the undergraduate Communication program in addition to their regular program.

Possession of the minimum entrance standing is not in itself, however, assurance of admission into the program.

Applicants who lack an Honours degree but who have a 3-year degree with honours standing (a minimum B standing overall) may be considered for admission to a qualifying-year program. Students who complete the qualifying year with high honours standing may be considered for admission to the master's program in the following year.

Admission

The normal requirement for admission into the doctoral program is a master's degree (or the equivalent) in communication or a cognate field such as journalism studies, with an overall average of B+ or better.

Applicants who have deficiencies in certain areas may be admitted to the Ph.D. Program, but will normally be required to complete additional course work.

Communication and Media Studies (COMS) Courses

COMS 5101 [1.0 credit]

Foundations of Communication Studies

Origins and traditions of modern communication studies with attention to theoretical and methodological aspects of developments and debates shaping current communication research.

Precludes additional credit for COMM 5101 (no longer offered).

COMS 5200 [0.5 credit]

Civic Media

The role of communication in relation to the emergence, development, and problematization of citizenship within civil society and the public sphere. Topics to be covered include the communicative strategies of NGOs, the aesthetics of protest, and alternative forms of journalism, among others.

Precludes additional credit for COMM 5200 (no longer offered).

COMS 5202 [0.5 credit]

Persuasion

Examines various efforts to discover and apply techniques of successful persuasion from classical rhetoric to scientific public opinion research with attention to contemporary political, public information, and corporate campaigns.

Precludes additional credit for COMM 5202 (no longer offered).

COMS 5203 [0.5 credit]

Communication, Technology, Society

Critically examines the technological context of social communication in terms of human agency, medium theory, and the idea of progress.

Precludes additional credit for COMM 5203 (no longer offered).

COMS 5206 [0.5 credit]

Communication, Culture, Regulation

Contemporary and historical modes of regulating and governing media and communication, including policy-making, moral regulation, markets, code and so on. Topics may include the regulation of ownership, content, production, circulation, and consumption.

Precludes additional credit for COMM 5206 (no longer offered).

COMS 5207 [0.5 credit]**Communication and Racialization**

Provides theoretical and methodological foundations for graduate students studying the constructs of race, ethnicity, and indigeneity in communication and media contexts, particularly from a critical/cultural perspective. Precludes additional credit for COMM 5207 (no longer offered).

COMS 5208 [0.5 credit]**Audiences, Consumption, Reception**

How audiences and users consume, interact with, deploy and shape media; how they receive and interpret information; and the impacts of these practices on social relations and institutions. Consumerism, entertainment, and “sites” of consumption, including information technologies, space, and built environments. Precludes additional credit for COMM 5208 (no longer offered).

COMS 5212 [0.5 credit]**History, Time, Memory**

Interactions among notions of time, environments, media technologies and artifacts, and the production of memory and history. Topics may include practices of memorialization through historical monuments or museums, contemporary challenges of data storage and media archiving, issues of technological obsolescence and waste, and more. Precludes additional credit for COMM 5212 (no longer offered).

COMS 5214 [0.5 credit]**The Local and the Global**

Communicative aspects of globalization in the context of the local. Among the areas to be addressed include global communication history, cultural imperialism, international regulation, transnational networking, cultural industries, media integration, diasporic communication, and the translocal circulation of content. Precludes additional credit for COMM 5214 (no longer offered).

COMS 5218 [0.5 credit]**Special Studies of Media and Communication**

Examines a specific traditional or non-traditional medium or practice of communication. Topics will vary from year to year. Precludes additional credit for COMM 5218 (no longer offered).

COMS 5219 [0.5 credit]**Regional Studies of Media**

An exploration of the media landscape of specific region or geographical/political territory. Attention will be given to understanding specific conditions of reception, the character of media industries, and the historical development of media forms. Topics will vary from year to year.

COMS 5220 [0.5 credit]**Visual Culture**

The role of image in (re)producing culture. Diverse practices of visual communication such as photography, built environments, screen culture, and image sharing through virtual social networks.

COMS 5221 [0.5 credit]**Science and the Making of Knowledge**

Issues related to science and communication. Topics may include: contemporary issues such as public health risks, climate change, science as ideology, the relationship between science and politics; historical considerations of the relationship between knowledge and expertise.

COMS 5222 [0.5 credit]**Cultural Intersections**

Critically examines the engagement of cultures with each other in contexts such as the constructions of self and other, settler-colonial relations, postcolonial discourses, multiculturalism, cosmopolitanism, communication between groups and across borders, and the roles of media in cultural intersections .

COMS 5223 [0.5 credit]**Work in the Contemporary Media Environment**

Modes of media work and labour. Topics may include studies of immaterial labour, emotional labour, user-generated content and active audiences, labour and labour relations in digitizing media industries.

COMS 5224 [0.5 credit]**Internet, Infrastructure, Materialities**

The internet as infrastructure; how the technical characteristics of the internet influence our experience and use of this medium. Questions addressing the physical structures, power and control, and ecological impacts of the internet are also considered.

COMS 5225 [0.5 credit]**Critical Data Studies**

Theoretical debates, research approaches and discursive regimes pertaining to the datafication of everyday life, data and living environments, and the quantified control of the future. Emphasis on the production of databased knowledge and the influence data have on the material and social world.

COMS 5509 [0.5 credit]**Gender, Sexuality, Culture**

Theoretical debates and current research in the production and reproduction of gender, sexual and sexualized relations through communication processes, practices and institutions. Precludes additional credit for COMM 5509 (no longer offered).

COMS 5605 [0.5 credit]**Approaches to Communication Research**

Processes of conducting communication research in the context of writing a thesis or research essay. Topic selection, question framing, research design, the use of theory; specific methodologies such as content analysis, discourse analysis, survey research, ethnography, semiotics, and historical analysis.

Includes: Experiential Learning Activity

Precludes additional credit for COMM 5605 (no longer offered).

COMS 5808 [0.5 credit]**Directed Studies**

Directed research or readings on a topic area not covered in that year's course offerings.

Precludes additional credit for COMM 5808 (no longer offered).

COMS 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

Precludes additional credit for COMM 5908 (no longer offered).

COMS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Precludes additional credit for COMM 5909 (no longer offered).

COMS 6000 [1.0 credit]**Doctoral Seminar in Communication Studies**

A seminar leading to the first comprehensive encompassing the program's three fields of concentration: the history of communication as object and field of study, the political economy of communication, and socio-cultural analysis of communication.

Precludes additional credit for COMM 6000 (no longer offered).

COMS 6001 [0.5 credit]**Selected Topics in Communication**

Examines a newly emerging issue, research method, or theory related to communication. Topic will vary from year to year.

Precludes additional credit for COMM 6001 (no longer offered).

COMS 6005 [0.5 credit]**Communication and History**

The history of communication and its conceptualization from various perspectives as well as the way in which historical events arise through communication.

Precludes additional credit for COMM 6005 (no longer offered).

COMS 6006 [0.5 credit]**Political Economy of Communication**

The history of political economy with attention to applications in the field of communication.

Precludes additional credit for COMM 6006 (no longer offered).

COMS 6007 [0.5 credit]**Communication, Discourse, and Representation**

The processes and practices of representation through which meanings arise.

Precludes additional credit for COMM 6007 (no longer offered).

COMS 6010 [0.5 credit]**Directed Studies**

Directed research or readings on a topic area not covered in that year's course offerings.

Precludes additional credit for COMM 6010 (no longer offered).

COMS 6900 [1.0 credit]**Comprehensive Examination I**

Examination normally conducted in May of each year in connection with COMS 6000 and covering the program's three fields of concentration: history of communication as object and field of study; political economy of communication; socio-cultural analysis of communication. Graded as Satisfactory or Unsatisfactory.

Precludes additional credit for COMM 6900 (no longer offered).

COMS 6901 [1.0 credit]**Comprehensive Examination II**

Examination by the student's thesis supervisor and committee of an approved project related to a particular field of communication research; the field may or may not be related to the student's thesis. Graded as Satisfactory or Unsatisfactory.

Precludes additional credit for COMM 6901 (no longer offered).

COMS 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Computer Science

This section presents the requirements for programs in:

- M.C.S. Computer Science
- M.C.S. Computer Science with Specialization in Data Science
- Ph.D. Computer Science

Program Requirements**M.C.S. Computer Science (5.0 credits)****Requirements - Thesis pathway (5.0 credits)**

1. **2.5 credits** in course work. Course work must include a minimum of 1.5 credits of OCICS courses in three different research areas (see OCICS course listing by research areas). 2.5
2. **2.5 credits** in: 2.5

COMP 5905 [2.5]	M.C.S. Thesis (Each candidate submitting a thesis will be required to undertake an oral defence of the thesis.)	
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Total Credits **5.0**

Requirements - Research Project pathway (5.0 credits)

1. 4.0 credits in course work. Course work must include a minimum of 1.5 credits of OCICS courses in three different research areas (see OCICS course listing by research areas). **4.0**

2. 1.0 credit in Graduate project (Each candidate submitting a Project will be required to present a departmental seminar on their Project) **1.0**

COMP 5903 [1.0]	Graduate Project (M.C.S.)	
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Total Credits **5.0**

M.C.S. Computer Science with Specialization in Data Science (5.0 credits)

Requirements - Thesis Option (5.0 credits)

1. 0.5 credit in: **0.5**

DATA 5000 [0.5]	Data Science Seminar	
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2. 2.0 credits in course work. Course work must include a minimum of 1.5 credits of OCICS courses in at least three different research areas. See OCICS course listing by research areas. **2.0**

3. 2.5 credits in: **2.5**

COMP 5905 [2.5]	M.C.S. Thesis (M.C.S. Thesis must be in an area of Data Science and requires approval from the Institute of Data Science. Each candidate submitting a thesis will be required to undertake an oral defence of the thesis.)	
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Total Credits **5.0**

Ph.D. Computer Science (1.5 credits)

Requirements:

1. 1.5 credits in OCICS courses. Course work must include a minimum of 1.5 credits of OCICS courses in at least three different research areas (see OCICS course listing by research areas) within the first 4 terms. **1.5**

The admission committee and the student's advisory committee may impose additional program requirements according to the student's background and research topic.

2. Requirement of two seminars.

3. 0.0 credit in: **0.0**

COMP 6907 [0.0]	Doctoral Comprehensive (involving breadth and depth components, must be taken within the first 4 terms)	
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4. 0.0 credit in: **0.0**

COMP 6908 [0.0]	Doctoral Proposal (defended at an oral examination within the first 6 terms)	
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5. 0.0 credits in:

COMP 6909 [0.0]	Ph.D. Thesis (defended at an oral examination)	
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Total Credits **1.5**

Guidelines for Completion of Doctoral Degree

The following completion times are estimates based on full-time study.

- During the first term, the student and his or her faculty adviser should select graduate courses related to their area(s) of research and interests. Approval from the Graduate Supervisor of the Institute is only required for courses not listed as valid OCICS courses.
- Subject to the approval of the Graduate Supervisor, Ph.D. students may take courses in other relevant disciplines. At least half of the course credits of a Ph.D. student must be valid OCICS courses.
- An advisory committee comprised of three to five faculty members must be established before the student registers in the comprehensive examination. The committee is responsible for the comprehensive examination, the thesis proposal, and for guiding the student's research. The advisory committee must include at least one representative from EECS at the University of Ottawa. The advisory committee must be approved by the director or associate director of the Institute.
- All course requirements must be completed within the first four (4) terms.
- Within the first six (6) terms, the student must submit a written thesis proposal and defend it in an oral examination (see COMP 6908).
- The expected completion time for the Ph.D. program is approximately twelve terms depending on the type of thesis and the area of research.
- Before the completion of the program, the student must satisfy the seminar requirement.

Graduate Courses

The following graduate courses are offered by the joint Ottawa-Carleton Institute for Computer Science (OCICS). The institute comprises the School of Electrical Engineering and Computer Science (EECS) at the University of Ottawa and the School of Computer Science (SCS) at Carleton University. Typically, the courses with COMP (CSI) designation are offered by SCS and the courses with CSI (COMP) designation are offer by EECS. Note that not all of the following courses are offered in a given year. For an up-to-date statement of course offerings or to determine the term of offering, consult central.carleton.ca. The courses are grouped according to research areas as follows:

Software Engineering

COMP 5001 (CSI 5113)	Foundations of Programming Languages
COMP 5104 (CSI 5314)	Object-Oriented Software Development
COMP 5110 (CSI 5136)	Computer Security and Usability
COMP 5113	Machine Learning for Healthcare
COMP 5116 (CSI 5155.)	Machine Learning

COMP 5117 (CSI 5346.)	Mining Software Repositories	COMP 5409 (CSI 5127)	Applied Computational Geometry
COMP 5119 (CSI 5345.)	Internet of Things Security	COMP 5703 (CSI 5163)	Algorithm Analysis and Design
COMP 5209 (CSI 5135)	Visual Analytics	COMP 6601 (CSI 7160)	Advanced Topics in the Theory of Computing
COMP 6104 (CSI 7314)	Advanced Topics in Object-Oriented Systems	COMP 6602 (CSI 7170,CSI 7970)	Advanced Topics in Distributed Computing
COMP 6603 (CSI 7161,CSI 7561)	Advanced Topics in Programming Systems and Languages	CSI 5108 (COMP 5700)	Software Specification and Verification
CSI 5111 (COMP 5501)	Software Quality Engineering	CSI 5110 (COMP 5707)	Principles of Formal Software Development
CSI 5112 (COMP 5207)	Software Engineering	CSI 5126 (COMP 5108)	Algorithms in Bioinformatics
CSI 5115 (COMP 5503)	Database Analysis and Design	CSI 5148 (COMP 5103)	Wireless Ad Hoc Networking
CSI 5118 (COMP 5302)	Automated Verification and Validation of Software	CSI 5149 (COMP 5007)	Graphical Models
CSI 5122 (COMP 5301)	Software Usability	CSI 5161 (COMP 5606)	Topics in System Simulation and Optimization
CSI 5134 (COMP 5004)	Fault Tolerance	CSI 5165 (COMP 5709)	Combinatorial Algorithms
SYSC 5101 (ELG 6111)	Design of High Performance Software	CSI 5166 (COMP 5805)	Applications of Combinatorial Optimization
SYSC 5103 (ELG 6113)	Software Agents	CSI 5169 (COMP 5304)	Wireless Networks and Mobile Computing
SYSC 5105 (ELG 6115)	Software Quality Engineering and Management	CSI 5174 (COMP 5604)	Validation Methods for Distributed Systems
SYSC 5709 (ELG 6179)	Advanced Topics in Software Engineering	CSI 5510 (COMP 5707)	Principes de developpement formel de logiciels
Theory of Computing		CSI 5526 (COMP 5108)	Algorithmes en bioinformatique
COMP 5003 (CSI 5308)	Principles of Distributed Computing	CSI 5565 (COMP 5709)	Algorithmes combinatoires
COMP 5005 (CSI 5390)	Learning Systems for Random Environments	Computer Applications	
COMP 5008 (CSI 5164)	Computational Geometry	COMP 5002 (CSI 5128)	Swarm Intelligence
COMP 5107 (CSI 5185)	Statistical and Syntactic Pattern Recognition	COMP 5100 (CSI 5180,CSI 5580)	Topics in Artificial Intelligence
COMP 5111 (CSI 5153)	Data Management for Business Intelligence	COMP 5110 (CSI 5136)	Computer Security and Usability
COMP 5112 (CSI 5154)	Algorithms for Data Science	COMP 5111 (CSI 5153)	Data Management for Business Intelligence
COMP 5113	Machine Learning for Healthcare	COMP 5112 (CSI 5154)	Algorithms for Data Science
COMP 5116 (CSI 5155.)	Machine Learning	COMP 5113	Machine Learning for Healthcare
COMP 5119 (CSI 5345.)	Internet of Things Security	COMP 5114	Quantum Communications and Networking
COMP 5203 (CSI 5173)	Data Networks	COMP 5115 (CSI 5344.)	Geometry Processing
COMP 5306 (CSI 5100)	Data Integration	COMP 5116 (CSI 5155.)	Machine Learning
COMP 5307 (CSI 5101)	Knowledge Representation	COMP 5117 (CSI 5346.)	Mining Software Repositories
COMP 5308 (CSI 5102)	Topics in Medical Computing	COMP 5118 (CSI 5347.)	Trends in Big Data Management
COMP 5310 (CSI 5152)	Evolving Information Networks	COMP 5204 (CSI 5124)	Computational Aspects of Geographic Information Systems
COMP 5408 (CSI 5121)	Advanced Data Structures	COMP 5206 (CSI 5183)	Evolutionary Computation and Artificial Life

COMP 5209 (CSI 5135)	Visual Analytics	COMP 5118 (CSI 5347.)	Trends in Big Data Management
COMP 5210 (CSI 5167)	Human-Computer Interaction Models, Theories, and Frameworks	COMP 5203 (CSI 5173)	Data Networks
COMP 5220 (CSI 5175)	Mobile Commerce Technologies	COMP 5305 (CSI 5129)	Advanced Database Systems
COMP 5305 (CSI 5129)	Advanced Database Systems	COMP 5401 (CSI 5389, CSI 5789)	Electronic Commerce Technologies
COMP 5306 (CSI 5100)	Data Integration	COMP 5402 (CSI 5142)	Protocols for Mobile and Wireless Networks
COMP 5307 (CSI 5101)	Knowledge Representation	COMP 5406 (CSI 5105)	Network Security and Cryptography
COMP 5308 (CSI 5102)	Topics in Medical Computing	COMP 5407 (CSI 5116)	Authentication and Software Security
COMP 5310 (CSI 5152)	Evolving Information Networks	COMP 5704 (CSI 5131)	Parallel Algorithms and Applications in Data Science
COMP 5401 (CSI 5389, CSI 5789)	Electronic Commerce Technologies	COMP 6100 (CSI 7131)	Advanced Parallel and Systolic Algorithms
COMP 5406 (CSI 5105)	Network Security and Cryptography	COMP 6602 (CSI 7170, CSI 6970)	Advanced Topics in Distributed Computing
COMP 5407 (CSI 5116)	Authentication and Software Security	COMP 6605 (CSI 7163)	Advanced Topics in Computer Systems
COMP 6604 (CSI 7162)	Advanced Topics in Computer Applications	CSI 5134 (COMP 5004)	Fault Tolerance
CSI 5126 (COMP 5108)	Algorithms in Bioinformatics	CSI 5147 (COMP 5201)	Computer Animation
CSI 5146 (COMP 5202)	Computer Graphics	CSI 5148 (COMP 5103)	Wireless Ad Hoc Networking
CSI 5147 (COMP 5201)	Computer Animation	CSI 5161 (COMP 5606)	Principles of Distributed Simulation
CSI 5151 (COMP 5205)	Virtual Environments	CSI 5168 (COMP 5309)	Digital Watermarking
CSI 5168 (COMP 5309)	Digital Watermarking	CSI 5169 (COMP 5304)	Wireless Networks and Mobile Computing
CSI 5380 (COMP 5405)	Systems and Architectures for Electronic Commerce	CSI 5174 (COMP 5604)	Validation Methods for Distributed Systems
CSI 5386 (COMP 5505)	Natural Language Processing	CSI 5380 (COMP 5405)	Systems and Architectures for Electronic Commerce
CSI 5387 (COMP 5706)	Data Mining and Concept Learning	CSI 5780 (COMP 5405)	Systemes et architectures des logiciels pour le commerce electronique
CSI 5388 (COMP 5801)	Topics in Machine Learning	COMP 5220 (CSI 5175)	Mobile Commerce Technologies
CSI 5526 (COMP 5108)	Algorithmes en bioinformatique		
CSI 5580 (COMP 5100)	Sujet en intelligence artificielle	Others	
CSI 5780 (COMP 5405)	Systemes et architectures des logiciels pour le commerce electronique	COMP 5900 (CSI 5140)	Selected Topics in Computer Science
CSI 5787 (COMP 5706)	Fouille des donnees et apprentissage des concepts	COMP 5901 (CSI 5901)	Directed Studies (M.C.S.)
		COMP 5903 (CSI 6900)	Graduate Project (M.C.S.)
Computer Systems		COMP 5905 (CSI 7999)	M.C.S. Thesis
COMP 5003 (CSI 5308)	Principles of Distributed Computing	COMP 5913 (CGI 6001/CGI 6002)	Master's Co-operative Work Term
COMP 5101 (CSI 5311)	Distributed Databases and Transaction Processing Systems	COMP 6901 (CSI 7901)	Directed Studies (Ph.D.)
COMP 5102 (CSI 5312)	Distributed Operating Systems	COMP 6902 (CSI 7900)	Graduate Project (Ph.D.)
COMP 5107 (CSI 5185)	Statistical and Syntactic Pattern Recognition	COMP 6907 (CSI 9998)	Doctoral Comprehensive

COMP 6908 (CSI Doctoral Proposal
9997)

COMP 6909 (CSI Ph.D. Thesis
9999)

Admission

M.C.S. and M.C.S. Data Science

See the General Regulations section of this Calendar for detailed admission requirements. Applicants should have an honours bachelor's degree in computer science or the equivalent. By equivalent is meant an honours degree in a program that includes at least twelve computer science half-credits, two of which must be at the 4000-level, and eight half-credits in mathematics, one of which must be at the 3000- or 4000-level.

Applicants who have a general (3-year) bachelor's degree, or who otherwise lack the required undergraduate preparation, may be admitted to a qualifying-year program. Refer to the General Regulations section of this Calendar for regulations governing the qualifying year.

Accelerated Pathway

The accelerated pathway in the M.C.S. Computer Science is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.C.S.(Hons.) degree with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third-year of study in the B.C.S.(Hons.) degree should consult with both their Undergraduate Program Coordinator and the Director for Graduate Studies to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. At least one OCICS courses at the 5000-level with a grade of B+ or higher.
2. Minimum overall and Major CGPA of A-.

Students may receive advanced standing of up to 1.0 credit which can reduce their time to completion.

Admission

See the General Regulations section of this Calendar for detailed admission requirements. Admission to the Ph.D. in Computer Science requires a Masters in Computer Science with thesis, or equivalent including demonstrated significant research ability.

In exceptional cases, students who are currently in the M.C.S. program and who have completed all course requirements with a grade of no less than A in each course may be permitted to transfer into the Ph.D. program.

Co-operative Option

A co-operative option is also available to full-time students in the Masters of Computer Science. Co-operative education is based on the principle that academic studies combined with work experience are desirable for effective professional preparation.

In addition to all other requirements for the degree, students admitted to the co-operative option must satisfactorily complete two work terms placements with a suitable employer in order to graduate with a co-op designation on their transcripts and diplomas. It is desirable that the work placements be related to the student's research. Placements are subject to the approval of the Supervisor of Graduate Studies and of the student's research supervisor. These work terms are four months in duration and students will conduct job searches through the university's co-op office. During a work term, students will register in COMP 5913. While on a work term, students in this option are limited to taking one additional 0.5-credit course, or registering in their thesis.

Students in the co-op option normally apply for admission to the co-operative option during their first academic term. This option requires an initial study period of two academic terms, typically followed by two work terms and a final academic period to complete the remaining requirements of the degree. The student must submit a work term report upon the completion of each work placement, and receive a grade of Satisfactory in order to meet the requirements for the successful completion of that work term's requirement.

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the Master of Computer Science program, including all specializations/concentrations within the program, is considered a regularly scheduled break approved by Carleton University. Students should resume full-time studies in September.

Computer Science (COMP) Courses

COMP 5001 [0.5 credit] (CSI 5113)

Foundations of Programming Languages

Advanced study of programming paradigms from a practical perspective. Paradigms may include functional, imperative, concurrent, distributed, generative, aspect- and object-oriented, and logic programming. Emphasis on underlying principles. Topics may include: types, modules, inheritance, semantics, continuations, abstraction and reflection.

COMP 5002 [0.5 credit] (CSI 5128)

Swarm Intelligence

Collective computation, collective action, and principles of self-organization in social agent systems. Algorithms for combinatorial optimization problems, division of labour, task allocation, task switching, and task sequencing with applications in security, routing, wireless and ad hoc networks and distributed manufacturing.

COMP 5003 [0.5 credit] (CSI 5308)**Principles of Distributed Computing**

Formal models of distributed environment; theoretical issues in the design of distributed algorithms; message and time complexity; problem solving in distributed settings. Problems discussed may include: coordination and control, information diffusion, leader election, consensus, distributed data operations, computing by mobile entities.

COMP 5004 [0.5 credit] (CSI 5134)**Fault Tolerance**

Hardware and software techniques for fault tolerance. Topics include modeling and evaluation techniques, error detecting and correcting codes, module and system level fault detection mechanisms, design techniques for fault-tolerant and fail-safe systems, software fault tolerance through recovery blocks, N-version programming, algorithm-based fault tolerance, checkpointing.

COMP 5005 [0.5 credit] (CSI 5390)**Learning Systems for Random Environments**

Computerized adaptive learning for random environments and its applications. Topics include a mathematical review, learning automata which are deterministic/stochastic, with fixed/variable structures, of continuous/discretized design, with ergodic/absorbing properties and of estimator families.

Prerequisite(s): SYSC 5503 or equivalent.

COMP 5007 [0.5 credit] (CSI 5149)**Graphical Models and Applications**

Bayesian networks, factor graphs, Markov random fields, maximum a posteriori probability (MAP) and maximum likelihood (ML) principles, elimination algorithm, sum-product algorithm, decomposable and non-decomposable models, junction tree algorithm, completely observed models, iterative proportional fitting algorithm, expectation-maximization (EM) algorithm, iterative conditional modes algorithm.

COMP 5008 [0.5 credit] (CSI 5164)**Computational Geometry**

Study of design and analysis of algorithms to solve geometric problems; emphasis on applications such as robotics, graphics, and pattern recognition. Topics include: visibility problems, hidden line and surface removal, path planning amidst obstacles, convex hulls, polygon triangulation, point location.

COMP 5100 [0.5 credit] (CSI 5180.)**Topics in Artificial Intelligence**

Areas in knowledge-based systems including recent approaches to machine learning and data mining, inference methods, knowledge-based and fuzzy systems, heuristic search, and natural language processing. Precludes additional credit for COMP 4106 (no longer offered).

COMP 5101 [0.5 credit] (CSI 5311)**Distributed Databases and Transaction Processing Systems**

Principles in the design and implementation of distributed databases and distributed transaction processing systems. Topics include: distributed computing concepts, computing networks, distributed and multi-database system architectures and models, atomicity, synchronization and distributed concurrency control algorithms, data replication, recovery techniques, reliability in distributed databases.

COMP 5102 [0.5 credit] (CSI 5312)**Distributed Operating Systems**

Design issues of advanced multiprocessor distributed operating systems: multiprocessor system architectures; process and object models; synchronization and message passing primitives; memory architectures and management; distributed file systems; protection and security; distributed concurrency control; deadlock; recovery; remote tasking; dynamic reconfiguration; performance measurement, modeling, and system tuning.

COMP 5103 [0.5 credit] (CSI 5148)**Wireless Ad Hoc Networking**

Self-organized, mobile, and hybrid ad hoc networks. Physical, medium access, networks, transport and application layers, and cross-layering issues. Power management. Security in ad hoc networks. Topology control and maintenance. Data communication protocols, routing and broadcasting. Location service for efficient routing.

COMP 5104 [0.5 credit] (CSI 5314)**Object-Oriented Software Development**

Issues in modeling and verifying quality and variability in object-oriented systems. Testable models in model-driven and test-driven approaches. System family engineering. Functional conformance: scenario modeling and verification, design by contract. Conformance to non functional requirements: goals, forces and tradeoffs, metrics.

COMP 5107 [0.5 credit] (CSI 5185)**Statistical and Syntactic Pattern Recognition**

Topics include a mathematical review, Bayes decision theory, maximum likelihood and Bayesian learning for parametric pattern recognition, non-parametric methods including nearest neighbor and linear discriminants. Syntactic recognition of strings, substrings, subsequences and tree structures. Applications include speech, shape and character recognition.

COMP 5108 [0.5 credit] (CSI 5126)**Algorithms in Bioinformatics**

Fundamental mathematical and algorithmic concepts underlying computational molecular biology; physical and genetic mapping, sequence analysis (including alignment and probabilistic models), genomic rearrangement, phylogenetic inference, computational proteomics and systemics modelling of the whole cell.

COMP 5110 [0.5 credit] (CSI 5136)**Computer Security and Usability**

This course focuses on designing and evaluating security and privacy software with particular attention to human factors and how interaction design impacts security. Topics include current approaches to usable security, methodologies for empirical analysis, and design principles for usable security and privacy.

COMP 5111 [0.5 credit] (CSI 5153)**Data Management for Business Intelligence**

Application of computational techniques to support business such as decision making, business understanding, data analysis, business process automation, learning from data, producing and using business models, data integration, data quality assessment and cleaning, use of contextual data, etc. Also offered at the undergraduate level, with different requirements, as COMP 4111, for which additional credit is precluded.

COMP 5112 [0.5 credit] (CSI 5154)**Algorithms for Data Science**

Algorithmic techniques to handle (massive/big) data arising from, for example, social media, mobile devices, sensors financial transactions. Algorithmic techniques may include locality-sensitive hashing, dimensionality reduction, streaming, clustering, VC-dimensions, external memory, core sets, link analysis and recommendation systems.

COMP 5113 [0.5 credit]**Machine Learning for Healthcare**

Principles, techniques, technology and applications of machine learning for medical data such as medical imaging data, genomic data, physiological signals, speech and language.

COMP 5114 [0.5 credit]**Quantum Communications and Networking**

Quantum communications and networking; the use of individual photons and teleportation to represent and transmit information. Theoretical (mathematical) principles. Practical aspects (implementation and software simulation) of quantum communications and networking.

COMP 5115 [0.5 credit] (CSI 5344.)**Geometry Processing**

Concepts, representations, and algorithms for processing 3D geometric datasets. Topics include shape representations (e.g., triangle meshes and implicit functions), and the geometry processing pipeline covering the acquisition (e.g., with laser scanning or depth cameras), reconstruction, manipulation, editing, analysis, and fabrication (3D printing) of geometric models.

COMP 5116 [0.5 credit] (CSI 5155.)**Machine Learning**

This course provides a broad introduction to the fundamental concepts, techniques and algorithms in machine learning.

Prerequisite(s): Familiarity with probability and statistics; familiarity with linear algebra and calculus; programming skills at a level sufficient to write a reasonably non-trivial computer program.

COMP 5117 [0.5 credit] (CSI 5346.)**Mining Software Repositories**

Introduction to the methods and techniques of mining software engineering data. Software repositories and their associated data. Data extraction and mining. Data analysis and interpretation (statistics, metrics, machine learning). Empirical case studies.

COMP 5118 [0.5 credit] (CSI 5347.)**Trends in Big Data Management**

In-depth study of recent research articles in the field of data management, with focus on data integration, Internet of Things, large scale data management, recommendation systems, text processing, and question answering. Students will work on a term-long project.

Prerequisite(s): Upper level undergraduate course work in operating systems, database management systems, algorithm design and analysis; or permission of the instructor.

COMP 5119 [0.5 credit] (CSI 5345.)**Internet of Things Security**

Security issues related to the Internet of Things (IoT). IoT device software design and device lifecycle, device pairing and configuration, management and security infrastructure, smarthome platforms, data and communication protocol security, IoT operating systems, malware, firmware in embedded systems, security administration and best practices.

COMP 5201 [0.5 credit] (CSI 5147)**Computer Animation**

Theories and techniques in 3D modeling and animation. Animation principles, categories, and history. Forward and inverse kinematics. Motion capture, editing and retargeting. Flexible bodies. Particle animation. Behavioral animation. Human modeling. Facial animation. Cloth animation and other sub-topics.

COMP 5202 [0.5 credit] (CSI 5146)**Computer Graphics**

Principles and advanced techniques in rendering and modelling. Research field overview. Splines, subdivision surfaces and hierarchical surface representations. Physics of light transport, rendering equation and Bidirectional Reflectance Distribution Function. Classical ray tracing, radiosity, global illumination and modern hybrid methods. Plenoptic function and image-based rendering.

COMP 5203 [0.5 credit] (CSI 5173)**Data Networks**

Mathematical and practical aspects of design and analysis of communication networks. Topics include: basic concepts, layering, delay models, multi-access communication, queuing theory, routing, fault-tolerance, and advanced topics on high-speed networks, ATM, mobile wireless networks, and optical networks.

COMP 5204 [0.5 credit] (CSI 5124)**Computational Aspects of Geographic Information Systems**

Through recent advances in navigation systems, mobile devices, and new software such as Mapquest and Google Earth, GIS is becoming increasingly important and exciting from a CS perspective. This course lays the algorithmic foundations to understand, use and further this technology. Also offered at the undergraduate level, with different requirements, as COMP 4202, for which additional credit is precluded.

COMP 5205 [0.5 credit] (CSI 5151)**Virtual Environments**

Basic concepts. Virtual worlds. Hardware and software support. World modeling. Geometric modeling. Light modeling. Kinematic and dynamic models. Other physical modeling modalities. Multi-sensor data fusion. Anthropomorphic avatars. Animation: modeling languages, scripts, real-time computer architectures. Virtual environment interfaces. Case studies.

COMP 5206 [0.5 credit] (CSI 5183)**Evolutionary Computation and Artificial Life**

Study of algorithms based upon biological theories of evolution, applications to machine learning and optimization problems. Possible topics: Genetic Algorithms, Classifier Systems, and Genetic Programming. Recent work in the fields of Artificial Life (swarm intelligence, distributed agents, behavior-based AI) and of connectionism. Precludes additional credit for COMP 4107.

COMP 5207 [0.5 credit] (CSI 5112)**Software Engineering**

Topics of current interest in Software Engineering, such as requirements engineering, precise and advanced modelling, development processes, change management, standards, and emerging types of applications.

COMP 5209 [0.5 credit] (CSI 5135)**Visual Analytics**

Principles, techniques, technology and applications of information visualization for data analysis. Topics include human visual perception, cognitive processes, static and dynamic models of image semantics, interaction paradigms, big data visual analysis case studies. Includes: Experiential Learning Activity

COMP 5210 [0.5 credit] (CSI 5167)**Human-Computer Interaction Models, Theories, and Frameworks**

Emphasis on the application of theory to user interface design. Review of main theories of human behaviour relevant to HCI, including especially cognitive dimensions of notations framework, mental models, distributed cognition, and activity theory, and their application to design and development of interactive systems. Lecture

COMP 5220 [0.5 credit] (CSI 5175)**Mobile Commerce Technologies**

Wireless networks support for m-commerce; m-commerce architectures and applications; mobile payment support systems; business models; mobile devices and their operating systems; mobile content presentation; security issues and solutions; relevant cross layer standards and protocols; case studies. Includes: Experiential Learning Activity

COMP 5301 [0.5 credit] (CSI 5122)**Software Usability**

Design principles and metrics for usability. Qualitative and quantitative methods for evaluation of software system usability: Heuristic evaluation, usability testing, usability inspections and walkthroughs, cognitive walkthroughs, formal usability experimentation. Ethical concerns. Economics of usability. Integration of usability engineering lifestyle.

COMP 5302 [0.5 credit] (CSI 5118)**Automated Verification & Validation of Software**

Topics in formal test derivation methods, test management, high-level, CASE-based verification and validation, data-flow and control-flow measures and metrics for assessing quality of designs and code, regression analysis and testing.

COMP 5304 [0.5 credit] (CSI 5169)**Wireless Networks and Mobile Computing**

Computational aspects and applications of design and analysis of mobile and wireless networking. Topics include Physical, Link Layer, Media Access Control, Wireless, Mobile LANs, Ad-Hoc, Sensor Networks, Power Consumption optimization, Routing, Searching, Service Discovery, Clustering, Multicasting, Localization, Mobile IP/TCP, File Systems, Mobility Models, Wireless Apps.

COMP 5305 [0.5 credit] (CSI 5129)**Advanced Database Systems**

In-depth study on developments in database systems shaping the future of information systems, including complex object, object-oriented, object-relational, and semi-structured databases. Data structures, query languages, implementation and applications.

COMP 5306 [0.5 credit] (CSI 5100)**Data Integration**

Materialized and virtual approaches to integration of heterogeneous and independent data sources. Emphasis on data models, architectures, logic-based techniques for query processing, metadata and consistency management, the role of XML and ontologies in data integration; connections to schema mapping, data exchange, and P2P systems.

COMP 5307 [0.5 credit] (CSI 5101)**Knowledge Representation**

KR is concerned with representing knowledge and using it in computers. Emphasis on logic-based languages for KR, and automated reasoning techniques and systems; important applications of this traditional area of AI to ontologies and semantic web.

COMP 5308 [0.5 credit] (CSI 5102)**Topics in Medical Computing**

Introductory course on data structures, algorithms, techniques, and software development related to medical computing (in particular spatial modeling). Topics may include: computational geometry algorithms for cancer treatment, medical imaging, spatial data compression algorithms, dynamic programming for DNA analysis.

COMP 5309 [5.0 credits] (CSI 5168)**Digital Watermarking**

Overview of recent advances in watermarking of image, video, audio, and other media. Spatial, spectral, and temporal watermarking algorithms. Perceptual models. Use of cryptography in steganography and watermarking. Content authentication, copy control, intellectual property, digital rights management and other applications.

COMP 5310 [0.5 credit] (CSI 5152)**Evolving Information Networks**

Convergence of social and technological networks with WWW. Interplay between information content, entities creating it and technologies supporting it. Structure and analysis of such networks, models abstracting their properties, link analysis, search, mechanism design, power laws, cascading, clustering and connections with work in social sciences.

Also offered at the undergraduate level, with different requirements, as COMP 4206, for which additional credit is precluded.

COMP 5401 [0.5 credit] (CSI 5389)**Electronic Commerce Technologies**

Introduction to business models and technologies. Search engines. Cryptography. Web services and agents. Secure electronic transactions. Value added e-commerce technologies. Advanced research questions.

COMP 5402 [0.5 credit] (CSI 5142)**Protocols for Mobile and Wireless Networks**

Link and network layer protocols of wireless networks; applications of wireless networks may be discussed. Topics may include: protocol implementation, mobile IP, resource discovery, wireless LANs/PANs, and Spreadpectrum.

Precludes additional credit for SYSC 5306.

COMP 5405 [0.5 credit] (CSI 5380)**Systems and Architectures for Electronic Commerce****COMP 5406 [0.5 credit] (CSI 5105)****Network Security and Cryptography**

Advanced methodologies selected from symmetric and public key cryptography, network security protocols and infrastructure, identification, anonymity, privacy technologies, secret-sharing, intrusion detection, firewalls, access control technologies, and defending network attacks.

Prerequisite(s): COMP 3203 and COMP 4109, or equivalent, or permission of the instructor.

COMP 5407 [0.5 credit] (CSI 5116)**Authentication and Software Security**

Specialized topics in security including advanced authentication techniques, user interface aspects, electronic and digital signatures, security infrastructures and protocols, software vulnerabilities affecting security, untrusted software and hosts, protecting software and digital content.

COMP 5408 [0.5 credit] (CSI 5121)**Advanced Data Structures**

Simple methods of data structure design and analysis that lead to efficient data structures for several problems. Topics include randomized binary search trees, persistence, fractional cascading, self-adjusting data structures, van Emde Boas trees, tries, randomized heaps, and lowest common ancestor queries.

COMP 5409 [0.5 credit] (CSI 5127)**Applied Computational Geometry**

Computer-based representation and manipulation of geometric objects. Design and analysis of efficient algorithms for solving geometric problems in applied fields such as Computer-Aided Design and Manufacturing, Cartography, Materials Science, and Geometric Network Design.

COMP 5500 [0.5 credit]**Internet Measurements and Security**

Measurement methodologies for understanding complex Internet phenomena and behaviors including: spread of vulnerabilities, remote network topologies, attack patterns, content popularity, Internet censorship, service quality, and adoption of security systems. Tools for efficient measurements, large-scale data analysis, stats, reproducibility of results. Ethical considerations.

COMP 5501 [0.5 credit] (CSI 5111)**Software Quality Engineering**

Software quality issues. Quality components and metrics. Software process quality. Software reliability engineering. Software design for testability. Requirements capture and validation. Systematic design validation; grey-box approach, test design, implementation and management, case studies in validation and verification of communications software. Object-oriented design and test.

COMP 5503 [0.5 credit] (CSI 5115)**Database Analysis & Design**

The dimensional and multidimensional data models for data warehousing. Data dependencies and decomposition. Structure and use of data definition and manipulation languages. Database economics, engineering, deployment and evolution. Issues in integrity, security, the Internet and distributed databases. Relationships to decision support systems.

COMP 5505 [0.5 credit] (CSI 5386)**Natural Language Processing**

Overview of both rule-based or symbolic methods and statistical methods as approaches to Natural Language Processing (NLP), with more emphasis on the statistical ones. Applications such as information retrieval, text categorization, clustering, and statistical machine translation could be discussed.

COMP 5604 [0.5 credit] (CSI 5174)**Validation Methods for Distributed Systems**

Review of formal specification and description techniques for distributed and open systems. Verification techniques. Correctness proofs. Verification of general properties of distributed systems. Analysis and relief strategies. Testing techniques. Test generation strategies. Test architectures.

COMP 5606 [0.5 credit] (CSI 5161)**Principles of Distributed Simulation**

Distributed simulation principles and practices. Synchronization protocols: Optimistic vs Conservative, Deadlock detection in conservative simulations, Time warp simulation. Distributed interactive simulation: Data distribution management, Interest management, High Level Architectures (HLA), Run Time Infrastructure (RTI). Distributed web-based and agent based simulation. Real time applications.

COMP 5703 [0.5 credit] (CSI 5163)**Algorithm Analysis and Design**

Topics of current interest in the analysis and design of sequential and parallel algorithms for non-numerical, algebraic and graph computations. Lower bounds on efficiency of algorithms. Complexity classes.

COMP 5704 [0.5 credit] (CSI 5131)**Parallel Algorithms and Applications in Data Science**

Multiprocessor architectures from an application programmer's perspective: programming models, processor clusters, multi-core processors, GPU's, algorithmic paradigms, efficient parallel problem solving, scalability and portability. Projects on high performance computing in Data Science, incl. data analytics, bioinformatics, simulations. Programming experience on parallel processing equipment. Includes: Experiential Learning Activity

COMP 5706 [0.5 credit] (CSI 5387)**Data Mining & Concept Learning**

Concepts and techniques of data mining. Methods for data summarization and data preprocessing. Algorithms for finding frequent patterns and association analysis; classification; cluster analysis and anomaly detection. Model selection, model evaluation and statistical significance testing. Applications of data mining and coping with Big Data.

COMP 5707 [0.5 credit] (CSI 5110)**Principles of Formal Software Development**

Methodologies in formal software specification, development, and verification. The use of theorem proving, automated deduction, and other related formal methods for software correctness. Applications in program verification and secure computation.

COMP 5709 [0.5 credit] (CSI 5165.)**Combinatorial Algorithms**

Design of algorithms for solving problems that are combinatorial in nature, involving exhaustive generation, enumeration, search and optimization. Algorithms for generating basic combinatorial objects and for solving hard optimization problems. Metaheuristic search, backtracking, branch-and-bound. Computing isomorphism of combinatorial objects.

COMP 5801 [0.5 credit] (CSI 5388)**Topics in Machine Learning****COMP 5805 [0.5 credit] (CSI 5166)****Applications of Combinatorial Optimization**

Topics in combinatorial optimization with emphasis on applications in Computer Science. Topics include network flows, various routing algorithms, polyhedral combinatorics, and the cutting plane method.

COMP 5900 [0.5 credit] (CSI 5140)**Selected Topics in Computer Science**

Selected topics, not covered by other graduate courses. Details will be available from the School at the time of registration.

COMP 5901 [0.5 credit] (CSI 5901)**Directed Studies (M.C.S.)**

A course of independent study under the supervision of a member of the School of Computer Science.

**COMP 5903 [1.0 credit] (CSI 6900)
Graduate Project (M.C.S.)**

A one- or two-session course. For M.C.S. non-thesis option students only.

**COMP 5905 [2.5 credits] (THM 7999)
M.C.S. Thesis**

**COMP 5913 [0.0 credit] (CGI 6001/CGI 6002)
Master's Co-operative Work Term**

**COMP 6100 [0.5 credit] (CSI 7131)
Advanced Parallel and Systolic Algorithms**
Continuation of COMP 5704.

**COMP 6104 [0.5 credit] (CSI 7314)
Advanced Topics in Object-Oriented Systems**
Advanced object-oriented software engineering, in particular the issues of reuse and testing. Sample topics include: interaction modeling; class and cluster testing; traceability; design patterns and testing; the C++ standard template library. Students will carry out research.

**COMP 6601 [0.5 credit] (CSI 7160)
Advanced Topics in the Theory of Computing**

**COMP 6602 [0.5 credit] (CSI 7170)
Advanced Topics in Distributed Computing**

**COMP 6603 [0.5 credit] (CSI 7161, CSI 7561)
Advanced Topics in Programming Systems and Languages**

**COMP 6604 [0.5 credit] (CSI 7162)
Advanced Topics in Computer Applications**

**COMP 6605 [0.5 credit] (CSI 7163)
Advanced Topics in Computer Systems**

**COMP 6901 [0.5 credit] (CSI 7901)
Directed Studies (Ph.D.)**

**COMP 6902 [0.5 credit] (CSI 7900)
Graduate Project (Ph.D.)**

**COMP 6907 [0.0 credit] (CSI 9998)
Doctoral Comprehensive**

Committee assembled approves at least 3 topics for written examination: typically, a major and two minor areas. An oral examination occurs if the written exam is passed. Both elements must take place within the first 4 terms following initial registration in the program. The comprehensive may be failed, passed conditionally (i.e., with extra course requirements) or passed unconditionally. If failed this course may be retaken at most one time.

**COMP 6908 [0.0 credit] (CSI 9997)
Doctoral Proposal**

Within 8 terms following initial registration in the program, a document generally defining the problem addressed, relating it to the literature, and outlining the hypotheses, goals, research methodology, initial results and validation approach must be submitted to an examination committee and successfully defended.

**COMP 6909 [0.0 credit] (THD 9999)
Ph.D. Thesis**

Conflict Resolution

This section presents the requirements for programs in:

- Graduate Diploma in Conflict Resolution

Program Requirements

Graduate Diploma in Conflict Resolution (2.5 credits)

Requirements:

1. 0.5 credit in:		0.5
LAWS 5701 [0.5]	Introduction to Conflict Resolution and Mediation	
2. 0.5 credit from:		0.5
LAWS 5700 [0.5]	Theories of Conflict Resolution	
LAWS 5702 [0.5]	Advanced Conflict Resolution and Mediation	
3. 0.5 credit from:		0.5
LAWS 5708 [0.5]	Applied Research Project	
LAWS 5709 [0.5]	Skills Assessment	
4. 1.0 credit from:		1.0
LAWS 5700 [0.5]	Theories of Conflict Resolution (if not used to fulfil Item 2 above)	
LAWS 5702 [0.5]	Advanced Conflict Resolution and Mediation (if not used to fulfil Item 2 above)	
LAWS 5703 [0.5]	Organizational Conflict and System Design	
LAWS 5704 [0.5]	Multi-Party, Multi-Issue Conflict Resolution and Consensus Building	
LAWS 5705 [0.5]	Mediation in Family Matters	
LAWS 5706 [0.5]	Special Topics in Conflict Resolution	
LAWS 5710 [0.5]	Directed Readings in Conflict and Dispute Resolution	
Total Credits		2.5

Regulations

See the General Regulations section of this Calendar.

All students are required to obtain a grade of B- or higher in each course in the program.

Admission

Applicants must have a bachelor's degree (or equivalent). Normally, an average of B+ or higher is required for admission.

Proficiency in English is necessary to pursue graduate studies at Carleton University. All applicants whose first

language is not English must satisfy this requirement as per the General Regulations.

Note: students in the diploma programs are not eligible to receive university funding.

Law (LAWS) Courses

Note: some graduate courses may also be open to interested fourth-year students with permission of the Department.

LAWS 5000 [0.5 credit]

Theories of Law and Social Transformation

Examines three groups of theories of law (liberal, sociological and Marxist) focusing on different ways law is conceived as an object of inquiry and on different accounts of trajectories of legal development. Potential of law for realizing or inhibiting social change provides analytic framework.

LAWS 5001 [0.5 credit]

Legal Method and Social Inquiry

Introduces problems of research strategy and methods. Explores contrasting methodologies in legal research; evaluates methodologies employed in understanding legal reasoning, discourses, and practices. Includes seminars in which participants present outlines of their own research projects, focusing on methodologies and research questions.

LAWS 5002 [0.5 credit]

Law and Gender Relations

Examines theoretical approaches informed by significance of gender to structure and operation of law. Concepts such as essentialism, difference, cultural determination, and social construction of gender relations examined in context of contemporary feminist debates. Focus on understanding and facility with feminist analysis and methodology.

LAWS 5003 [0.5 credit]

Law, Economy and Society

Addresses the relationship between law, economy, and society. Competing theoretical accounts of the relationship between legal regulation and social and economic change explored through selected historical and contemporary case studies.

LAWS 5004 [0.5 credit]

Law, Crime and Social Order

Examines issues of crime control and state security through topical, in-depth investigations into contemporary problems. Focus is on critically analyzing the criminal justice system, and crime control strategies, as order maintenance /social control.

LAWS 5005 [0.5 credit]

Law, State and Politics

Examines theoretical explanations of relationships between law, state and politics. Selected areas such as rights theory, rule of law, separation of powers or judicial review may provide focus.

LAWS 5006 [0.5 credit]

Historical Perspectives on Law and Society

Examines historical relationship between social forces, law and legal institutions and utility of historical forms of knowledge and methods to legal studies. Surveys selected issues in private, public and criminal law.

LAWS 5007 [0.5 credit]

Race, Ethnicity and the Law

Examines ways race and racism interact with gender and class in shaping legal system. Explores ways legal system institutionalizes racism and potential for using the legal system to combat racism. Selected areas such as immigration law and native rights may be used to illustrate themes.

LAWS 5008 [0.5 credit]

Consuming Passions: The Regulation of Consumption, Appearance and Sexuality

Examines rise of consumption and private pleasures and their regulation and self-regulation. Social history of regulation of two fields of consumption: surfaces of the person: personal appearance, in particular of dress, the body, sexuality; and intakes of the body, focusing on food, alcohol, drugs.

Also listed as SOCI 5204.

LAWS 5100 [0.5 credit]

Advanced Problems in Legal Philosophy

Studies in legal theory and analyses of law advanced by Hart, Dworkin, and others, and legal concepts: for example, principles, rights, duties, liability, etc. Precise course content will vary from year to year and will be announced at the beginning of the term.

Also listed as PHIL 5100.

Prerequisite(s): either LAWS 3105 or LAWS 3101 (PHIL 3101) and LAWS 3102 (PHIL 3102), or permission of the Department.

LAWS 5200 [0.5 credit]

International Economic Law: Regulation of Trade and Investment

Study of regulation of international economic activity. Discussion of relevant international institutions, legal aspects of integration, governmental regulation of trade and investment.

Also listed as INAF 5507.

Prerequisite(s): Open only to students in their master's year who have not studied international economic law.

LAWS 5302 [0.5 credit]

Feminism, Law and Social Transformation

Drawing on contemporary cases and/or historical contexts to explore limits and impact of feminist legal engagement. Race, class, disability, sexuality and other social categories and changing feminist conceptions of law and sites of legal relations, politics and activism: the meaning of social transformation.

LAWS 5305 [0.5 credit]**Crime, Social Change and Criminal Law Reform**

Political, practical and ideological dimensions of criminal law reform and activism undertaken by individuals, groups and the state to achieve social transformation. Reform initiatives are considered in relation to their effects on race, class, gender, sexuality, disability and other sites of difference and discrimination.

LAWS 5306 [0.5 credit]**Police and Capital**

The idea of 'police' as a general historical project aimed at the fabrication of social order and the development of liberal philosophy, political economy and security. Contemporary public and private security provision considered in light of commodification, class conflict, and risk thinking.

Also listed as SOCI 5305.

LAWS 5500 [0.5 credit]**The Canadian Constitution**

Familiarizes students with terminology, principles, and doctrines of judicial interpretation of Constitution Acts 1867-1982 and other constitutional statutes. Emphasis on division of legislative powers in the Canadian federation. Prerequisite(s): open only to graduate students in their master's year who have not previously studied Canadian constitutional law.

LAWS 5603 [0.5 credit]**International Law: Theory and Practice**

Legal principles governing international relations; emphasis on different theoretical, historical and political perspectives, such as Natural Law, Positivism, Critical Legal Studies, TWAIL, Feminism, Marxism. Specific case studies or topics are examined to critically interrogate the foundations and practices of international law.

Also listed as INAF 5505.

LAWS 5662 [0.5 credit]**Law, Regulation and Governance**

Historical and contemporary roles of law and regulation in processes, practices and discourses of governance. Law and state; domestic and global governance; diversity of law-governance relationships; law as a constituent force, enforcement mechanism and a distinctive product of governance.

Also offered, with different requirements as appropriate, as LAWS 6002, for which additional credit is precluded.

LAWS 5663 [0.5 credit]**Human Rights, Citizenship and Global Justice**

The implications of law in selected issues involving human rights, citizenship and global justice. Topics may include justification and legitimation of human rights, contemporary citizenship, struggles for global justice, recognition and democracy, and post-nationalism and global economic regulation.

Also offered with different requirements where appropriate, as LAWS 6003, for which additional credit is precluded.

LAWS 5664 [0.5 credit]**Crime, Law and Security**

Contemporary debates around crime, criminal justice and security as mediated through law. The interrelationship between the politics, process and reform of criminal justice in a socio-legal context.

Also offered as LAWS 6004, with different requirements where appropriate, for which additional credit is precluded.

LAWS 5700 [0.5 credit]**Theories of Conflict Resolution**

An introduction to the field of conflict studies, negotiation and mediation theory including: analyzing and resolving conflict, negotiation styles, orientations and models of mediation, alternative dispute resolution, building consensus, current issues and trends in the field of conflict studies.

LAWS 5701 [0.5 credit]**Introduction to Conflict Resolution and Mediation**

Introduction to the practice of negotiation and mediation including: contextualizing conflict resolution, understanding how to negotiate and mediate, determining the role of the negotiator/ mediator, reviewing the current state of mediation and conflict resolution, and understanding the importance of a theory-informed practice.

Includes: Experiential Learning Activity

LAWS 5702 [0.5 credit]**Advanced Conflict Resolution and Mediation**

Building upon the theory and skills of conflict resolution and mediation introduced in LAWS 5701. Students will learn to convene a mediation, analyze the level of conflict, design a conflict resolution process, co-mediate, and facilitate a multi-party problem solving session.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5701.

LAWS 5703 [0.5 credit]**Organizational Conflict and System Design**

Students will learn to apply conceptual frameworks to the diagnosis and assessment of organizational conflict, develop and implement appropriate intervention programs and strategies, and design conflict management systems for organizations.

Includes: Experiential Learning Activity

LAWS 5704 [0.5 credit]**Multi-Party, Multi-Issue Conflict Resolution and Consensus Building**

Using case studies where mediators have successfully assisted competing interest groups in finding mutual-gains resolutions to conflicts, students will expand upon their personal skills of crisis intervention, group facilitation, assisted negotiation, dispute resolution process design and coaching.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5701 and LAWS 5702 or equivalent.

LAWS 5705 [0.5 credit]**Mediation in Family Matters**

Students will examine family dynamics and family conflict and explore conflict within intact families as well as conflict that arises when parties separate. The practical aspects of mediation such as ethics, professional standards and screening, as well as intake and outcome documents will be discussed.

Includes: Experiential Learning Activity

LAWS 5706 [0.5 credit]**Special Topics in Conflict Resolution**

Topics of contemporary controversy relating to conflict and dispute resolution. Topics vary from year to year and may include bargaining, negotiation, legal issues, restorative justice, and international issues.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700 or LAWS 5701 or permission of the department.

LAWS 5708 [0.5 credit]**Applied Research Project**

Independent research in the theory and practice of conflict analysis, prevention or intervention, including system design, process intervention, and evaluation. The project must represent the candidate's independent study after being admitted to the program. Previous work may be used only as introductory or background material.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700, LAWS 5701, LAWS 5702, LAWS 5703, LAWS 5704.

LAWS 5709 [0.5 credit]**Skills Assessment**

An evaluation of a student's readiness to mediate disputes through a simulated mediation. Students are prepared by way of practice sessions and debriefings. Must be completed within one year after completion of course work.

Includes: Experiential Learning Activity

Prerequisite(s): Completion of three credits in Graduate Diploma in Conflict Resolution courses.

LAWS 5710 [0.5 credit]**Directed Readings in Conflict and Dispute Resolution**

A reading course on selected topics may be arranged with the permission of the GDCR Director.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700 and LAWS 5701, written acceptance by a faculty member, and permission of the Department.

LAWS 5900 [0.5 credit]**Tutorials/Directed Readings in Law**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

LAWS 5901 [0.5 credit]**Tutorial/Directed Readings in Law**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

LAWS 5903 [0.5 credit]**Contemporary Topics in Legal Studies**

A research seminar which explores a selected topic from current debates in legal studies. Students should check with the Department regarding the topic offered.

LAWS 5904 [0.5 credit]**Contemporary Topics in Legal Studies**

A research seminar which explores a selected topic from current debates in legal studies.

LAWS 5908 [1.0 credit]**M.A. Research Essay**

Includes: Experiential Learning Activity

LAWS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

LAWS 6000 [0.5 credit]**Doctoral Seminar in Legal Studies**

Analysis of the major themes, approaches and literature in contemporary legal and social theory.

LAWS 6001 [0.5 credit]**Proseminar in Legal Studies**

A seminar which meets every two weeks throughout the academic year. Based on presentations of papers and works in progress by faculty, students and invited guests, as well as assigned readings on issues that deal with current research in legal studies.

LAWS 6002 [0.5 credit]**Law, Regulation and Governance**

Historical and contemporary roles of law and regulation in processes, practices and discourses of governance. Law and state; domestic and global governance; diversity of law-governance relationships; law as a constituent force, enforcement mechanism and a distinctive product of governance.

Also offered as LAWS 5662, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6003 [0.5 credit]**Human Rights, Citizenship and Global Justice**

The implications of law in selected issues involving human rights, citizenship and global justice. Topics may include justification and legitimation of human rights, contemporary citizenship, struggles for global justice, recognition and democracy, and post-nationalism and global economic regulation.

Also offered as LAWS 5663, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6004 [0.5 credit]**Crime, Law, and Security**

Contemporary debates around crime, criminal justice and security as mediated through law. The interrelationship between the politics, process and reform of criminal justice in a socio-legal context.

Also offered as LAWS 5664, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6010 [0.5 credit]**Directed Readings in Legal Studies**

Advanced directed readings in selected areas of legal studies, involving presentation of papers as the basis for discussion with the course instructor.

LAWS 6095 [1.0 credit]**Field Comprehensive**

The field comprehensive examination will focus on the relevant theoretical and/or methodological issues related to the field of study. The examination can take a variety of forms and will be decided by the supervisory committee in consultation with the student.

The form of the exam will be in accordance with departmental policy.

LAWS 6096 [1.0 credit]**Thesis Proposal**

The thesis proposal is written after completion of the other course requirements, and is normally completed by the end of the second year of doctoral study. The proposal is defended at an oral examination conducted by the supervisory committee. Graded Sat/Uns.

LAWS 6909 [0.0 credit]**Ph. D. Thesis**

Includes: Experiential Learning Activity

Cultural Mediations

This section presents the requirements for programs in:

- Ph.D. Cultural Mediations

Program Requirements**Ph.D. Cultural Mediations (5.0 credits)****Requirements:**

1. 1.0 credit in:		1.0
CLMD 6101 [1.0]	Perspectives on Interdisciplinarity in Cultural Theory	
2. 1.5 credits in	approved CLMD courses. Up to 0.5 credit may be taken in a related program, subject to the approval of the Graduate Coordinator.	1.5
3. 0.5 credit in:		0.5
CLMD 6900 [0.5]	Research and Professional Development	
4. 2.0 credits in:		2.0
CLMD 6907 [1.0]	Comprehensive I	
CLMD 6908 [1.0]	Comprehensive II	
5. 0.0 credits in:		0.0
CLMD 6909 [0.0]	Ph.D. Thesis	
Total Credits		5.0

Language Requirements

Upon graduation, each student is expected to be proficient in one language (preferably French) in addition to English. Additionally, students will be expected to deal with all material that is their primary object of research in its original language. The graduate coordinator should be consulted about the fulfillment of language requirements.

Comprehensive Examinations

Students are required to pass two written comprehensive examinations. Each comprehensive has a 1.0 credit value:

- The first comprehensive will be a general examination of the broad range of cultural theory of the twentieth century;
- The second comprehensive will be a discipline-specific examination from one of the following four areas of specialization chosen by the student:
 - Literary Studies
 - Visual Culture
 - Musical Culture
 - Technology and Culture

Thesis

All students are required to complete a thesis in partial fulfillment of the requirements of the degree offered by the program. The thesis must be defended at an oral examination.

All students will be required to prepare, present and defend a thesis proposal before proceeding to the writing of the thesis. The proposal will be discussed and defended before the members of the thesis advisory committee at an oral defense chaired by the graduate supervisor.

The program appoints a doctoral thesis advisory committee, the chair of which shall be the student's thesis supervisor. The committee will consist of at least three members of the university faculty, at least two of whom will be core (or associate) faculty in the program. The advisory committee shall determine when a thesis may go forward for examination.

Regulations

See the General Regulations section of this Calendar.

Doctoral students are required to obtain a grade of B- or better in each course counted toward the fulfillment of the requirements of the degree.

Admission

The normal requirement for admission to the Ph.D. program in either a full-time or part-time capacity is an M.A. (or a recognized equivalent) in a discipline appropriate to the interdisciplinary strengths of the program.

A GPA of 10.0 (A-) or higher is required of course work completed at the master's level.

Appropriate disciplines might include English or French Literature, Art History, Film Studies, Music, Comparative Literature, Anthropology, Canadian Studies, Communication, Geography, History, Philosophy, Sociology, Gender Studies.

Cultural Mediations (CLMD) Courses

CLMD 6101 [1.0 credit]

Perspectives on Interdisciplinarity in Cultural Theory

Theory and practice of interdisciplinary studies of culture. Attention will be paid to those issues in cultural theory of the twentieth century that inform interdisciplinary work today in literature, film, music, art and new media.

CLMD 6102 [0.5 credit]

Issues in Transnationalism

This course will consider cultural production in the context of global exchange, examining the processes of mediation -- conflict, collaboration, transformation and hybridization -- that govern the movement of populations, objects, and ideas as they travel across borders and between societies.

CLMD 6103 [0.5 credit]

Issues of Cultural Mediation and Representation

This course will examine how works from different cultures or works in the same or different media from the same culture pose questions about the nature of representation, interpretation, meaning and affect. Emphasis will be upon the relation between social intelligibility and textual features.

CLMD 6104 [0.5 credit]

Issues in Cultural Politics

The theory of the subject and its relations, with examples from specific cultural practices in literary studies, film, music, art, popular culture and new media.

CLMD 6105 [0.5 credit]

Issues in the Technologies of Culture

The role that technology plays in changing models of literacy, visuality and aurality. The technologies of the cultures of print, vision and sound will be discussed through specific examples of cultural practices in various media.

CLMD 6106 [0.5 credit]

Issues in History and Culture

History as an object of representation and a condition of human experience. Historical approaches to print, visual, and auditory culture in relation to theoretical texts and specific periods and genres. Topics may include history and the novel, visual culture in history, and historiography.

CLMD 6900 [0.5 credit]

Research and Professional Development

Students develop research methods to prepare for their second comprehensive examination and to write and defend the doctoral dissertation successfully. Practices of academic publishing, conference presentations and academic articles; grant writing, ethical conduct in research and private and public sector employment opportunities.

CLMD 6901 [0.5 credit]

Directed Readings in Cultural Mediations

This tutorial is designed to permit students to pursue research on topics chosen in consultation with members of faculty and the graduate supervisor.

CLMD 6902 [0.5 credit]

Special Topic in Cultural Mediations

This in-class course offers selected topics in interdisciplinary studies of culture not available in the regular course offerings.

CLMD 6903 [0.5 credit]

Special Topic in Cultural Mediations

This in-class course offers selected topics in interdisciplinary studies of culture not available in the regular course offerings.

CLMD 6904 [0.5 credit]

Special Topic in Cultural Mediations

This in-class course offers selected topics in interdisciplinary studies of culture not available in the regular course offerings.

CLMD 6907 [1.0 credit]

Comprehensive I

A general examination of the broad range of cultural theory of the twentieth century as it informs interdisciplinary work today and the historical, intellectual and cultural frames of reference that this work invokes.

CLMD 6908 [1.0 credit]

Comprehensive II

A discipline-specific examination in a specialized area of study chosen by the student in consultation with the graduate supervisor. Students will choose from one of the following comprehensive areas: Literary Studies; Visual Culture; Musical Culture; New Technologies.

CLMD 6909 [0.0 credit]

Ph.D. Thesis

Includes: Experiential Learning Activity

Curatorial Studies (Graduate Diplomas)

This section presents the requirements for programs in:

- Graduate Diploma in Curatorial Studies

Program Requirements

The Type 2 and Type 3 master's level graduate diplomas are designed to serve professional development needs. The Type 2 diploma is for graduate students in other Carleton programs who seek to strengthen or broaden their conceptual and technical skills in curatorial studies. The Type 3 diploma is for individuals who are not currently registered in a Carleton graduate program. Both diplomas have the same requirements and are comprised of 3.0 credits, and are designed to be completed in one year (twelve months). Students may take the program on either a part-time or full-time basis.

Cognate Courses: All cognate courses will be determined in collaboration between the student, the Assistant Director of Curatorial Studies, and the Graduate Supervisor of the cognate department. For students with significant disciplinary knowledge, courses from the

School of Business may be more appropriate as cognate courses.

Graduate Diploma in Curatorial Studies (3.0 credits)

Requirements:

1. **0.5 credit in:** 0.5

CURA 5000 [0.5] Curatorial Studies Proseminar

2. **0.5 credit from:** 0.5

CURA 5001 [0.5] Curatorial Studies Pro-seminar: Visual Arts Stream

CURA 5002 [0.5] Curatorial Studies Pro-seminar: Material and Intangible Cultures Stream

3. **1.0 credit from:** 1.0

CURA 5011 [0.5] Curatorial Studies Practicum 1

CURA 5012 [0.5] Curatorial Studies Practicum 2

CURA 5013 [0.5] Directed Exhibition Proposal

4. **1.0 credit in cognate discipline, which may be selected from:** 1.0

ANTH 5706 [0.5] Contemporary Material Cultures

ANTH 5807 [0.5] Special Topics in Symbolism and Culture

ARCC 5001 [0.5] Introduction to Design and Multimedia

ARCC 5003 [0.5] Design and Technology Workshop

ARCC 5401 [0.5] Workshop: Technical Studies in Heritage Conservation

ARCH 5000 [0.5] Directed Studies in History and Theory of Architecture

ARCH 5001 [0.5] Architecture Seminar 1

ARCH 5002 [0.5] Architecture Seminar II

ARCH 5100 [0.5] Directed Studies in Architecture and Society

ARCH 5200 [0.5] Graduate Seminar 1: Introduction to Critical Thought in Architecture

ARTH 5010 [1.0] Art and Its Institutions

ARTH 5112 [0.5] Topics in Historiography, Methodology and Criticism

ARTH 5113 [0.5] Perspectives on Pre-Modernity

ARTH 5114 [0.5] Feminism and Gender

ARTH 5115 [0.5] Topics in Modern and Contemporary Art

ARTH 5117 [0.5] Community/Identity

ARTH 5210 [0.5] Topics in Indigenous Art

ARTH 5218 [0.5] Museum Studies and Curatorial Practice

ARTH 5403 [0.5] Architecture and Its Institutions

ARTH 5500 [0.5] Photography and Its Institutions

ARTH 5788 [0.5] Directed Art Exhibition

CDNS 5002 [0.5] Interdisciplinary Methods

CDNS 5101 [0.5] Indigenous Peoples, Canada and the North

CDNS 5301 [0.5] Canadian Cultural Studies

CDNS 5302 [0.5] Canadian Cultural Policy

CDNS 5401 [0.5] Heritage Conservation I: History, Principles, and Concepts

CDNS 5402 [0.5] Heritage Conservation II: Theory in Practice

CDNS 5501 [0.5] Decolonizing Canada: Cultural Politics and Collective Identities

CDNS 5601 [0.5] Constructing Canada: The Politics of National Identity

CLMD 6102 [0.5] Issues in Transnationalism

CLMD 6103 [0.5] Issues of Cultural Mediation and Representation

CLMD 6105 [0.5] Issues in the Technologies of Culture

CLMD 6106 [0.5] Issues in History and Culture

CURA 5003 [0.5] Special Topics in Curatorial Studies

DIGH 5000 [0.5] Issues in the Digital Humanities

DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities

DIGH 5800 [0.0] Digital Humanities: Professional Development

DIGH 5902 [0.5] Special Topics in Digital Humanities

ERTH 5104 [0.5] Mineralogy

ERTH 5215 [0.5] Natural Hazards in Canada - Risk and Impact

ERTH 5306 [0.5] Paleobiology

ERTH 5903 [0.5] Field Studies

HIST 5701 [0.5] Archival Theory and Practice

HIST 5702 [0.5] Public History Special Topics

HIST 5705 [0.5] Museums, National Identity and Public Memory

MUSI 5007 [0.5] Music and Visual Culture

MUSI 5011 [0.5] Music and Social Institutions

MUSI 5008 [0.5] Technologies of Music

MUSI 5011 [0.5] Music and Social Institutions

MUSI 5015 [0.5] Ethnomusicology of Canadian Traditions

MUSI 5016 [0.5] First Peoples Music in Canada

MUSI 5300 [0.5] Practicum in Music

SOCI 5306 [0.5] Cultural Studies

SOCI 5406 [0.5] Citizenship and Globalization

WGST 5001 [0.5] Research Seminar in Women's and Gender Studies

WGST 5901 [0.5] Advanced Topics in Women's and Gender Studies I

WGST 5906 [0.5] Feminist Theory

Note: additional cognate courses will be considered with the permission of the Director.

Total Credits 3.0

Regulations

See the General Regulations section of this Calendar.

All candidates are required to obtain a grade of B- or higher in each course in the program.

Admission

The minimum requirement for admission to the Diploma in Curatorial Studies is an honours bachelor's degree (or equivalent) in a related discipline, with an average of B+ or higher. Students pursuing a Type 2 diploma must also fulfil the admission requirements of their home departments.

Students wishing to obtain admission will be required to submit an application along with a statement of intent,

reference letters, and a writing sample or curatorial portfolio.

Curatorial Studies (CURA) Courses

CURA 5000 [0.5 credit]

Curatorial Studies Proseminar

This proseminar explores a range of historical, social, economic, educational, ethical, legal, technological and administrative issues concerning the world of museums and related institutions.

CURA 5001 [0.5 credit]

Curatorial Studies Pro-seminar: Visual Arts Stream

Practical examination of art exhibition practices; site visits and workshops designed to help students develop curatorial skills and navigate the museum world. This course trains students in the core competencies of curatorial practice.

Includes: Experiential Learning Activity

CURA 5002 [0.5 credit]

Curatorial Studies Pro-seminar: Material and Intangible Cultures Stream

Taught in collaboration with an institution in the National Capital Region. Development of practical and professional competencies with focus on issues specific to curatorial practice in natural and cultural history museums, interpretation/discovery centres, and science centres.

CURA 5003 [0.5 credit]

Special Topics in Curatorial Studies

Analysis of selected topics relevant to theory, research, and practice in Curatorial Studies. The choice of topics will vary and will be announced in advance of the registration period.

CURA 5011 [0.5 credit]

Curatorial Studies Practicum 1

Practical on-site work in the collecting and programming institutions of the National Capital Region (as available), including a written assignment.

Includes: Experiential Learning Activity

CURA 5012 [0.5 credit]

Curatorial Studies Practicum 2

Practical on-site work in the collecting and programming institutions of the National Capital Region (as available), including a written assignment.

Includes: Experiential Learning Activity

CURA 5013 [0.5 credit]

Directed Exhibition Proposal

Project-oriented course focused on an immersive engagement with institutional curatorial practices. Completion and presentation of an individual exhibition proposal for submission to a professional institution. Stage-by-stage approach covering all required aspects of proposal development. Seminar format with thematic workshops, guest interventions, group discussions, progress reports.

Includes: Experiential Learning Activity

Data Science (Collaborative Program)

This section presents the requirements for programs in:

- M.Sc. Biology with Specialization in Data Science
- M.A.Sc. Biomedical Engineering with Specialization in Data Science
- M.Eng. Biomedical Engineering with Specialization in Data Science
- Master of Cognitive Science with Specialization in Data Science
- M.A. Communication with Specialization in Data Science
- M.C.S. Computer Science with Specialization in Data Science
- M.A. Economics with Specialization in Data Science
- M.A.Sc. Electrical and Computer Engineering with Specialization in Data Science
- M.Eng. Electrical and Computer Engineering with Specialization in Data Science
- M.A. Geography with Specialization in Data Science
- M.Sc. Geography with Specialization in Data Science
- M.Sc. Health Sciences with Specialization in Data Science
- M.A. History with Specialization in Data Science
- M.A. International Affairs with Specialization in Data Science
- Master of Information Technology: Digital Media with Specialization in Data Science
- M.Sc. Physics Medical Physics Stream with Specialization in Data Science
- M.Sc. Physics Particle Physics Stream with Specialization in Data Science
- M.A. Psychology with Specialization in Data Science
- Master of Public Policy and Administration with Specialization in Data Science

Program Requirements

Students enrolled in the Collaborative Program in Data Science must meet the requirements of their respective home units as well as those of the Collaborative Program. The requirements of the Collaborative Program do not, however, add to the number of credits students are required to accumulate by their home unit and the credit value of the degree remains the same. Consult the individual programs for detailed program requirements.

M.Sc. Biology with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in approved coursework	0.5
2. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
3. 4.0 credits in:	4.0
BIOL 5909 [4.0] M.Sc. Thesis	

Total Credits 5.0

M.A.Sc. Biomedical Engineering with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
BIOM 5010 [0.5]	Introduction to Biomedical Engineering
2. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
3. 1.0 credit in BIOM (BMG) courses	1.0
4. 0.5 credit in elective courses taken either at Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director	0.5
5. 2.5 credits in:	2.5
BIOM 5909 [2.5]	M.A.Sc. Thesis
6. 0.0 credit in:	0.0
BIOM 5800 [0.0]	Biomedical Engineering Seminar
Total Credits	5.0

Note: for the course work **Item 3** and **Item 4** above, one 0.5 credit data science elective course must be taken (one of BIOM 5202, BIOM 5400, BIOM 5405, COMP 5100, COMP 5101, COMP 5107, COMP 5108, COMP 5111, COMP 5112, COMP 5204, COMP 5209, COMP 5305, COMP 5306, COMP 5307, COMP 5308, COMP 5401, COMP 5703, COMP 5704, PHYS 5002, SYSC 5001, SYSC 5003, SYSC 5004, SYSC 5007, SYSC 5101, SYSC 5102, SYSC 5103, SYSC 5108, SYSC 5201, SYSC 5207, SYSC 5300, SYSC 5303, SYSC 5306, SYSC 5401, SYSC 5404, SYSC 5405, SYSC 5407, SYSC 5500, SYSC 5703, SYSC 5706).

M.Eng. Biomedical Engineering with Specialization in Data Science (5.0 credits)

Requirements - by coursework:

1. 0.5 credit in:	0.5
BIOM 5010 [0.5]	Introduction to Biomedical Engineering
2. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
3. 2.0 credits in BIOM (BMG) courses	2.0
4. 2.0 credits in elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director	2.0
5. 0.0 credit in:	
BIOM 5800 [0.0]	Biomedical Engineering Seminar
Total Credits	5.0

Note: for the course work **Item 3** and **Item 4** above, three 0.5-credit data science elective courses must be taken (three of BIOM 5400, BIOM 5405, COMP 5100, COMP 5101, COMP 5107, COMP 5108, COMP 5111, COMP 5112, COMP 5204, COMP 5209, COMP 5305, COMP 5306, COMP 5307, COMP 5308, COMP 5401, COMP 5703, COMP 5704, PHYS 5002, SYSC 5001, SYSC 5003, SYSC 5004, SYSC 5007, SYSC 5101, SYSC 5102, SYSC 5103, SYSC 5108, SYSC 5201, SYSC 5207, SYSC 5300, SYSC 5303, SYSC 5306, SYSC 5401, SYSC 5404, SYSC 5405, SYSC 5407, SYSC 5500, SYSC 5703, SYSC 5706)

Requirements - by project:

1. 0.5 credit in:	0.5
BIOM 5010 [0.5]	Introduction to Biomedical Engineering
2. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
3. 1.5 credits in BIOM (BMG) courses	1.5
4. 1.0 credit in elective courses at either Carleton University or University of Ottawa with the approval of the OCIBME Director or Associate Director	1.0
5. 0.0 credit in:	
BIOM 5800 [0.0]	Biomedical Engineering Seminar
6. 1.5 credit in:	1.5
BIOM 5900 [1.5]	Biomedical Engineering Project
Total Credits	5.0

Note: for the course work **Item 3** and **Item 4** above, three 0.5-credit data science elective courses must be taken (three of BIOM 5400, BIOM 5405, COMP 5100, COMP 5101, COMP 5107, COMP 5108, COMP 5111, COMP 5112, COMP 5204, COMP 5209, COMP 5305, COMP 5306, COMP 5307, COMP 5308, COMP 5401, COMP 5703, COMP 5704, PHYS 5002, SYSC 5001, SYSC 5003, SYSC 5004, SYSC 5007, SYSC 5101, SYSC 5102, SYSC 5103, SYSC 5108, SYSC 5201, SYSC 5207, SYSC 5300, SYSC 5303, SYSC 5306, SYSC 5401, SYSC 5404, SYSC 5405, SYSC 5407, SYSC 5500, SYSC 5703, SYSC 5706)

Master of Cognitive Science with Specialization in Data Science (5.0 credits)

Requirements - Thesis Option (5.0 credits)

1. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
2. 0.5 credit in:	0.5
CGSC 5100 [0.5]	Issues in Cognitive Science
3. 0.5 credit in:	0.5
CGSC 5101 [0.5]	Experimental Methods and Statistics
4. 1.0 credit in CGSC or other approved courses, from two different cognitive disciplines, selected in consultation with the graduate supervisor.	1.0
5. 2.5 credits in:	2.5
CGSC 5909 [2.5]	M. Cog. Thesis (The thesis must be approved as fulfilling the data science requirement and be supervised by a faculty member working in a data science related field.)
6. Preparation of research for presentation at the Carleton Cognitive Science Spring Conference.	
Total Credits	5.0

Requirements - Research Project Option (5.0 credits)

1. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
2. 0.5 credit in:	0.5
CGSC 5100 [0.5]	Issues in Cognitive Science
3. 0.5 credit in:	0.5
CGSC 5101 [0.5]	Experimental Methods and Statistics

4. 1.5 credits from:	1.5
CGSC 5001 [0.5] Cognition and Artificial Cognitive Systems	
CGSC 5002 [0.5] Experimental Research in Cognition	
CGSC 5003 [0.5] Language and Cognition	
CGSC 5004 [0.5] Cognition and Conceptual Issues	
CGSC 5005 [0.5] Cognition and Neuroscience	
5. 1.0 credit in CGSC or other approved courses selected in consultation with the graduate supervisor.	1.0
6. 1.0 credit in:	1.0
CGSC 5908 [1.0] Research Project (Project must be approved as fulfilling the data science requirement and be supervised by a faculty member working in a data science related field.)	
7. Preparation of research for presentation at the Cognitive Science Spring Conference.	
Total Credits	5.0

M.A. Communication with Specialization in Data Science (5.0 credits)

Requirements - Coursework Option (5.0 credits)	
1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 1.0 credit in:	1.0
COMS 5101 [1.0] Foundations of Communication Studies	
3. 0.5 credit in:	0.5
COMS 5605 [0.5] Approaches to Communication Research	
4. 0.5 credit in:	0.5
COMS 5225 [0.5] Critical Data Studies	
5. 0.5 credit from:	0.5
COMS 5203 [0.5] Communication, Technology, Society	
COMS 5221 [0.5] Science and the Making of Knowledge	
COMS 5224 [0.5] Internet, Infrastructure, Materialities	
6. 2.0 credits in electives	2.0
Total Credits	5.0

Requirements - Research Essay Option (5.0 credits)	
1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 1.0 credit in:	1.0
COMS 5101 [1.0] Foundations of Communication Studies	
3. 0.5 credit in:	0.5
COMS 5605 [0.5] Approaches to Communication Research	
4. 0.5 credit in:	0.5
COMS 5225 [0.5] Critical Data Studies	
5. 1.0 credit in:	1.0
COMS 5908 [1.0] Research Essay	
Research Essay on a Data Science topic approved by the Advisory Board representative from Communication in consultation with the graduate Committee of the Institute of Data Science.	

6. 1.5 credits in electives.	1.5
Total Credits	5.0
Requirements - Thesis Option (5.0 credits)	
1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 1.0 credit in:	1.0
COMS 5101 [1.0] Foundations of Communication Studies	
3. 0.5 credit in:	0.5
COMS 5605 [0.5] Approaches to Communication Research	
4. 0.5 credit in:	0.5
COMS 5225 [0.5] Critical Data Studies	
5. 2.0 credits in:	2.0
COMS 5909 [2.0] M.A. Thesis	
M.A. Thesis on a Data Science topic approved by the Advisory Board representative from Communication in consultation with the Graduate Committee of the Institute of Data Science.	
6. 0.5 credit in electives	0.5
Total Credits	5.0

M.C.S. Computer Science with Specialization in Data Science (5.0 credits)

Requirements - Thesis Option (5.0 credits)	
1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 2.0 credits in course work. Course work must include a minimum of 1.5 credits of OCICS courses in at least three different research areas. See OCICS course listing by research areas.	2.0
3. 2.5 credits in:	2.5
COMP 5905 [2.5] M.C.S. Thesis (M.C.S. Thesis must be in an area of Data Science and requires approval from the Institute of Data Science. Each candidate submitting a thesis will be required to undertake an oral defence of the thesis.)	
Total Credits	5.0

M.A. Economics with Specialization in Data Science (4.0 credits)

Requirements - Coursework option (4.0 credits)	
1. 1.5 credits in:	1.5
ECON 5020 [0.5] Microeconomic Theory	
ECON 5021 [0.5] Macroeconomic Theory	
ECON 5027 [0.5] Econometrics I	
2. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
3. 0.5 credit in:	0.5
ECON 5029 [0.5] Methods of Economic Research including a research paper on a data science related topic	
4. 0.5 credit from:	0.5
ECON 5055 [0.5] Financial Econometrics	
ECON 5361 [0.5] Labour Economics I	
ECON 5362 [0.5] Labour Economics II	
ECON 5700 [0.5] Social and Economic Measurement	

ECON 5712 [0.5]	Micro-Econometrics	
ECON 5713 [0.5]	Time-Series Econometrics	
5. 0.5 credit in	ECON approved by the M.A. Supervisor of the Department of Economics	0.5

6. 0.5 credit in Data Science elective (which may be an additional course from the preceding list) approved by the M.A. Supervisor of the Department of Economics 0.5

Total Credits 4.0

Requirements - Thesis option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5]	Microeconomic Theory
ECON 5021 [0.5]	Macroeconomic Theory
ECON 5027 [0.5]	Econometrics I

2. 0.5 credit in: 0.5

DATA 5000 [0.5]	Data Science Seminar
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3. 1.5 credit in: 1.5

ECON 5909 [1.5]	M.A. Thesis on a data science topic approved by the Data Science governance committee
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4. 0.5 credit from: 0.5

ECON 5055 [0.5]	Financial Econometrics
ECON 5361 [0.5]	Labour Economics I
ECON 5362 [0.5]	Labour Economics II
ECON 5700 [0.5]	Social and Economic Measurement
ECON 5712 [0.5]	Micro-Econometrics
ECON 5713 [0.5]	Time-Series Econometrics

Total Credits 4.0

M.A.Sc. Electrical and Computer Engineering with Specialization in Data Science (5.0 credits)

Requirements - by Thesis (5.0 credits)

1. 0.5 credit in: 0.5

DATA 5000 [0.5]	Data Science Seminar
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2. 0.5 credit from data science elective courses: 0.5

SYSC 5001 [0.5]	Simulation and Modeling
SYSC 5003 [0.5]	Discrete Stochastic Models
SYSC 5004 [0.5]	Optimization for Engineering Applications
SYSC 5101 [0.5]	Design of High Performance Software
SYSC 5103 [0.5]	Software Agents
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation
SYSC 5201 [0.5]	Computer Communication
SYSC 5207 [0.5]	Distributed Systems Engineering
SYSC 5300 [0.5]	Advanced Health Care Engineering
SYSC 5303 [0.5]	Interactive Networked Systems and Telemedicine
SYSC 5306 [0.5]	Mobile Computing Systems
SYSC 5401 [0.5]	Adaptive and Learning Systems
SYSC 5404 [0.5]	Multimedia Compression, Scalability, and Adaptation
SYSC 5405 [0.5]	Pattern Classification and Experiment Design
SYSC 5407 [0.5]	Planning and Design of Computer Networks
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems

SYSC 5703 [0.5]	Integrated Database and Cloud Systems
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SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems
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3. 1.5 credits in courses 1.5

4. 2.5 credits in: 2.5

SYSC 5909 [2.5]	M.A.Sc. Thesis
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in the area of data science (each candidate submitting a thesis will be required to undertake an oral defence of the thesis)

Total Credits 5.0

M.Eng. Electrical and Computer Engineering with Specialization in Data Science (4.5 credits)

Requirements - by Project (4.5 credits)

1. 0.5 credit in: 0.5

DATA 5000 [0.5]	Data Science Seminar
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2. 1.0 credit from data science elective courses: 1.0

SYSC 5001 [0.5]	Simulation and Modeling
SYSC 5003 [0.5]	Discrete Stochastic Models
SYSC 5004 [0.5]	Optimization for Engineering Applications

SYSC 5101 [0.5]	Design of High Performance Software
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SYSC 5103 [0.5]	Software Agents
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SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation
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SYSC 5201 [0.5]	Computer Communication
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SYSC 5207 [0.5]	Distributed Systems Engineering
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SYSC 5300 [0.5]	Advanced Health Care Engineering
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SYSC 5303 [0.5]	Interactive Networked Systems and Telemedicine
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SYSC 5306 [0.5]	Mobile Computing Systems
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SYSC 5401 [0.5]	Adaptive and Learning Systems
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SYSC 5404 [0.5]	Multimedia Compression, Scalability, and Adaptation
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SYSC 5405 [0.5]	Pattern Classification and Experiment Design
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SYSC 5407 [0.5]	Planning and Design of Computer Networks
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SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems
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SYSC 5703 [0.5]	Integrated Database and Cloud Systems
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SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems
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3. 2.5 credits in courses 2.5

4. 0.5 credit in: 0.5

SYSC 5900 [0.5]	Systems Engineering Project in the area of data science
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Total Credits 4.5

Requirements - by Coursework (4.5 credits)

1. 0.5 credit in: 0.5

DATA 5000 [0.5]	Data Science Seminar
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2. 1.5 credits from data science elective courses: 1.5

SYSC 5001 [0.5]	Simulation and Modeling
SYSC 5003 [0.5]	Discrete Stochastic Models
SYSC 5004 [0.5]	Optimization for Engineering Applications

SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5201 [0.5]	Computer Communication	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5300 [0.5]	Advanced Health Care Engineering	
SYSC 5303 [0.5]	Interactive Networked Systems and Telemedicine	
SYSC 5306 [0.5]	Mobile Computing Systems	
SYSC 5401 [0.5]	Adaptive and Learning Systems	
SYSC 5404 [0.5]	Multimedia Compression, Scalability, and Adaptation	
SYSC 5405 [0.5]	Pattern Classification and Experiment Design	
SYSC 5407 [0.5]	Planning and Design of Computer Networks	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems	
3. 2.5 credits in courses		2.5
Total Credits		4.5

M.A. Geography with Specialization in Data Science (5.0 credits)

Requirements:		
1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
3. 2.5 credits in:		2.5
GEOG 5909 [2.5]	M.A. Thesis (in the specialization and including oral examination of the thesis)	
4. 0.5 credit in:		0.5
GEOG 5905 [0.5]	Masters Research Workshop	
5. 1.0 credit in approved graduate-level electives		1.0
6. In addition to the formal requirements, M.A. students are required to attend the Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

M.Sc. Geography with Specialization in Data Science (5.0 credits)

Requirements		
1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
GEOG 5001 [0.5]	Modeling Environmental Systems	
3. 0.5 credit in:		0.5
GEOG 5905 [0.5]	Masters Research Workshop	
4. 0.5 credit in Physical Geography selected from:		0.5
GEOG 5002 [0.5]	Quantitative Analysis for Geographical Research	

GEOG 5103 [0.5]	Hydrologic Principles and Methods	
GEOG 5104 [0.5]	Advanced Biogeography	
GEOG 5107 [0.5]	Field Study and Methodological Research	
GEOG 5303 [0.5]	Geocryology	
GEOG 5307 [0.5]	Soil Resources	
GEOG 5803 [0.5]	Seminar in Geomatics	
GEOG 5804 [0.5]	Geographic Information Systems	
GEOG 5900 [0.5]	Graduate Tutorial	
up to 0.5 credit in GEOG or GEOM at the 4000 level, with departmental approval		
5. 3.0 credits in:		3.0
GEOG 5906 [3.0]	M.Sc. Thesis (in the specialization and including oral examination of the thesis)	
6. In addition to the formal requirements, M.Sc. students are required to attend the DGES Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

M.Sc. Health Sciences with Specialization in Data Science (5.5 credits)

Requirements (5.5 credits)		
1. 1.0 credits in:		1.0
HLTH 5901 [0.5]	Advanced Topics in Interdisciplinary Health Sciences	
HLTH 5902 [0.5]	Seminars in Interdisciplinary Health Sciences for MSc	
2. 0.5 credits in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
3. Completion of:		
HLTH 5905 [0.0]	Final Research Seminar Presentation for MSc	
4. 4.0 credits in:		4.0
HLTH 5909 [4.0]	MSc Thesis	
5. Twice-yearly meetings with the thesis Graduate Advisory Committee, with students meeting a level of progress as determined by the Committee.		
Total Credits		5.5

Note: The final research seminar presentation must be completed within one month of the thesis defence.

M.A. History with Specialization in Data Science (4.5 credits)

Requirements:		
1. 0.5 credit in:		0.5
HIST 5003 [0.5]	Historical Theory and Method	
2. 1.5 credits in HIST at the graduate level of which only 0.5 credit may be taken in a designated public history course; with departmental permission, up to 0.5 credit of courses with historical content may be taken from another unit at Carleton University, at the University of Ottawa, or at another accredited institution.		1.5
3. 0.5 credit in:		0.5
HIST 5706 [0.5]	Digital History	
4. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
5. 0.5 credit in:		0.5
HIST 5900 [0.5]	Directed Research	

6. 1.0 credit in:	1.0
HIST 5908 [1.0] M.A. Research Essay (in the specialization)	
Total Credits	4.5

M.A. International Affairs with Specialization in Data Science (5.0 credits)

Requirements - Thesis pathway:

1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 1.0 credit in:	1.0
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in Economics, successfully completed by the end of the second term from: (see Note 1, below)	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
4. 2.0 credits in:	2.0
INAF 5909 [2.0] M.A. Thesis (in the specialization)	
5. 1.0 credit in Field or Elective courses	1.0
6. Successful completion of second language proficiency examination (See Note 4, below)	
Total Credits	5.0

Requirements - Research essay pathway:

1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 1.0 credit in:	1.0
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in Economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	

4. 1.0 credit in:	1.0
INAF 5908 [1.0] Research Essay (in the specialization)	
5. 2.0 credits in Field or Elective Courses (See Note 3, below)	2.0

6. Successful completion of second language proficiency examination (See Note 4, below)

Total Credits	5.0
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Requirements - Coursework pathway:

1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 1.0 credit in:	1.0
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in specialization: (see Note 1, below)	0.5
INAF 5904 [0.5] Quantitative Research Methods	
INAF 6002 [0.5] Quantitative Research Methods	
4. 0.5 credit in Economics, successfully completed by the end of the second term, from: (see Note 2, below)	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
5. 2.5 credits in Field or Elective courses (See Note 3, below)	2.5
6. Successful completion of second language proficiency examination (see Note 4, below)	
Total Credits	5.0

Notes:

- The course must include at least one major assignment with a significant data science component. The selected course must be approved by the School and Institute for Data Science. An accepted data science specialization course from outside the School can be used for this requirement with approval.
- All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed.
- For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.

4. Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. Details of the language requirement are provided on the School website.

Master of Information Technology: Digital Media with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
ITEC 5002 [0.5]	Fundamentals of Information Technology Research	
3. 1.0 credit from core courses:		1.0
ITEC 5200 [0.5]	Entertainment Technologies	
ITEC 5201 [0.5]	Computer Animation Technologies	
ITEC 5202 [0.5]	Visual Effects Technologies	
ITEC 5203 [0.5]	Game Design and Development Technologies	
ITEC 5204 [0.5]	Emerging Interaction Techniques	
ITEC 5920 [0.5]	Selected Topics in Digital Media	
4. 0.5 credit in electives, which may include ITEC courses or any other 5000- or 4000-level courses from other departments or programs selected in consultation with the supervisor.		0.5
5. 2.5 credits in:		2.5
ITEC 5909 [2.5]	Master's Thesis (in the specialization)	
Total Credits		5.0

Note: No additional IT seminar requirements for this stream.

M.Sc. Physics Medical Physics Stream with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
PHYS 5002 [0.5]	Statistical Data Analysis Techniques for Physics (or equivalent course in computing physics)	
3. 0.5 credit in:		0.5
PHYS 5203 [0.5]	Medical Radiation Physics	
4. 0.5 credits from:		0.5
PHYS 5204 [0.5]	Physics of Medical Imaging (for imaging)	
PHYS 5206 [0.5]	Medical Radiotherapy Physics (for therapy)	
PHYS 5207 [0.5]	Radiobiology (for biophysics)	
5. 0.5 additional credit in PHYS or PHYJ. With approval, an appropriate graduate-level course in engineering, computer science, business or law can be used.		0.5
6. 2.5 credits in		2.5

PHYS 5909 [2.5]	M.Sc. Thesis (on a data science topic approved by the Data Science governance committee and defended at an oral examination)
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7. Participation in the seminar series of the Ottawa-Carleton Institute for Physics

Total Credits **5.0**

M.Sc. Physics Particle Physics Stream with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
PHYS 5002 [0.5]	Statistical Data Analysis Techniques for Physics (or equivalent course in computing physics)	
3. 1.5 credit in:		1.5
PHYS 5602 [0.5]	Physics of Elementary Particles	
PHYS 5701 [0.5]	Intermediate Quantum Mechanics with Applications	
PHYS 5702 [0.5]	Relativistic Quantum Mechanics	
4. 2.5 credits in:		2.5
PHYS 5909 [2.5]	M.Sc. Thesis (on a data science topic approved by the Data Science governance committee and defended at an oral examination)	
5. Participation in the seminar series of the Ottawa-Carleton Institute of Physics		

Total Credits **5.0**

M.A. Psychology with Specialization in Data Science (5.0 credits)

Requirements:

1. 1.0 credit in:		1.0
PSYC 5410 [0.5]	Advanced Analysis of Variance	
PSYC 5411 [0.5]	Advanced Regression	
2. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
3. 0.5 credit in PSYC at the 5000 level, excluding the professional development courses listed in Item 4 and excluding the elective statistics courses listed below.		0.5
4. 0.5 credit from the following professional development courses:		0.5
PSYC 5002 [0.5]	Ethics in Psychology	
PSYC 5003 [0.5]	Open Science and Methodological Improvements	
PSYC 5004 [0.5]	Knowledge Translation	
PSYC 5802 [0.5]	Special Topics: Professional Development	
PSYC 5903 [0.5]	Practicum in Psychology	
5. Completion of:		0.0
PSYC 5906 [0.0]	Pro-Seminar in Psychology	
6. 2.5 credits in:		2.5
PSYC 5909 [2.5]	M.A. Thesis (in the area of Data Science, which must be defended at an oral examination)	

Total Credits **5.0**

Notes:

1. Students must receive a minimum grade of A in each of the courses included in the Specialization.
2. Courses for each research area are listed on the departmental website: carleton.ca/psychology.

Master of Public Policy and Administration with Specialization in Data Science (7.0 credits)

Requirements - Course work pathway:

1. 4.5 credits in core courses: 4.5

PADM 5120 [0.5] Modern Challenges to Governance

PADM 5121 [0.5] Policy Analysis: The Practical Art of Change

PADM 5122 [0.5] Public Management: Principles and Approaches

PADM 5123 [0.5] Public Management in Practice

PADM 5124 [0.5] Law and Ethics

PADM 5125 [0.5] Qualitative Methods for Public Policy

PADM 5127 [0.5] Microeconomics for Policy Analysis

PADM 5128 [0.5] Macroeconomics for Policy Analysis

PADM 5129 [0.5] Capstone Course

2. 1.5 credits in data science core courses: 1.5

DATA 5000 [0.5] Data Science Seminar

PADM 5126 [0.5] Quantitative Methods for Public Policy

PADM 5218 [0.5] Analysis of Socio-economic Data

3. 0.5 credit from data science electives: 0.5

COMP 5111 [0.5] Data Management for Business Intelligence

COMP 5209 [0.5] Visual Analytics

COMP 5305 [0.5] Advanced Database Systems

COMP 5306 [0.5] Data Integration

PADM 5219 [0.5] Advanced Statistical Policy Analysis

PADM 5372 [0.5] Policy Seminar (Data Science Specialization)

PADM 5391 [0.5] Directed Studies (Data Science Specialization)

4. 0.5 credit in approved elective 0.5

Total Credits 7.0

Requirements - Research essay pathway:

1. 4.5 credits in core courses: 4.5

PADM 5120 [0.5] Modern Challenges to Governance

PADM 5121 [0.5] Policy Analysis: The Practical Art of Change

PADM 5122 [0.5] Public Management: Principles and Approaches

PADM 5123 [0.5] Public Management in Practice

PADM 5124 [0.5] Law and Ethics

PADM 5125 [0.5] Qualitative Methods for Public Policy

PADM 5127 [0.5] Microeconomics for Policy Analysis

PADM 5128 [0.5] Macroeconomics for Policy Analysis

PADM 5129 [0.5] Capstone Course

2. 1.5 credits in data science core courses: 1.5

DATA 5000 [0.5] Data Science Seminar

PADM 5126 [0.5] Quantitative Methods for Public Policy

PADM 5218 [0.5] Analysis of Socio-economic Data

3. 1.0 credit in: 1.0

PADM 5908 [1.0] Research Essay (on a Data Science topic approved by the MPPA Graduate Supervisor and the Data Science governance committee)

Total Credits 7.0

Master of Public Policy and Administration with Specialization in Data Science (Advanced completion, 5.0 credits)

Requirements - Course work pathway (Advanced completion, 5.0 credits - see Note, below):

1. 3.0 credits from core courses: 3.0

PADM 5120 [0.5] Modern Challenges to Governance

PADM 5121 [0.5] Policy Analysis: The Practical Art of Change

PADM 5122 [0.5] Public Management: Principles and Approaches

PADM 5123 [0.5] Public Management in Practice

PADM 5124 [0.5] Law and Ethics

PADM 5125 [0.5] Qualitative Methods for Public Policy

PADM 5127 [0.5] Microeconomics for Policy Analysis

PADM 5128 [0.5] Macroeconomics for Policy Analysis

PADM 5129 [0.5] Capstone Course

2. 1.0 credit from data science core courses: 1.0

DATA 5000 [0.5] Data Science Seminar

PADM 5126 [0.5] Quantitative Methods for Public Policy

PADM 5218 [0.5] Analysis of Socio-economic Data

3. 0.5 credit from data science electives: 0.5

COMP 5111 [0.5] Data Management for Business Intelligence

COMP 5209 [0.5] Visual Analytics

COMP 5305 [0.5] Advanced Database Systems

COMP 5306 [0.5] Data Integration

PADM 5219 [0.5] Advanced Statistical Policy Analysis

PADM 5372 [0.5] Policy Seminar (Data Science Specialization)

PADM 5391 [0.5] Directed Studies (Data Science Specialization)

4. 0.5 credit in approved elective 0.5

Note: additional credits may be required, as specified on offer of admission.

Total Credits 5.0

Requirements - Research essay pathway (Advanced completion, 5.0 credits - See Note, below):

1. 3.0 credits from core courses: 3.0

PADM 5120 [0.5] Modern Challenges to Governance

PADM 5121 [0.5] Policy Analysis: The Practical Art of Change

PADM 5122 [0.5]	Public Management: Principles and Approaches	
PADM 5123 [0.5]	Public Management in Practice	
PADM 5124 [0.5]	Law and Ethics	
PADM 5125 [0.5]	Qualitative Methods for Public Policy	
PADM 5127 [0.5]	Microeconomics for Policy Analysis	
PADM 5128 [0.5]	Macroeconomics for Policy Analysis	
PADM 5129 [0.5]	Capstone Course	
2. 1.0 credit from	data science core courses:	1.0
DATA 5000 [0.5]	Data Science Seminar	
PADM 5126 [0.5]	Quantitative Methods for Public Policy	
PADM 5218 [0.5]	Analysis of Socio-economic Data	
3. 1.0 credit in:		1.0
PADM 5908 [1.0]	Research Essay (on a Data Science topic approved by the MPPA Graduate Supervisor and the Data Science governance committee)	
Note: additional credits may be required, as specified on offer of admission		
Total Credits		5.0

Regulations

See the General Regulations section of this Calendar, as well as regulations pertaining to the specific collaborative programs offering the data science specialization.

Admission

Students who are enrolled in a master's program in one of the participating units may apply to the Data Science governance committee for admission to the Collaborative Program. Admission to the program is determined by the governance committee and will normally take place before the end of October the year of admittance in one of the participating master's programs.

Admission requirements to the Collaborative Master's with Specialization in Data Science are:

- Registration in the master's program of one of the participating units
- Approval of a student's program of study by the Data Science governance committee and the student's home department. Students in a thesis program will be expected to choose a thesis topic that is directly related to Data Science. Students in an approved course work program will be required to take some elective courses in designated or approved courses with significant Data Science content.

Design

This section presents the requirements for programs in:

- Master of Design

Program Requirements

Master of Design (5.0 credits)

The Master of Design program requires the successful completion of 5.0 credits with at least 4.5 credits taken at

the 5000 level or higher. A minimum of 1.0 of the required 1.5 elective credits should be selected from outside the M.Des. program and 0.5 elective credits may be taken as a Directed Study. All electives should be chosen in consultation with the Graduate Program Coordinator and exceptions can be made only subject to approval. The program may be completed over two years.

Requirements:

Year 1		2.5
Fall Term		
IDES 5101 [0.5]	Interdisciplinary Design Development Seminar	
IDES 5102 [0.5]	Design Research Methods	
Winter Term		
IDES 5103 [0.5]	Interdisciplinary Design Development Studio	
	1.0 credits in elective courses	
Year 2		2.5
Fall Term		
	0.5 credit in elective course	
Winter Term		
IDES 5909 [2.0]	Thesis	
Total Credits		5.0

Regulations

See the General Regulations section of this Calendar.

Industrial Design does not permit the C+ option as stipulated in Section 11.2 of the General Regulations.

Admission

The University's general requirements for admission are outlined in Section 2.1 of the General Regulations in the Graduate Calendar.

Applicants must have successfully completed a bachelor's degree in a design discipline, or the equivalent, with B- or higher overall.

Applicants with a design-related background, but not a degree in design, will be required to demonstrate significant links between their academic background and professional experience in the design development process.

In addition to these academic credentials, applicants must submit the following materials to the School of Industrial Design:

- Application Form
- Statement of Intent (One page)

The quality of the statement of intent is critical to the likelihood of an applicant's admission. The writing should be succinct and as carefully considered as the content of the statement, which should address at least the four following areas:

- What is the area of intended research with specific reference to the program courses and the expertise of the faculty members
- How the applicant's academic background and professional experience relates to the program with reference to any previous research, scholarship, or

project experience with interdisciplinary or collaborative teams

- How the intended research program will align with the objectives of the program relating to: design research, interdisciplinary design development, strategic design planning, knowledge creation and dissemination
- An explanation of the specific reasons for choosing the School of Industrial Design at Carleton University

Portfolio

The portfolio should provide the best examples of creative intellectual activity and recent professional work that indicates the applicant is sufficiently prepared to pursue studies in the program. These activities may be represented by proposals, reports, and/or analysis documents. Emphasis should be placed on evidence of understanding the communication of design ideas in visual form.

The presentation of the portfolio should be professional and facilitate the review process of the content, and should be submitted in prescribed format.

Two Letters of Recommendation

Applicants must provide two (2) confidential letters of reference appended to prescribed recommendation forms.

Language Proficiency

Proficiency in English is necessary to pursue graduate studies at Carleton University. All applicants are required to meet the requirements set out in Section 3.6 of the General Regulations of this Calendar.

Qualifying Year Program

Candidates with admission deficiencies would be required to successfully complete additional prescribed courses to qualify for admission. Applicants without a degree in design may be required to register for up to 2.0 credits of courses selected from the undergraduate Bachelor of Industrial Design program, in consultation with the Graduate Program Coordinator.

All courses must be approved by the Graduate Program Coordinator of the School in consultation with the Faculty of Graduate Studies and Research. (See General Regulations Section 2.3, "Completion of the Qualifying Year", for more details.) Completion of the Qualifying Year is not a guarantee of admission to the Master of Design. Re-application to the M.Des. program is required.

Accelerated Pathway

The accelerated pathway in Industrial Design is a flexible and individualized plan of graduate study for students in the final year of the Bachelor of Industrial Design.

Students in their third-year of study in the Bachelor of Industrial Design should consult with both the Director and the Graduate Program Coordinator to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses.

Accelerated Pathway Requirements

1. A maximum of 1.0 credits with 5000-level courses.
2. Minimal overall CGPA of B+

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Industrial Design (IDES) Courses

IDES 5000 [0.5 credit]

Directed Studies in Industrial Design

Reading and research tutorials.

Includes: Experiential Learning Activity

IDES 5101 [0.5 credit]

Interdisciplinary Design Development Seminar

Investigation of interdisciplinary design discourse about disciplines, themes, and concepts involved in design development. Examines a range of different professional perspectives and methods for integrating collaborative practices affected by leadership, negotiation, conflict management, and team building. Introduction to graduate academic writing.

Includes: Experiential Learning Activity

IDES 5102 [0.5 credit]

Design Research Methods

Critical review of qualitative and quantitative research methods to support interdisciplinary design. Methods used by collaborators from the sciences and humanities as well as methods designers bring to interdisciplinary collaborations are introduced. Research for design, research through design and theoretical frameworks are discussed.

Includes: Experiential Learning Activity

Also listed as HCIN 5404.

IDES 5103 [0.5 credit]

Interdisciplinary Design Development Studio

Team-based studio projects draw on interdisciplinary design development methods in achieving a common design objective. Projects will be supervised by academic and industry advisors from a wide range of disciplines, and conducted in collaboration with professionals from external organizations. Open to students from other programs.

Includes: Experiential Learning Activity

Prerequisite(s): IDES 5101 and IDES 5102 or permission of the School of Industrial Design.

IDES 5104 [0.5 credit]

Accessibility and Inclusive Design Seminar

Provides foundational knowledge, exploring interdisciplinary approaches for incorporating accessible, inclusive, and human-centered design principles into the research, design, and development of products, information, and environments that can be used by all people, regardless of ability.

Includes: Experiential Learning Activity

IDES 5500 [0.5 credit]

Special Topics in Industrial Design

Seminar course in contemporary design issues of an interdisciplinary nature. Guided by a faculty member and supported by external professionals.

Includes: Experiential Learning Activity

IDES 5909 [2.0 credits]

Thesis

A comprehensive project that demonstrates the student's ability to conduct critical research in a specific area in which design can contribute to competitive advantage through design planning and interdisciplinary design development processes.

Includes: Experiential Learning Activity

Prerequisite(s): IDES 5101, IDES 5102, and IDES 5103.

Digital Humanities

This section presents the requirements for programs in:

- M.A. Anthropology with Specialization in Digital Humanities
- M.A. Applied Linguistics with Specialization in Digital Humanities
- M.A. Art and Architectural History with Specialization in Digital Humanities
- M.A. Canadian Studies with Specialization in Digital Humanities
- M.A. English with Specialization in Digital Humanities
- M.A. Film Studies with Specialization in Digital Humanities
- M.A. French and Francophone Studies with Specialization in Digital Humanities
- M.A. History with Specialization in Digital Humanities
- M.A. Music and Culture with Specialization in Digital Humanities
- M.A. Philosophy with Specialization in Digital Humanities
- M.A. Public History with Specialization in Digital Humanities
- M.A. Sociology with Specialization in Digital Humanities
- Master of Cognitive Science with Specialization in Digital Humanities

Program Requirements

Students enrolled in the Collaborative Program in Digital Humanities must meet the requirements of their respective home units as well as those of the Collaborative Program. In most cases, the requirements of the Collaborative Program do not add to the number of credits students are required to accumulate by their home unit and the credit value of the degree remains the same.

Notes:

- A list of Digital Humanities courses will be selected annually by the Digital Humanities Management committee in consultation with the participating programs for fulfillment of the 0.5 credit in Digital Humanities.
- Where a collaborating program has its own practicum course, such as in Art History and Applied Linguistics, only a maximum of 1.0 credit in practica can be applied to degree requirements.
- Students writing a thesis or major research paper must focus on a Digital Humanities topic. The proposed topic

must be approved by the student's home unit and by the Digital Humanities Management Committee.

The requirements of the collaborative program are:

1. **0.5 credit in** DIGH 5000
2. **0.5 credit in** Digital Humanities (DIGH 5011, DIGH 5012, or annually listed Digital Humanities course)
3. **0.0 credit in** DIGH 5800
4. In addition, requirements specific to the particular master's programs of the supporting units, as described in their respective sections.

M.A. Anthropology with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I
2. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
3. 1.0 credit in electives	1.0
4. 2.0 credits in:	2.0
ANTH 5909 [2.0]	M.A. Thesis
5. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
6. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually-listed DIGH course)	0.5
7. 0.0 credit in:	0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development
Total Credits	5.0

Requirements - Research Essay program (5.0 credits)

1. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I (normally to be taken in the first fall term after admission to the program)
2. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
3. 2.0 credits in electives	2.0
4. 1.0 credit in:	1.0
ANTH 5908 [1.0]	M.A. Research Essay
5. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
6. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
7. 0.0 credit in DIGH 5800	0.0
Total Credits	5.0

Requirements - Coursework program (5.0 credits)

1. 0.5 credit in:	0.5
ANTH 5401 [0.5]	Theories and Methods I (normally to be taken in the first fall term after admission to the program)
2. 0.5 credit in:	0.5
ANTH 5402 [0.5]	Theories and Methods II
3. 2.5 credits in electives	2.5
4. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities

5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually-listed DIGH course)	0.5
6. 0.5 credit in 5000-level ANTH course with a digital humanities focus	0.5
7. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	5.0

M.A. Applied Linguistics with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5] Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5] Inquiry Strategies in Applied Linguistics and Discourse Studies	
2. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
3. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
4. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
5. 1.0 credit from any 5000-level ALDS course	1.0
6. 2.0 credits in:	2.0
ALDS 5909 [2.0] M.A. Thesis	
Total Credits	5.0

Requirements - Research Essay pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5] Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5] Inquiry Strategies in Applied Linguistics and Discourse Studies	
2. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
3. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
4. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
5. 2.0 credits from any 5000-level ALDS course	2.0
6. 1.0 credit in:	1.0
ALDS 5908 [1.0] Research Essay	
Total Credits	5.0

Requirements - Coursework pathway (5.0 credits)

1. 1.0 credit in:	1.0
ALDS 5001 [0.5] Directions in Applied Linguistics and Discourse Studies	
ALDS 5002 [0.5] Inquiry Strategies in Applied Linguistics and Discourse Studies	
2. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
3. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
4. 0.5 credit in 5000-level ALDS with Digital Humanities focus or a DIGH course, chosen in consultation with the SLALS graduate supervisor	0.5

5. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
6. 2.5 credits from any 5000-level ALDS course	2.5
Total Credits	5.0

M.A. Art and Architectural History with Specialization in Digital Humanities (4.5 credits)

Requirements:

1. 1.0 credit in:	1.0
ARTH 5010 [1.0] Art and Its Institutions	
2. 2.0 credits in ARTH, including 1.5 credits from:	2.0
ARTH 5112 [0.5] Topics in Historiography, Methodology and Criticism	
ARTH 5113 [0.5] Perspectives on Pre-Modernity	
ARTH 5114 [0.5] Feminism and Gender	
ARTH 5115 [0.5] Topics in Modern and Contemporary Art	
ARTH 5117 [0.5] Community/Identity	
ARTH 5210 [0.5] Topics in Indigenous Art	
ARTH 5218 [0.5] Museum Studies and Curatorial Practice	
ARTH 5403 [0.5] Architecture and Its Institutions	
ARTH 5500 [0.5] Photography and Its Institutions	
and	
ARTH 5011 [0.5] Graduate Practicum	
3. 0.5 credit in:	0.5
ARTH 5011 [0.5] Graduate Practicum (with a Digital Humanities focus)	
4. 0.0 credit in:	0.0
ARTH 5800 [0.0] Carleton Art Forum	
4. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
5. 0.5 credit in Digital Humanities (DIGH 5011, DIGH 5012, or annually listed Digital Humanities course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	4.5

M.A. Canadian Studies with Specialization in Digital Humanities (5.0 credits)

Requirements - coursework option (5.0 credits)

1. 1.0 credit in:	1.0
CDNS 5001 [0.5] M.A. Core Seminar: Conceptualizing Canada	
DIGH 5000 [0.5] Issues in the Digital Humanities	
DIGH 5800 [0.0] Digital Humanities: Professional Development	
2. 1.0 credit in approved Digital Humanities elective courses.	1.0
3. 3.0 credits in approved elective courses, Internship/ Practicum, or Directed Studies.	3.0
Total Credits	5.0

Requirements - research essay option (5.0 credits)

1. 1.0 credit in:	1.0
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CDNS 5908 [1.0]	Research Essay	
2. 0.5 credit in:		0.5
CDNS 5001 [0.5]	M.A. Core Seminar: Conceptualizing Canada	
3. 0.5 credit from:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
4. 1.0 credit in	approved Digital Humanities elective courses.	1.0
5. 2.0 credits in	approved elective courses, Internship/ Practicum, or Directed Studies.	2.0
Total Credits		5.0

Requirements - thesis option (5.0 credits)

1. 2.0 credits in:		2.0
CDNS 5909 [2.0]	M.A. Thesis	
2. 0.5 credit in:		0.5
CDNS 5001 [0.5]	M.A. Core Seminar: Conceptualizing Canada	
3. 0.5 credit from:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
4. 1.0 credit in	approved Digital Humanities elective courses.	1.0
5. 1.0 credit in	approved elective courses, Internship/ Practicum, or Directed Studies.	1.0
Total Credits		5.0

Thesis/Research Essay Proposal

At the time of declaring their option, thesis/research essay students are encouraged to declare a preliminary topic and tentative list of potential supervisors. Thesis/research essay students must submit a research proposal to the School that has been approved by their thesis/research essay supervisor prior to registering in CDNS 5908 or CDNS 5909.

Language Requirement

The School requires a reading knowledge of French. This is a program requirement and not an admission requirement. This requirement may be satisfied in the following ways:

- Successful completion of FINS 3105 or its equivalent (with a grade of B- or better).
- Successful completion of a French language examination.
- Alternatively, a student may fulfill this requirement with a demonstrated knowledge of an Aboriginal language.
- The School conducts the French language examinations in September and January. Students choosing the first option should note that examination results in these courses form part of their record, although they are additional to the course requirements for the degree.

M.A. English with Specialization in Digital Humanities (4.5 credits)

Requirements - Coursework Option (4.5 credits)

1. 2.5 credits in	5000-level ENGL (excluding ENGL 5908 and ENGL 5909)	2.5
2. 0.5 credit in:		0.5
ENGL 5005 [0.5]	M.A. Seminar	
3. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
3. 1.0 credit in	DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	1.0
4. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	

Total Credits 4.5

Requirements - Research Essay Option (4.5 credits)

1. 2.0 credits in	ENGL at the 5000 level (excluding ENGL 5909)	2.0
2. 0.5 credit in:		0.5
ENGL 5005 [0.5]	M.A. Seminar	
3. 1.0 credit in:		1.0
ENGL 5908 [1.0]	Research Essay (with mandatory oral examination)	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	Digital Humanities (DIGH 5011, DIGH 5012, or annually listed Digital Humanities course)	0.5
6. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	

Total Credits 4.5

Requirements - Thesis Option (4.5 credits)

1. 1.0 credit in	ENGL at the 5000 level (excluding ENGL 5908)	1.0
2. 0.5 credit in:		0.5
ENGL 5005 [0.5]	M.A. Seminar	
3. 2.0 credits in:		2.0
ENGL 5909 [2.0]	M.A. Thesis	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit from:		0.5
DIGH 5011 [0.5]	Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5]	Directed Readings and Research in Digital Humanities	
	- or annually listed DIGH course	
6. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	

Total Credits 4.5

M.A. Film Studies with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis Stream (5.0 credits)

1. 1.0 credit in:		1.0
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FILM 5010 [0.5]	Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
2. 1.5 credits in	Film Studies graduate course work, excluding FILM 5801	1.5
3. 1.5 credits in:		1.5
FILM 5909 [1.5]	M.A. Thesis	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	DIGH (DIGH 5011, DIGH 5012, or annually-listed DIGH course)	0.5
6. 0.0 credit in	DIGH 5800	0.0
Total Credits		5.0

Requirements - Research Essay Stream (5.0 credits)

1. 1.0 credit in:		1.0
FILM 5010 [0.5]	Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
2. 2.0 credits in	Film Studies graduate course work, 0.5 credit of which can include:	2.0
FILM 5801 [0.5]	Graduate Internship	
3. 1.0 credit in:		1.0
FILM 5908 [1.0]	Research Essay	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
Total Credits		5.0

Note: for **Item 2** above, students may take 0.5 credit of coursework outside the Film Studies program subject to the approval of the Graduate Supervisor. This credit may be a 4000-level Film Studies course.

Requirements - Coursework Stream (5.0 credits)

1. 1.0 credit in:		1.0
FILM 5010 [0.5]	Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
2. 2.5 credits in	Film Studies graduate course work, 0.5 credit of which can include:	2.5
FILM 5801 [0.5]	Graduate Internship	
3. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
4. 1.0 credit in	DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	1.0
5. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
Total Credits		5.0

Note: for **Item 2** above, students may take a 0.5 credit Film Studies course at the 4000-level subject to the approval of the Graduate Supervisor.

M.A. French and Francophone Studies with Specialization in Digital Humanities (4.0 credits)

Note: FREN 5300 and FREN 5350 are mandatory for all students. Candidates select from one of two program options, chosen in consultation with an adviser from the Department, normally the Supervisor of Graduate Studies.

Requirements - Research Essay option (4.0 credits)

1. 1.0 credit in:		1.0
FREN 5908 [1.0]	Mémoire de recherche	
2. 0.5 credit in:		0.5
FREN 5300 [0.5]	Méthodologie de la recherche	
3. 0.0 credit in:		
FREN 5350 [0.0]	Proposition de recherche	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
7. 1.5 credit at the 5000 level		1.5
Total Credits		4.0

Requirements - Thesis option (4.0 credits)

1. 2.0 credits in:		2.0
FREN 5909 [2.0]	M.A. Thesis	
2. 0.5 credit in:		0.5
FREN 5300 [0.5]	Méthodologie de la recherche	
3. 0.0 credit in:		0.0
FREN 5350 [0.0]	Proposition de recherche	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
7. 0.5 credit at the 5000 level		0.5
Total Credits		4.0

M.A. History with Specialization in Digital Humanities (4.5 credits)

Requirements:

1. 0.5 credit in:		0.5
HIST 5003 [0.5]	Historical Theory and Method	
2. 1.0 credit in	HIST at the graduate level at Carleton; up to 0.5 credit may be taken in a designated public history course; with departmental permission, up to 0.5 credit of courses with historical content may be taken from another unit at Carleton University, at the University of Ottawa, or at another accredited institution.	1.0
3. 2.0 credits in:		2.0
HIST 5909 [2.0]	M.A. Thesis	
4. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
5. 0.5 credit in	DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5

6. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	

Total Credits 4.5

M.A. Music and Culture with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 1.5 credits in: 1.5

MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories

MUSI 5002 [0.5] Research Methods in Music and Culture

MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates

2. 0.5 credit in additional MUSI course work chosen from available electives 0.5

3. 2.0 credits in: 2.0

MUSI 5909 [2.0] M.A. Thesis

4. 0.5 credit in: 0.5

DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit from DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course) 0.5

6. 0.0 credit in: 0.0

DIGH 5800 [0.0] Digital Humanities: Professional Development 0.0

Total Credits 5.0

Requirements - Research Essay program (5.0 credits)

1. 1.5 credits in: 1.5

MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories

MUSI 5002 [0.5] Research Methods in Music and Culture

MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates

2. 1.5 credits additional MUSI course work chosen from available elective courses 1.5

3. 1.0 credit in: 1.0

MUSI 5908 [1.0] Research Essay

4. 0.5 credit in: 0.5

DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit from DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course) 0.5

6. 0.0 credit in: 0.0

DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits 5.0

Requirements - Coursework program (5.0 credits)

1. 1.5 credits in: 1.5

MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories

MUSI 5002 [0.5] Research Methods in Music and Culture

MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates

2. 2.0 credits in additional MUSI course work chosen from available elective courses 2.0

3. 0.5 credit in: 0.5

DIGH 5000 [0.5] Issues in the Digital Humanities

4. 1.0 credit from: 1.0

DIGH 5011 [0.5] Graduate Practicum in Digital Humanities

DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities

DIGH 5902 [0.5] Special Topics in Digital Humanities - or annually listed DIGH course [0.5]

5. 0.0 credit in: 0.0

DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits 5.0

M.A. Philosophy with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in: 1.0

PHIL 5850 [0.5] Proseminar

PHIL 5900 [0.5] Research Seminar

2. 2.0 credits in: 2.0

PHIL 5909 [2.0] M.A. Thesis

3. 1.0 credits in courses, subject to the following limitations: 1.0

- They may include PHIL 5701 or PHIL 5751 but not both

- They may include up to 0.5 credit from PHIL 5000, PHIL 5200, PHIL 5250, PHIL 5300, PHIL 5350, PHIL 5500, PHIL 5600, PHIL 5650, PHIL 5660, or, with permission of the department, other approved courses at the graduate or 4000-level at Carleton or other universities

- They may include up to 0.5 credit in tutorials, or, with permission of the department, approved graduate-only courses at the graduate level in other departments or at other universities

- They must include at least 0.5 credit in two of the following areas of study: history of philosophy, philosophy of mind, philosophy of language, logic, epistemology, or metaphysics, moral, social, or political philosophy

4. 0.5 credit in: 0.5

DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course) 0.5

6. 0.0 credit in: 0.0

DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits 5.0

Requirements - Research Essay pathway (5.0 credits)

1. 1.0 credit in: 1.0

PHIL 5850 [0.5] Proseminar

PHIL 5900 [0.5] Research Seminar

2. 1.0 credit in: 1.0

PHIL 5908 [1.0] Research Essay

3. 1.0 credit from: 1.0

PHIL 5701 [0.5] Fall Colloquium

PHIL 5751 [0.5] Winter Colloquium

Or, with permission of the department, approved graduate-level courses in other departments or at other universities

4. 1.0 credit from:	1.0
PHIL 5000 [0.5] Special Topic in Philosophy	
PHIL 5200 [0.5] Topics in Philosophy of Mind or Philosophy of Language	
PHIL 5250 [0.5] Topics in Logic, Epistemology, Metaphysics or Philosophy of Science	
PHIL 5300 [0.5] Topics in Value Theory	
PHIL 5350 [0.5] Topics in Ethics or Political Philosophy	
PHIL 5500 [0.5] Topics in Contemporary Philosophy	
PHIL 5600 [0.5] Topics in the History of Philosophy	
PHIL 5650 [0.5] Semantics	
PHIL 5660 [0.5] Lexical Semantics	
Or, with permission of the department, approved courses at graduate or 4000-level at Carleton or other universities	
5. 0.5 credit in DIGH 5000	0.5
6. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
7. 0.0 credit in:	
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	5.0

M.A. Public History with Specialization in Digital Humanities (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
HIST 5003 [0.5] Historical Theory and Method	
2. 0.5 credit in:	0.5
HIST 5700 [0.5] Introduction to Public History	
3. 1.0 credit in designated public history courses.	1.0
4. 0.5 credit in a graduate-level history course outside of public history.	0.5
5. 0.5 credit in:	0.5
HIST 5703 [0.5] Public History Internship	
6. 1.0 credit in:	1.0
HIST 5908 [1.0] M.A. Research Essay	
7. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
8. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
9. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	5.0

M.A. Sociology with Specialization in Digital Humanities (5.0 credits)

Requirements - Research Essay program (5.0 credits)

1. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
2. 2.0 credits in courses. With departmental permission one of the courses may be 0.5 credit at the 4000-level.	2.0

3. An oral examination on the candidate's research essay and program	
4. 1.0 credit in:	1.0
SOCI 5908 [1.0] M.A. Research Essay	
5. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
6. 0.5 credit from:	0.5
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities	
Or, annually listed DIGH course.	
7. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	

Total Credits 5.0

Requirements - Thesis program (5.0 credits)

1. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
2. 1.0 credit in courses	1.0
3. 2.0 credits in:	2.0
SOCI 5909 [2.0] M.A. Thesis	
4. An oral examination on the candidate's thesis and program	
5. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
6. 0.5 credit from:	0.5
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities	
Or, annual listed DIGH course	
7. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	5.0

Master of Cognitive Science with Specialization in Digital Humanities (6.0 credits)

Requirements - Research Project pathway (6.0 credits)

1. 0.5 credit in:	0.5
CGSC 5100 [0.5] Issues in Cognitive Science	
2. 0.5 credit in:	0.5
CGSC 5101 [0.5] Experimental Methods and Statistics	
or CGSC 5103 [0.5] Formal Methods	
3. 1.5 credits from:	1.5
CGSC 5001 [0.5] Cognition and Artificial Cognitive Systems	
CGSC 5002 [0.5] Experimental Research in Cognition	
CGSC 5003 [0.5] Language and Cognition	
CGSC 5003 [0.5] Language and Cognition	
CGSC 5004 [0.5] Cognition and Conceptual Issues	
CGSC 5005 [0.5] Cognition and Neuroscience	

4. 1.5 credits in CGSC or other courses selected with approval of the project supervisor and graduate supervisor.	1.5
5. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
6. 0.5 credit from:	0.5
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities	
or annually-listed DIGH course	
7. 0.0 credit in:	
DIGH 5800 [0.0] Digital Humanities: Professional Development	
8. 1.0 credit in:	1.0
CGSC 5908 [1.0] Research Project (in the specialization)	
9. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year)	
Total Credits	6.0

Requirements - Thesis pathway (6.0 credits)

1. 0.5 credit in:	0.5
CGSC 5100 [0.5] Issues in Cognitive Science	
2. 0.5 credit from:	0.5
CGSC 5101 [0.5] Experimental Methods and Statistics	
or CGSC 5103 [0.5] Formal Methods	
3. 1.5 credits in CGSC or other courses, from at least two different cognitive disciplines, selected with approval of the thesis supervisor and the graduate supervisor.	1.5
4. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
5. 0.5 credit from:	0.5
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities	
or annually-listed DIGH course	
6. 0.0 credit in:	
DIGH 5800 [0.0] Digital Humanities: Professional Development	
7. 2.5 credits in:	2.5
CGSC 5909 [2.5] M. Cog. Thesis (in the specialization)	
8. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year)	
Total Credits	6.0

Regulations

See the General Regulations section of this Calendar, and the regulations of the participating unit offering the Specialization.

Admission

Students who are enrolled in their first or second year of study in an M.A. in one of the collaborating programs may apply to the College of the Humanities for admission to the Collaborative Program. Admission to the program is determined by the Digital Humanities Management

Committee and will normally take place before the end of August, although early acceptances (in the spring) will be considered by the committee. Students will be selected for the program based on the following criteria:

- G.P.A. (based on university transcripts)
- Letter of intent (Application form)
- Recommendation of the participating program (application form)
- Balanced representation from different participating units
- Students whose M.A. theses have a Digital Humanities content

Digital Humanities (DIGH) Courses

DIGH 5000 [0.5 credit]

Issues in the Digital Humanities

Introduction to the theoretical and practical aspects of the Digital Humanities, including the historical and ongoing debates over its boundaries, methodologies, objectives and values.

Includes: Experiential Learning Activity

DIGH 5011 [0.5 credit]

Graduate Practicum in Digital Humanities

Practical on-site work in a public institution or private sector company (as available), including a written assignment or equivalent project in alternative format. In collaborating programs with practicum programs, a maximum of 1.0 practicum credit may be applied towards degree requirements.

Includes: Experiential Learning Activity

DIGH 5012 [0.5 credit]

Directed Readings and Research in Digital Humanities

Students pursue topics in the Digital Humanities, which they select in consultation with a member of the graduate faculty of the program.

Includes: Experiential Learning Activity

DIGH 5800 [0.0 credit]

Digital Humanities: Professional Development

This course allows students to participate with Digital Humanities scholars and professionals in public discussions of topics in the Digital Humanities, as both presenter and audience member. The course is graded satisfactory/unsatisfactory based on attendance and engagement.

DIGH 5902 [0.5 credit]

Special Topics in Digital Humanities

This course offers selected topics in Digital Humanities not available in the regular course offerings.

Earth Sciences

This section presents the requirements for programs in:

- M.Sc. Earth Sciences
- M.Sc. Earth Sciences with Specialization in Chemical and Environmental Toxicology
- Ph.D. Earth Sciences

- Ph.D. Earth Sciences with Specialization in Chemical and Environmental Toxicology

Program Requirements

M.Sc. Earth Sciences (5.0 credits)

Requirements:

1. **1.5 credit in** course work, 0.5 credit of which may be at the senior undergraduate level **1.5**

2. **3.5 credits in:** **3.5**

ERTH 5909 [3.5] M.Sc. Thesis (defended at an oral examination)

3. A pre-defence public lecture, preceding the oral examination, based on the thesis research

4. **0.0 credit in:** participation in the OCGC Seminar Series. Each student gives a presentation of one lecture (open to all members of the OCGC) describing the candidate's research study within 16 months of the candidate's registration in the M.Sc. program.

Total Credits **5.0**

M.Sc. Earth Sciences with Specialization in Chemical and Environmental Toxicology (5.0 credits)

Requirements:

1. **0.5 credit in:** **0.5**

BIOL 6402/CHEM 5708 [0.5] Principles of Toxicology
or BIOL 6403 [0.5] Ecotoxicology
or CHEM 5705 [0.5] Ecotoxicology

2. **0.5 credit in:** **0.5**

BIOL 6405/CHEM 5805 [0.5] Seminar in Toxicology

3. **0.5 credit in** additional course work **0.5**

4. **3.5 credits in:** **3.5**

ERTH 5909 [3.5] M.Sc. Thesis

5. A pre-defence public lecture, preceding the oral examination, based on the thesis research

6. 0.0 credit: participation in the OCGC Seminar Series. Each student gives a presentation of one lecture (open to all members of the OCGC) describing the candidate's research study within 16 months of the candidate's registration in the M.Sc. program.

Total Credits **5.0**

Ph.D. Earth Sciences (1.0 credit)

Requirements:

1. **1.0 credit of course work at the graduate level.** **1.0**

Additional courses may be prescribed by the thesis advisory committee

ERTH 6908 [0.0] Ph.D. Comprehensive Examination (Conducted by the thesis advisory committee. Includes the presentation of a thesis proposal and involves three areas of geoscience specialization chosen by the student's advisory committee and approved by the Director of the Ottawa-Carleton Geoscience Centre)

2. **0.0 credits in:** **0.0**

ERTH 6909 [0.0] Ph.D. Thesis (defended at an oral examination before an examination board that includes an external examiner)

3. **A pre-defence public lecture, preceding the oral examination, based on the thesis research** **0.0**

4. **0.0 credit in:** participation in the OCGC Seminar Series. Each student gives a presentation of one lecture (open to all members of the OCGC) describing the candidate's research study within 16 months of the candidate's registration in the Ph.D. program. **0.0**

5. **Fulfilment of residence requirement: at least four terms of full-time study** **0.0**

Total Credits **1.0**

Ph.D. Earth Sciences with Specialization in Chemical and Environmental Toxicology (1.0 credit)

Requirements:

1. **0.0 credits in:**

ERTH 6909 [0.0] Ph.D. Thesis (a research thesis on a topic in toxicology supervised by a faculty member of the Collaborative Program in Chemical and Environmental Toxicology, defended at an oral examination before an examination board that includes an external examiner)

2. **A pre-defence public lecture, preceding the oral examination, based on the thesis research**

3. **1.0 credit in:** **1.0**

BIOL 6402 [0.5] Principles of Toxicology
or CHEM 5708 [0.5] Principles of Toxicology

BIOL 6405 [0.5] Seminar in Toxicology
or CHEM 5805 [0.5] Seminar in Toxicology

4. **0.0 credit in:** **0.0**

ERTH 6908 [0.0] Ph.D. Comprehensive Examination (Conducted by the thesis advisory committee. Includes the presentation of a thesis proposal)

5. **0.0 credit in:** participation in the OCGC Seminar Series. Each student gives a presentation of one lecture (open to all members of the OCGC) describing the candidate's research study within 16 months of the candidate's registration in the Ph.D. program. **0.0**

6. **Fulfilment of residence requirement: at least four terms of full-time study** **0.0**

Total Credits **1.0**

Regulations

See the General Regulations section of this Calendar.

A grade of B- or higher is required for each course counted towards the Master's degree.

Regulations

See the General Regulations section of this Calendar.

Admission

The requirement for admission to the program is an Honours B.Sc. degree, with at least high honours standing, in geology or a related discipline.

Admission

The requirement for admission to the Ph.D. Program is an M.Sc. degree in Earth Sciences or a related discipline.

A grade of B- or higher is required for each course to be counted.

Earth Sciences (ERTH) Courses

ERTH 5001 [0.5 credit] (GEO 5301)

Seminars in Earth Sciences I

One-term modular courses covering a spectrum of Earth Science topics and current research problems, ranging from the geology and geophysics of the solid Earth, to its surface environment and crustal resources. Course complements EARTH 5002.

Precludes additional credit for Students may not take a module for credit that is offered by their supervisor, but may do so with the permission of the OCGC Director. A minimum of four modules offered per term, three must be completed to obtain course credit. Choice of modules must be approved by the OCGC Director.

ERTH 5002 [0.5 credit] (GEO 5302)

Seminars in Earth Sciences II

One-term modular courses covering a spectrum of Earth Science topics and current research problems, ranging from the geology and geophysics of the solid Earth, to its surface environment and crustal resources. Course complements EARTH 5001.

Precludes additional credit for Students may not take a module for credit that is offered by their supervisor, but may do so with the permission of the OCGC Director. A minimum of four modules offered per term, three must be completed to obtain course credit. Choice of modules must be approved by the OCGC Director.

ERTH 5104 [0.5 credit] (GEO 5114)

Mineralogy

An advanced course covering selected topics in mineralogy, such as crystallography, crystal chemistry, crystal structure, mineralogy of rock-forming mineral groups, and instrumental methods in mineralogical research, such as use of electronic optical instruments, spectroscopy, and X-ray crystallography; seminar presentations and practical exercises.

ERTH 5105 [0.5 credit] (GEO 5105)

Thermodynamics, Kinetic Theory, and Metamorphic Petrology

Phase equilibria, phase diagrams, and the kinetics of mineral reactions; mass transfer; regional and global aspects of metamorphic petrogenesis. Course may include one or two weeks of field-based instruction with costs borne by students.

Includes: Experiential Learning Activity

ERTH 5202 [0.5 credit] (GEO 5122)

Advanced Igneous Petrology

Integrates physical and chemical processes with the dynamics of magmatic systems to understand igneous processes. Course may involve a field trip with costs to be paid by students.

Includes: Experiential Learning Activity

ERTH 5204 [0.5 credit] (GEO 5124)

Geology and Geochemistry of Ore Deposits

An advanced course in ore deposits examining aspects of their geology, geochemistry, and exploration. Topics will be selected from a range of different deposit types, including hydrothermal and magmatic ore deposits, as well as laboratory and field examination of different ores and their host rocks.

Includes: Experiential Learning Activity

ERTH 5206 [0.5 credit] (GEO 5306)

Hydrothermal Ore Deposits

Advanced economic geology course on hydrothermal ore deposits including geology and geochemistry, physical and chemical controls on mineralization, recognition and characterization of ore-fluid reservoirs, nature of large-scale fluid flow and alteration, and applications to exploration.

ERTH 5215 [0.5 credit] (GEO 5115)

Natural Hazards in Canada - Risk and Impact

Overview of natural hazards and severe weather phenomena in Canada. Notions of risk, return period, and probability of occurrence of natural disasters. Impact on society and infrastructure. Mitigation policies and strategies.

Also listed as IPIS 5505.

Also offered at the undergraduate level, with different requirements, as EARTH 4815, for which additional credit is precluded.

ERTH 5301 [0.5 credit] (GEO 5131)

Siliciclastic Sedimentology

Origin and significance of physical sedimentary processes and structures. Analysis of ancient siliciclastic depositional environments in a facies model and sequence stratigraphic framework. Course involves lectures, seminars and field excursions.

Includes: Experiential Learning Activity

ERTH 5305 [0.5 credit] (GEO 5135)

Carbonate Sedimentology

Aspects of modern depositional systems, dynamic facies models, sequence stratigraphy, mineralogy, and diagenesis of carbonate sediments. The practical part of the course will consist of a field-laboratory project that integrates various techniques in carbonate sedimentology (mapping, petrography, staining, cathodoluminescence, fluorescence, SEM).

Includes: Experiential Learning Activity

ERTH 5306 [0.5 credit] (GEO 5136)

Paleobiology

Extinctions, micro- and macro-evolutionary processes, long-term trends and cycles in the Phanerozoic; functional morphology; application of invertebrates to biostratigraphy, paleoceanography and paleolimnology. May include one or two weeks of field-based instruction with costs borne by the student.

ERTH 5307 [0.5 credit] (GEO 5137)**Evolutionary Developmental Biology**

This course explores the mechanistic basis of organismic evolution from genetic, morphogenetic and epigenetic perspectives, within a phylogenetic context of living and extinct vertebrates.

Includes: Experiential Learning Activity

ERTH 5308 [0.5 credit] (GEO 5138)**Advanced Micropaleontology**

Paleobiology, biostratigraphy and paleoecology of microfossils in the context of paleoceanography, paleolimnology and paleoclimatology. Course may involve a field trip with costs to be paid by students.

Includes: Experiential Learning Activity

ERTH 5403 [0.5 credit] (GEO 5143)**Environmental Isotopes and Groundwater Geochemistry**

Geochemistry and environmental isotopes in studies of groundwater dynamics, age and contaminant hydrogeology. Environments from shallow groundwater and surface water to deep crustal brines are examined. Low temperature aqueous geochemistry and mineral solubility with emphasis on the carbonate system.

ERTH 5407 [0.5 credit] (GEO 5147)**Aqueous Inorganic Geochemistry and Modelling**

Covers concepts in aqueous geochemistry including ion hydration and hydrolysis, aqueous activity, complexation, mineral solubility, carbonate system, redox, adsorption/surface complexation and reaction kinetics. Bi-weekly assignments provide an introduction to equilibrium geochemical modelling.

ERTH 5409 [0.5 credit]**Reactive Transport Modelling**

Introduction to the theory of numerical models and application of reactive transport models in hydrogeology. Focus will be on development of appropriate conceptual models of flow, transport and bio- and geochemical reactions and simulation of these conceptual models using reactive transport codes.

ERTH 5414 [0.5 credit] (GEO 5144.)**Isotope Mapping and Provenance Applications**

Isotopes are used to trace provenance of organic and inorganic materials. This course will discuss how traditional isotope systems vary in the environment at different spatiotemporal scales and how mapping their variations can solve problems in hydrology, climatology, ecology, and archeology.

Includes: Experiential Learning Activity

ERTH 5501 [0.5 credit] (GEO 5151)**Precambrian Geology**

Geology of the main Archean cratons and Proterozoic belts with emphasis on North America. Formation of the Earth, composition and evolution of the crust and mantle during the first 4 billion years of Earth's history, from its formation to the end of the Proterozoic.

Includes: Experiential Learning Activity

ERTH 5503 [0.5 credit] (GEO 5153)**Computer Techniques in the Earth Sciences**

A practical course for mapping; quantitative analysis, integration and modeling of spatial data related to geosciences and engineering applications using a combination of GIS, statistical and geostatistical analysis techniques.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ERTH 5505 [0.5 credit] (GEO 5155.)**Climate Change**

Considers climate changes and their driving mechanisms over a broad range of timescales based on observations from geological archives and more recent instrumented evidence. Future climate projections and their accuracy are also considered.

Includes: Experiential Learning Activity

ERTH 5507 [0.5 credit] (GEO 5157)**Tectonic Processes Emphasizing Geochronology and Metamorphism**

Applications of empirical, analytical and quantitative techniques to problems in regional geology and crustal tectonics; orogenic processes; heat and metamorphism; isotopic geochronology as applied to thermal history.

ERTH 5600 [0.5 credit] (GEO 5160)**Chemistry of the Earth**

An examination of the composition of the mantle and crust in selected tectonic settings, such as subduction zones and hot spots. Topics may include how geochemical data constrain geodynamic settings of study areas.

ERTH 5603 [0.5 credit] (GEO 5163)**Stable Isotope Geochemistry**

Mechanisms of isotope fractionation in nature; physical and chemical isotope fractionation, kinetic isotope effects. Variation of stable isotope ratios (hydrogen/carbon/oxygen/sulphur) in nature. Preparation techniques of natural samples for isotope analysis. Applications of stable isotopes to study magma genesis, ore genesis, nature.

ERTH 5609 [0.5 credit] (GEO 5169)**Radiogenic Isotope Geochemistry**

Radiogenic isotope systematics applied to the solid Earth and their use to understand various geological processes. Evolution of large-scale isotopic reservoirs throughout Earth's history. Application of different radiometric dating techniques, assessment of geochronological data, models and interpretations.

ERTH 5701 [0.5 credit] (GEO 5171)**Physics of the Earth**

The physics and dynamics of the solid Earth: seismology; gravitational and magnetic fields, thermal state. Geophysical constraints on the structure and composition of the interior. Geodynamic processes. Also offered at the undergraduate level, with different requirements, as EARTH 4801, for which additional credit is precluded.

ERTH 5703 [0.5 credit] (GEO 5173)**Structural Geology**

Deformation processes and the analysis of geological structures at all scales.

ERTH 5704 [0.5 credit] (GEO 5174)**Tectonics**

Dynamic and geological aspects of plate tectonics throughout Earth history.

ERTH 5707 [0.5 credit] (GEO 5177)**Engineering Seismology**

Seismological topics with engineering applications. Characterization of seismicity and seismic sources (areas and faults). Seismic hazard analysis. Empirical and theoretical modeling of strong ground motion in time and frequency domain.

ERTH 5708 [0.5 credit] (GEO 5178)**Earthquake Signal Processing**

Theoretical and practical aspects of earthquake signal processing, seismic instrumentation, instrument response and application of spectral analysis and response spectra.

ERTH 5901 [0.5 credit] (GEO 5191.)**Research Topics in Earth Sciences**

Directed reading/field/laboratory studies unrelated to thesis research, under the guidance of directors other than the thesis supervisor. A written proposal including research plan, deliverables, and evaluation, must be submitted for departmental approval prior to registration. Written report required.

Includes: Experiential Learning Activity

ERTH 5903 [0.5 credit] (GEO 5193)**Field Studies**

Field investigations of geological problems, unrelated to thesis research, under the guidance of directors other than the thesis supervisor. Minimum of fifteen days field work. A written proposal including research plan, deliverables, and evaluation must be submitted for departmental approval prior to registration.

Includes: Experiential Learning Activity

ERTH 5906 [0.0 credit] (GEO 5193)**M.Sc. Geoscience Seminar**

Participation in the Geoscience Seminar Series.

ERTH 5907 [0.0 credit] (GEO 5193)**Ph.D. Geoscience Seminar**

Participation in the Geoscience Seminar Series.

ERTH 5909 [3.5 credits] (GEO 7999)**M.Sc. Thesis**

A thesis proposal must be approved by the research advisory committee by the end of the first year of registration.

Includes: Experiential Learning Activity

ERTH 6908 [0.0 credit] (GEO 9998)**Ph.D. Comprehensive Examination**

The Comprehensive Examination involves a thesis proposal and oral examination in three different areas of specialization. Students will receive a grade of Satisfactory or Unsatisfactory. This exam is taken within the first twelve months of registration in the program.

ERTH 6909 [0.0 credit] (GEO 9999)**Ph.D. Thesis**

A thesis proposal must be approved by the research advisory committee by the end of the first year of registration.

Includes: Experiential Learning Activity

Economics

This section presents the requirements for programs in:

- M.A. Economics
- M.A. Economics with Concentration in Financial Economics
- M.A. Economics with Specialization in African Studies
- M.A. Economics with Specialization in Data Science
- Master of Arts Economics with Concentration in Financial Economics - Master of Business Administration with Concentration in Finance and Economics
- Ph.D. Economics
- Graduate Diploma in Economic Policy

Program Requirements**M.A. Economics (4.0 credits)****Requirements - Coursework option (4.0 credits)**

1. 1.5 credits in:	1.5
ECON 5020 [0.5] Microeconomic Theory	
ECON 5021 [0.5] Macroeconomic Theory	
ECON 5027 [0.5] Econometrics I	
2. 0.5 credit in:	0.5
ECON 5029 [0.5] Methods of Economic Research	
3. 0.5 credit from:	0.5
ECON 5055 [0.5] Financial Econometrics	
ECON 5712 [0.5] Micro-Econometrics	
ECON 5713 [0.5] Time-Series Econometrics	
4. 1.5 credits in approved electives	1.5
Total Credits	4.0

Requirements - Thesis option (4.0 credits)

1. 1.5 credits in:	1.5
ECON 5020 [0.5] Microeconomic Theory	
ECON 5021 [0.5] Macroeconomic Theory	
ECON 5027 [0.5] Econometrics I	
2. 0.5 credit from:	0.5
ECON 5055 [0.5] Financial Econometrics	
ECON 5712 [0.5] Micro-Econometrics	
ECON 5713 [0.5] Time-Series Econometrics	
3. 0.5 credit in approved electives	0.5
4. 1.5 credits in:	1.5

ECON 5909 [1.5]	M.A. Thesis	
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Total Credits 4.0

M.A. Economics with Concentration in Financial Economics (4.0 credits)

Requirements - Coursework option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5] Microeconomic Theory

ECON 5021 [0.5] Macroeconomic Theory

ECON 5027 [0.5] Econometrics I

2. 1.0 credit in: 1.0

ECON 5051 [0.5] Asset Pricing

ECON 5052 [0.5] Financial Markets and Instruments

3. 0.5 credit in: 0.5

ECON 5029 [0.5] Methods of Economic Research

4. 0.5 credit in elective concentration from: 0.5

ECON 5055 [0.5] Financial Econometrics

ECON 5058 [0.5] Advanced Topics in Financial Economics

ECON 5602 [0.5] International Monetary Theory and Policy

ECON 5608 [0.5] Monetary Economics and Financial Intermediation

ECON 5713 [0.5] Time-Series Econometrics

5. 0.5 credit in approved course (which may be an additional course from the elective concentration list) 0.5

Total Credits 4.0

Requirements - Thesis option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5] Microeconomic Theory

ECON 5021 [0.5] Macroeconomic Theory

ECON 5027 [0.5] Econometrics I

2. 1.0 credit in: 1.0

ECON 5051 [0.5] Asset Pricing

ECON 5052 [0.5] Financial Markets and Instruments

3. 1.5 credit in: 1.5

ECON 5909 [1.5] M.A. Thesis

Total Credits 4.0

M.A. Economics with Specialization in African Studies (4.0 credits)

Requirements - Coursework option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5] Microeconomic Theory

ECON 5021 [0.5] Macroeconomic Theory

ECON 5027 [0.5] Econometrics I

2. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

3. 0.0 credit in: 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

4. 0.5 credit in: 0.5

ECON 5029 [0.5] Methods of Economic Research

including a research paper on an African Studies topic approved by the Graduate Committee of the Institute of African Studies

5. 0.5 credit in African Studies elective approved by the M.A. Supervisor of the Department of Economics 0.5

6. 1.0 credit in ECON approved by the M.A. Supervisor of the Department of Economics, including at least 0.5 credit from ECON 5500, ECON 5504, ECON 5505 1.0

Total Credits 4.0

Requirements - Thesis option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5] Microeconomic Theory

ECON 5021 [0.5] Macroeconomic Theory

ECON 5027 [0.5] Econometrics I

2. 0.5 credit in: 0.5

AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

3. 0.0 credit in: 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

4. 1.5 credit in: 1.5

ECON 5909 [1.5] M.A. Thesis

on an African Studies topic approved by the Graduate Committee of the Institute of African Studies

5. 0.5 credit from: 0.5

ECON 5500 [0.5] Development Economics I

ECON 5504 [0.5] Development Economics II

ECON 5505 [0.5] Selected Topics in Development Economics

Total Credits 4.0

M.A. Economics with Specialization in Data Science (4.0 credits)

Requirements - Coursework option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5] Microeconomic Theory

ECON 5021 [0.5] Macroeconomic Theory

ECON 5027 [0.5] Econometrics I

2. 0.5 credit in: 0.5

DATA 5000 [0.5] Data Science Seminar

3. 0.5 credit in: 0.5

ECON 5029 [0.5] Methods of Economic Research

including a research paper on a data science related topic

4. 0.5 credit from: 0.5

ECON 5055 [0.5] Financial Econometrics

ECON 5361 [0.5] Labour Economics I

ECON 5362 [0.5] Labour Economics II

ECON 5700 [0.5] Social and Economic Measurement

ECON 5712 [0.5] Micro-Econometrics

ECON 5713 [0.5] Time-Series Econometrics

5. 0.5 credit in ECON approved by the M.A. Supervisor of the Department of Economics 0.5

6. 0.5 credit in Data Science elective (which may be an additional course from the preceding list) approved by the M.A. Supervisor of the Department of Economics 0.5

Total Credits 4.0

Requirements - Thesis option (4.0 credits)

1. 1.5 credits in: 1.5

ECON 5020 [0.5]	Microeconomic Theory	
ECON 5021 [0.5]	Macroeconomic Theory	
ECON 5027 [0.5]	Econometrics I	
2. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
3. 1.5 credit in:		1.5
ECON 5909 [1.5]	M.A. Thesis on a data science topic approved by the Data Science governance committee	
4. 0.5 credit from:		0.5
ECON 5055 [0.5]	Financial Econometrics	
ECON 5361 [0.5]	Labour Economics I	
ECON 5362 [0.5]	Labour Economics II	
ECON 5700 [0.5]	Social and Economic Measurement	
ECON 5712 [0.5]	Micro-Econometrics	
ECON 5713 [0.5]	Time-Series Econometrics	
Total Credits		4.0

Master of Arts Economics with Concentration in Financial Economics - Master of Business Administration with Concentration in Finance and Economics (10.0 credits)

Students completing the dual degree pathway will graduate with: M.A. Economics with Concentration in Financial Economics, and M.B.A. with Concentration in Financial Economics.

Requirements:

1. 6.0 credits in compulsory courses:		6.0
ACCT 5001 [0.25]	Financial Accounting	
ACCT 5002 [0.25]	Managerial Accounting	
BUSI 5802 [0.25]	Business Ethics	
BUSI 5998 [0.0]	MBA Skills Workshop	
ECON 5020 [0.5]	Microeconomic Theory	
ECON 5021 [0.5]	Macroeconomic Theory	
ECON 5027 [0.5]	Econometrics I	
ECON 5029 [0.5]	Methods of Economic Research	
FINA 5501 [0.25]	Financial Management	
FINA 5502 [0.25]	Corporate Finance	
IBUS 5701 [0.25]	International Business	
ITIS 5401 [0.25]	Managing Information Systems in Organizations	
MGMT 5100 [0.5]	Managing People and Organizations	
MKTG 5200 [0.5]	Marketing Strategy	
TOMS 5302 [0.25]	Operations Management	
STGY 5900 [0.5]	Corporate and Business Strategy	
STGY 5903 [0.5]	Strategic Concepts	
2. 1.75 credits in required concentration courses:		1.75
ECON 5051 [0.5]	Asset Pricing	
ECON 5052 [0.5]	Financial Markets and Instruments	
FINA 5512 [0.25]	Valuation	
FINA 5513 [0.25]	Mergers and Acquisitions	
FINA 5521 [0.25]	Financial Management Concentration Integration	
3. 0.5 credit in elective concentration from:		0.5
ECON 5055 [0.5]	Financial Econometrics	

ECON 5058 [0.5]	Advanced Topics in Financial Economics	
ECON 5602 [0.5]	International Monetary Theory and Policy	
ECON 5608 [0.5]	Monetary Economics and Financial Intermediation	
ECON 5713 [0.5]	Time-Series Econometrics	
4. 0.75 credit in M.B.A. elective courses:		0.75
5. 1.0 credit in:		1.0
BUSI 5999 [1.0]	Internship (Students with less than two (2) years of relevant professional employment experience must successfully complete the Internship in order to graduate. Students with two or more years relevant work experience may apply for an exemption.)	
Total Credits		10.0

Internship Placement

An Internship option is available to full-time students in the M.A. program who are eligible to work in Canada. Registration in the Internship option requires departmental permission and is limited by availability of placements. Application for an internship placement will normally be considered after the student has successfully completed 2.0 credits, including ECON 5020 and ECON 5027.

Internship placements will locate students for at least one term in the public service, the private sector, or non-governmental organizations. Students will integrate theoretical and applied economic analysis in their work experience. During their work term, students are required to register in ECON 5902 (Internship Placement), which is additional to the program requirements described above. While taking ECON 5902, students are considered to be part-time, and may register for at most 1.0 credit in total.

If the student is in receipt of a teaching assistantship, a research assistantship, or some other type of scholarship, the value of the award will be deferred to a later term. External awards will be issued or deferred in accordance with the relevant criteria of the associated agency.

Ph.D. Economics (6.0 credits)

Notwithstanding additional course work that may be required by the admissions committee as a condition of entry, students admitted to the Ph.D. program are required to complete:

Requirements:		
1. 4.0 credits in:		4.0
ECON 6019 [0.5]	Mathematical Foundations for Economic Theory	
ECON 6027 [0.5]	Econometrics II	
ECON 6501 [0.5]	PhD Microeconomic Theory I	
ECON 6502 [0.5]	PhD Microeconomic Theory II	
ECON 6503 [0.5]	PhD Macroeconomic Theory I	
ECON 6504 [0.5]	PhD Macroeconomics Theory II	
ECON 6513 [0.5]	Second Year Research Paper	
ECON 6514 [0.25]	Thesis Workshop I	
ECON 6515 [0.25]	Thesis Workshop II	
2. 2.0 credits in ECON electives		2.0

3. 0.0 credits in:	0.0
ECON 6909 [0.0] Ph.D. Thesis	

Total Credits **6.0**

Students must pass the six first year core courses ECON 6019, ECON 6027, ECON 6501, ECON 6502, ECON 6503 and ECON 6504 within twelve months of beginning full time study. Should a student fail any of these courses they will be offered a supplemental exam in August of their first year in each course that they failed. Students who do not pass all of the six core first year courses or their supplemental exams within twelve months of beginning full time study will normally be withdrawn from the Ph.D. program.

Students must take 2.0 credits in ECON electives. Students will choose one primary field of specialization as listed below and must take at least 1.0 credit of their ECON electives in this primary field. Students wishing to take courses from outside those listed below as part of their 2.0 credits in ECON electives must first obtain permission from the department.

Econometrics

ECON 5712 [0.5]	Micro-Econometrics
ECON 5713 [0.5]	Time-Series Econometrics
ECON 6714 [0.5]	Advanced Topics in Econometrics

Economic Development

ECON 5500 [0.5]	Development Economics I
ECON 5504 [0.5]	Development Economics II
ECON 5505 [0.5]	Selected Topics in Development Economics

Economics of the Environment

ECON 5803 [0.5]	Economics of Natural Resources
ECON 5804 [0.5]	Economics of the Environment
ECON 5805 [0.5]	Topics in Environmental and Resource Economics

Industrial Organization

ECON 5301 [0.5]	Industrial Organization I
ECON 5303 [0.5]	Industrial Organization II
ECON 5304 [0.5]	Topics in Industrial Organization

International Economics

ECON 5601 [0.5]	International Trade: Theory and Policy
ECON 5602 [0.5]	International Monetary Theory and Policy
ECON 5603 [0.5]	Topics in International Economics

Labour Economics

ECON 5361 [0.5]	Labour Economics I
ECON 5362 [0.5]	Labour Economics II
ECON 5363 [0.5]	Advanced Topics in Labour Economics

Monetary Economics

ECON 5606 [0.5]	Foundations of Monetary Economics
ECON 5607 [0.5]	Topics in Monetary Economics
ECON 5609 [0.5]	Explorations in Monetary Economics

Public Economics

ECON 5401 [0.5]	Public Economics: Expenditures
ECON 5402 [0.5]	Public Economics: Taxation
ECON 5403 [0.5]	Topics in the Theory of Public Economics

Second Year Paper

In the summer of their first year, students register in ECON 6513 Second Year Research Paper. Students who do not successfully complete ECON 6513 and 2.0 credits of Economics electives within 28 months of beginning full-time study will normally be withdrawn from the Ph.D. program.

Thesis Requirements

Doctoral students will write and defend a Ph.D. thesis. In preparing the thesis, the student is required to give two thesis workshops. In the first (ECON 6514), a research proposal for the thesis will be presented for evaluation by at least three faculty members. In the second (ECON 6515), a substantial portion of the research for the thesis will have been completed and will be presented. The student's progress will be evaluated by at least three faculty members.

Guidelines for Completion of Ph.D. Degree

Full-time Ph.D. students are expected to complete their requirements within five calendar years. Students who undertake the program by a combination of full-time and part-time study must complete their degree requirements within an elapsed period of nine calendar years, as set out in the General Regulations section of the Graduate Calendar.

Graduate Diploma in Economic Policy (2.0 credits)

The Graduate Diploma is designed to be completed in one year. However, as it is understood that most students will be either working for pay or full-time students in another graduate program, they may take the Graduate Diploma program on either a part-time or full-time basis.

1. 2.0 credits from:	2.0
ECON 5060 [0.5]	Economic Analysis of Public Policy
ECON 5061 [0.5]	Central Banking: Theory, Practice, and Recent Challenges
ECON 5062 [0.5]	Fiscal Policy in Canada: Practice and Challenges
ECON 5063 [0.5]	Innovation Policy and Economic Growth
ECON 5064 [0.5]	Economic Policy Formulation and Evaluation
ECON 5065 [0.5]	Selected Topics in Economic Policy

Total Credits **2.0**

Regulations

See the General Regulations section of this Calendar.

A grade of B- or higher must be received in each required core course in the M.A. program: ECON 5020, ECON 5021, ECON 5027, and ECON 5029. With respect to all other courses, a student may, with the recommendation of the Department and the approval of

the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed a grade of C+ in up to a maximum of 1.0 credit.

Students following the M.A.-M.B.A. dual pathway are governed by the academic regulations for the M.A. (above) and the M.B.A. For academic regulations concerning the M.B.A. visit the Business programs section of this Calendar.

Guidelines for Completion of Master's Degree

All approved elective courses will normally be taken at the 5000 level.

Full-time master's students are expected to complete their 4.0-credit requirements within two terms. Part-time students will take a minimum of five terms but must complete within an elapsed period of six calendar years, as set out in Section 13 of the General Regulations of this Calendar.

Regulations

See the General Regulations section of this Calendar.

Doctoral students must normally obtain a grade of B- or higher in each credit counted towards the degree.

Regulations

See the General Regulations section of this Calendar.

Graduate Diploma students must normally obtain a grade of B- or higher in each course counted towards the Diploma.

Admission

The normal requirement for admission to the master's program is a B.A. (Honours) (or the equivalent) in Economics, with an average grade of B+ or higher.

Applicants to the M.A.-M.B.A. dual degree pathway must qualify for admission for both the M.A. Economics and the M.B.A. program. For admission information concerning the M.B.A., visit the Business section of this Calendar.

Applicants are expected to have had adequate preparation in microeconomic and macroeconomic theory, econometrics, and mathematics. This could be satisfied, for example, by having completed undergraduate courses in advanced microeconomic theory, advanced macroeconomic theory, econometric theory and methods, mathematical analysis in economics, and statistical analysis in economics. Students with deficiencies in their preparation may have their program requirements extended accordingly.

Post-Baccalaureate Diploma: Applicants who lack the required undergraduate preparation may be admitted to the Post-Baccalaureate Diploma program in Economics designed to raise their standing to honours status. Refer to the Undergraduate Calendar for details about this program as well as the regulations governing it.

The Department may require certain applicants to write the Graduate Record Examination Aptitude Test and the Advanced Test in Economics offered by the Educational Testing Service.

Applicants whose first language is not English must certify adequate proficiency in English in one of the following ways:

- by presenting a CAEL overall band score of 70 or higher; or
- by presenting a TOEFL iBT total score of 100 or higher with a score of 24 or higher on each of the four (Listening, Reading, Writing, and Speaking) sections; or
- by presenting an IELTS overall band score of 7.0 or higher with a score of 6.5 or higher on each of the four (Listening, Reading, Writing, and Speaking) parts; or
- by having completed ESLA 1900 [1.0] or ESLA 1905 [1.0] at Carleton University with a final grade of B- or higher.

Admission

The normal requirement for admission into the Ph.D. program is a master's degree (or the equivalent) from a recognized university with high honours standing. The Department may require certain applicants to write the Graduate Record Examination Aptitude Test and the Advanced Test in Economics offered by the Educational Testing Service.

In cases of exceptional merit, Ph.D. candidates may be accepted on a part-time basis.

Transfer from Master's to Ph.D. Program

A student who achieves outstanding academic performance and demonstrates high promise for advanced research during the master's program may, with the permission of the Department, transfer into the Ph.D. program without completing the M.A. program if they have completed ECON 5020 (ECO 6120), ECON 5021 (ECO 6122), and ECON 5027 (ECO 5185) with an average grade of A or higher. Such students must take a total of at least eleven regular courses (M.A. and Ph.D. levels combined) and do not receive an M.A. degree. However, students who make the transfer and do not complete the Ph.D. can receive an M.A. by fulfilling all the requirements of the M.A. program.

Admission

The minimum requirement for admission to the Graduate Diploma program is an undergraduate degree with a GPA of 9.0 (out of 12) or higher, preferably with honours, successfully completed university-level introductory (micro- and macro-) economics, calculus, and linear algebra with a grade of C+ or higher in each, and permission of the Department of Economics. The normal requirement for admission is that the undergraduate degree be in economics or equivalent.

Economics (ECON) Courses

ECON 5020 [0.5 credit] (ECO 6122, ECO 6522)

Microeconomic Theory

An introduction to graduate-level microeconomic theory, including topics such as utility maximization and individual choice, decision-making under uncertainty, producer theory (technology, costs, and profit maximization), alternative market structures (competition, monopoly, and oligopoly), general equilibrium, and the economics of information.

Precludes additional credit for ECON 5000 (no longer offered) and ECON 5001 (no longer offered).

ECON 5021 [0.5 credit] (ECO 6120, ECO 6520)

Macroeconomic Theory

An introduction to graduate-level macroeconomic theory, including topics such as economic growth, consumption, investment, real and nominal frictions in the goods, labour, and credit markets, models of short-run economic fluctuations, and monetary and fiscal policy design.

Precludes additional credit for ECON 5002 (no longer offered).

ECON 5027 [0.5 credit] (ECO 5185, ECO 5585) Econometrics I

An introduction to econometrics at the graduate level. Topics include the analysis and treatment of univariate and multivariate regression models, GLS, IV, and maximum likelihood estimation, hypothesis testing, seemingly unrelated regression models, and simultaneous equations models, together with relevant economic applications. Precludes additional credit for ECON 5005 (no longer offered).

ECON 5029 [0.5 credit] Methods of Economic Research

Formulation, specification, and analysis of economic and econometric models; derivation of policy implications; communication of results and economic methodology. Includes: Experiential Learning Activity. Precludes additional credit for ECON 5006 (no longer offered).

Prerequisite(s): ECON 5020 (ECON 5000 if taken before 2012-2013, ECON 5001 if taken before 2007-2008) and ECON 5027 (ECON 5005 if taken before 2012-2013), or permission of the Department.

ECON 5051 [0.5 credit] Asset Pricing

Value, the dynamic optimization problems of firms and investors, risk-neutral pricing, and related topics.

ECON 5052 [0.5 credit] Financial Markets and Instruments

Capital structure, debt financing, options, financial planning, corporate governance, and related topics.

ECON 5055 [0.5 credit] Financial Econometrics

The econometrics of empirical finance including parametric and nonparametric models of volatility, evaluation of asset-pricing theories, and models for risk management and transactions data.

Prerequisite(s): ECON 5027 (or equivalent).

ECON 5058 [0.5 credit] Advanced Topics in Financial Economics

Current research in financial economics. Topics may include theoretical analysis, quantitative methods, policy issues, and applications to the financial industry.

Prerequisite(s): ECON 5051 or ECON 5052, which may be taken concurrently with ECON 5058.

ECON 5060 [0.5 credit] Economic Analysis of Public Policy

This course examines how economic theory and empirical analysis are used to design and evaluate public policies.

ECON 5061 [0.5 credit] Central Banking: Theory, Practice, and Recent Challenges

Issues related to the formulation and implementation of monetary policy in Canada and other countries. The theoretical basis for such policy. Ways in which policy makers have addressed practical issues of central-bank policy making over the years.

ECON 5062 [0.5 credit] Fiscal Policy in Canada: Practice and Challenges

Formulation and implementation of fiscal policy by the Government of Canada over recent decades. Assessment of the inputs (both analytical and political) into decision-making, the importance of public communications, the role of federal-provincial relations, and the roles of the bureaucracy and Cabinet.

ECON 5063 [0.5 credit] Innovation Policy and Economic Growth

An overview of the issues facing policy makers in trying to improve the innovative performance of the economy. The links between innovation, productivity, and economic growth. Topics may include private-sector innovation financing and the roles of government laboratories, universities, and intellectual property in promoting innovation.

ECON 5064 [0.5 credit] Economic Policy Formulation and Evaluation

Formulation of a policy paradigm based in economic theory and application of it to various relevant and current federal, provincial, and municipal policies, including those relating to health, pensions, income inequality, social assistance, division of powers, education, labour, Indigenous peoples, tax expenditures, and the environment.

ECON 5065 [0.5 credit]**Selected Topics in Economic Policy**

This course provides an overview of selected topics at the forefront of Economic Policy from both a theoretical and empirical perspective. Possible topics include regulation of financial markets, cryptocurrency, competition policy, environmental policy, artificial intelligence and machine learning for public policy, among others.

ECON 5209 [0.5 credit] (ECO 6106, ECO 6506)**Selected Topics in the History of Economic Thought**

The development of economic thought through time in relation to selected economic problems.

Precludes additional credit for ECON 5201 (no longer offered) and ECON 5202 (no longer offered).

Also offered at the undergraduate level, with different requirements, as ECON 4209, for which additional credit is precluded.

ECON 5230 [0.5 credit]**Economic History**

The application of economic theory and quantitative techniques to selected topics in economic history, which may include historical patterns of growth and welfare, nineteenth-century globalization, technological change, the development of agriculture, industrialization, the Great Depression, and the origins of central banks.

Also offered at the undergraduate level, with different requirements, as ECON 4230, for which additional credit is precluded.

ECON 5301 [0.5 credit] (ECO 6140, ECO 6540)**Industrial Organization I**

An examination of theories pertaining to industrial organization and their application by way of empirical studies. Topics include oligopoly theory, product differentiation, and strategic behaviour.

ECON 5303 [0.5 credit] (ECO 6142, ECO 6542)**Industrial Organization II**

Regulation and competition policy as alternative approaches for influencing industry conduct and performance and correcting market failures. Topics may include incentive regulation under asymmetric information, cost-based pricing, second-best pricing, peak-load pricing, rate-of-return regulation, price-cap regulation, access pricing, and regulatory capture.

ECON 5304 [0.5 credit] (ECO 6135, ECO 6535)**Topics in Industrial Organization**

Topics may include vertical restraints and vertical integration, innovation and research and development, network economics, contract theory, search theory and advertising, and industry studies.

ECON 5309 [0.5 credit]**Applied Industrial Economics**

The application of industrial economics, with special emphasis on Canada and the rest of North America. Topics include the structure of consumer demand, firm production and investment, industrial structure and international trade, and the effect of government policies on industrial development.

ECON 5361 [0.5 credit] (ECO 6191, ECO 6591)**Labour Economics I**

The application of microeconomic and macroeconomic theory to the labour market. Topics include labour supply and labour demand, wage determination, human capital, and the economics of education, and unemployment.

Precludes additional credit for ECON 5360 (no longer offered) and ECON 5307 (no longer offered).

ECON 5362 [0.5 credit] (ECO 6192, ECO 6592)**Labour Economics II**

Personnel economics and contract theory. Topics include the economics of unions, discrimination, the economics of the household, gender and fertility, and labour mobility.

ECON 5363 [0.5 credit] (ECO 6193, ECO 6593)**Advanced Topics in Labour Economics**

Topics may include program evaluation, inequality, labour markets and health, labour markets and crime, and the structural estimation of labour market models.

Precludes additional credit for ECON 5360 (no longer offered) and ECON 5307 (no longer offered).

ECON 5401 [0.5 credit] (ECO 6130, ECO 6530)**Public Economics: Expenditures**

The theory of public expenditures. Topics may include public goods and externalities, social insurance and redistribution, public provision of health care and education, public pension systems, and unemployment insurance.

ECON 5402 [0.5 credit] (ECO 6131, ECO 6531)**Public Economics: Taxation**

The study of tax systems. Concepts of equity and efficiency in taxation. The optimal design of tax structures using commodity, income, and capital taxes. Additional topics may include political economy of taxation, low-income support, environmental taxes, and tax evasion.

ECON 5403 [0.5 credit] (ECO 6133, ECO 6533)**Topics in the Theory of Public Economics**

Topics may include political economy, tax incidence in general equilibrium, the theory and practice of tax reform, normative approaches to income redistribution, the theory of non-market decision-making, the non-profit sector, and social choice theory.

ECON 5404 [0.5 credit]**Fiscal Federalism**

Economic aspects of federalism, including efficiency, redistribution, consideration of a federal system of government, intergovernmental grants, and problems of stabilization policy in a federal context.

ECON 5407 [0.5 credit]**Cost-Benefit Analysis and Project Evaluation**

Techniques and problems in cost-benefit analysis and the evaluation of public and private projects. Topics may include surplus measurement, investment decision rules, shadow pricing, the valuation of non-marketed goods, distributive weights, and the evaluation of projects involving uncertainty, loss of life, and/or population change.

ECON 5460 [0.5 credit] (ECO 6174, ECO 6574)**Health Economics**

Review of both classic and frontier work in the field of health and health care economics. Empirical work with an emphasis on theory and methodology. This course is also relevant to students interested in broader empirical microeconomic research.

ECON 5500 [0.5 credit] (ECO 6170, ECO 6570)**Development Economics I**

Topics at the forefront of development economics, combining theoretical and empirical analysis. Topics may include economic growth, firm behaviour, institutions, and political economy.

ECON 5504 [0.5 credit] (ECO 6171, ECO 6571)**Development Economics II**

A selection of topics currently at the forefront of research in development economics. Topics may include poverty and income distribution, labour markets, financial markets, and education.

ECON 5505 [0.5 credit] (ECO 6172, ECO 6572)**Selected Topics in Development Economics**

Overview of selected topics of current interest in the field of development economics from both a theoretical and empirical perspective.

ECON 5507 [0.5 credit] (ECO 6173, ECO 6573)**Environmental Aspects of Economic Development**

Policy aspects of sustainable economic development and environmental quality in developing countries. Topics may include energy use, deforestation, drought and desertification, depletion of natural resources, debt, environment and poverty, sustainable industrial and agricultural development, conservation policies, pollution control, and global environmental issues.

ECON 5601 [0.5 credit] (ECO 6160, ECO 6560)**International Trade: Theory and Policy**

International trade theory and its implications for economic policy, with emphasis on topics such as determinants of trade and specialization, gains from trade and commercial policy, international factor mobility, growth, and development.

ECON 5602 [0.5 credit] (ECO 6161, ECO 6561)**International Monetary Theory and Policy**

International monetary theory and its implications for economic policy, with emphasis on topics such as sources of equilibrium and disequilibrium in the balance of payments, balance-of-payments adjustment under fixed versus flexible exchange rates, international capital movements, and recent issues in the international monetary system.

ECON 5603 [0.5 credit] (ECO 6162, ECO 6562)**Topics in International Economics**

Selected topics in international economics, including theoretical analysis, quantitative methods, and policy formulation, implementation, and evaluation.

ECON 5606 [0.5 credit] (ECO 6180, ECO 6580)**Foundations of Monetary Economics**

Microeconomic foundations of monetary theory. Alternative theories of the existence of money and the micro-foundations for how money is integrated into aggregate macroeconomic models.

ECON 5607 [0.5 credit] (ECO 6181, ECO 6581)**Topics in Monetary Economics**

Coverage of one or more areas of current research on the frontiers of monetary economics.

ECON 5608 [0.5 credit] (ECO 6182, ECO 6582)**Monetary Economics and Financial Intermediation**

The evolution of the financial system and its interrelationship with the money supply process. Monetary and finance theory and empirical research applied to institutional problems in both historical and contemporary settings. Topics may include credit markets, financial instability, bubbles, and links to central bank policy.

ECON 5609 [0.5 credit] (ECO 6183, ECO 6583)**Explorations in Monetary Economics**

Explorations in the theory, policy and empirics of monetary economics.

ECON 5700 [0.5 credit]**Social and Economic Measurement**

Index number theory and national accounting. Topics may include: biases in indexes, inflation accounting, the theory of international comparisons, and the measurement of business and personal income, capital and depreciation, and productivity.

ECON 5712 [0.5 credit] (ECO 6175, ECO 6575)**Micro-Econometrics**

Analysis of the concepts and tools used in micro-econometrics with particular focus on empirical applicability. Topics may include discrete choice models, limited dependent variables, panel data, duration models, and program evaluation, together with relevant economic applications.

Precludes additional credit for ECON 5702 (no longer offered).

Prerequisite(s): ECON 5027 (or equivalent), or permission of the Department.

ECON 5713 [0.5 credit] (ECO 6176, ECO 6576)**Time-Series Econometrics**

Analysis of the concepts and tools used in time-series econometrics with particular focus on empirical applicability. Topics may include cointegration analysis, error-correction models, VAR models, volatility analysis, and non-linear time-series models, together with relevant economic applications.

Precludes additional credit for ECON 5703 (no longer offered).

Prerequisite(s): ECON 5027 (or equivalent), or permission of the Department.

ECON 5801 [0.5 credit]**Regional Economics**

Regional economic disparities in Canada, theories and public policy relating thereto. Consideration will be given to the concept of regions, location of industry and industrial structure, and to growth determinants.

ECON 5802 [0.5 credit]**Urban Economics**

The economic properties of urban areas. Attention will be focused on the macrodynamics of urban development, together with the microstatics of the equilibrium properties of the urban land market.

ECON 5803 [0.5 credit] (ECO 6143, ECO 6543)**Economics of Natural Resources**

The concept of scarcity rents in static and dynamic settings. Basic property regimes: open access, exclusive access and common property. Policy instruments. The importance of transaction costs. General-equilibrium and political-economic aspects of property regimes. Conflict. Elements of dynamic optimization. Renewable and non-renewable resources.

Precludes additional credit for ECON 5305 (no longer offered).

ECON 5804 [0.5 credit] (ECO 6151, ECO 6551)**Economics of the Environment**

Theory of environmental regulation, including command and control, incentive based mechanisms, effects of market structure, and interactions with pre-existing taxes. Valuation of non-marketed goods, including existence value, contingent valuation, hedonic price methods, health impacts, irreversibility, and recreational benefits.

Precludes additional credit for ECON 5306 (no longer offered).

ECON 5805 [0.5 credit] (ECO 6134, ECO 6534)**Topics in Environmental and Resource Economics**

Topics may include: international dimensions of environmental regulation, including treaties, competitiveness, and the effects of trade liberalization; development issues, including fiscal sustainability, Dutch disease, the resource curse, and population growth; resource topics, including optimal taxation, green national accounts, sustainability theory, and scarcity of extractive resources.

ECON 5820 [0.5 credit]**The Canadian Economy**

Aspects and problems of the Canadian economy. Economic theory applied to the workings of the Canadian economy. Topics may include regional development, industrial organization, factor markets, natural resources, income distribution, international trade and capital flows, and macroeconomic stability.

Precludes additional credit for ECON 5101 (no longer offered) and ECON 5102 (no longer offered).

ECON 5840 [0.5 credit]**Law and Economics**

The interrelationships between law and economics, emphasizing transaction costs and property rights. Economic analysis of such topics as the allocative effects of alternative property rights, contract, tort, and nuisance law, and the economics of crime, pollution, pay television, and eminent domain.

Precludes additional credit for ECON 5308 (no longer offered).

ECON 5880 [0.5 credit]**Special Topics**

Topics may vary from year to year and are announced in advance of the registration period.

Prerequisite(s): permission of the Department.

ECON 5902 [0.5 credit]**Internship Placement**

Internship students are required to register in this course during their work term.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ECON 5906 [0.5 credit]**Directed Research**

A substantial research paper is required of any student enrolled in this course, which is designed to facilitate the pursuit of research on a topic chosen in consultation with a faculty member and the relevant Graduate Supervisor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ECON 5909 [1.5 credit]**M.A. Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): At least A- in each of ECON 5020, ECON 5021, and ECON 5027, and approval of the Department.

ECON 6019 [0.5 credit] (ECO 7119)**Mathematical Foundations for Economic Theory**

Mathematical techniques needed to understand micro- and macro-economic theory at the Ph.D. level, and to carry out research. Real analysis. Review of static optimization. Continuous- and discrete-time dynamic optimization in deterministic and stochastic environments. Applications to economic theory are presented.

Includes: Experiential Learning Activity

Prerequisite(s): ECON 5020 (or equivalent) and ECON 5021 (or equivalent), or permission of the Department.

ECON 6027 [0.5 credit] (ECO 7126, ECO 7526)**Econometrics II**

Statistical foundations of econometrics: estimation, inference, and decision theory. Topics may include likelihood and moment-based inference, asymptotic theory, semi-parametric and non-parametric models, Bayesian approaches, and structural models, together with relevant economic applications.

Includes: Experiential Learning Activity

Precludes additional credit for ECON 5701 (no longer offered) and ECON 6005 (no longer offered).

Prerequisite(s): ECON 5027 (or equivalent).

ECON 6501 [0.5 credit]**PhD Microeconomic Theory I**

Topics include demand, production, general equilibrium, and welfare economics.

Precludes additional credit for ECON 6020 (no longer offered).

ECON 6502 [0.5 credit]**PhD Microeconomic Theory II**

Topics may include game theory, information economics, externalities and public goods.

Precludes additional credit for ECON 6020 (no longer offered).

ECON 6503 [0.5 credit]**PhD Macroeconomic Theory I**

Analysis of dynamic macroeconomic systems, with applications to economic growth. Micro-foundations of modern macroeconomics, with a focus on solving dynamic optimization problems and applied to consumption, portfolio, and investment decisions, and to micro-founded growth models.

Precludes additional credit for ECON 6021 (no longer offered).

ECON 6504 [0.5 credit]**PhD Macroeconomics Theory II**

Modern dynamic stochastic general equilibrium models, such as real-business-cycle models, models of labour-market and financial frictions, and heterogeneous-agent models. Students also learn computational techniques to solve and estimate these models.

Precludes additional credit for ECON 6021 (no longer offered).

ECON 6513 [0.5 credit]**Second Year Research Paper**

This course aids the transition to the research phase of the program. Students complete a research paper and formally present this paper in a departmental workshop.

Includes: Experiential Learning Activity

ECON 6514 [0.25 credit]**Thesis Workshop I**

Students present a research proposal that includes an advanced draft of a substantive chapter of their thesis for evaluation by at least three faculty members.

Includes: Experiential Learning Activity

Prerequisite(s): ECON 6013.

ECON 6515 [0.25 credit]**Thesis Workshop II**

Students present a substantial portion of their thesis for evaluation by at least three faculty members. This must include a revised draft of their first substantive chapter of their thesis, and an advanced draft of their second substantive chapter.

Includes: Experiential Learning Activity

Prerequisite(s): ECON 6014.

ECON 6714 [0.5 credit] (ECO 7177, ECO 7577)**Advanced Topics in Econometrics**

Coverage of one or more areas of current econometric research.

Prerequisite(s): ECON 6027 (ECON 6005 if taken before 2012-2013).

ECON 6904 [0.5 credit] (ECO 7980)**Directed Readings**

This course is designed to permit students to pursue research on topics chosen in consultation with faculty members and the Ph.D. Supervisor.

Prerequisite(s): permission of the Department.

ECON 6909 [0.0 credit] (ECO 9999)**Ph.D. Thesis**

Includes: Experiential Learning Activity

Electrical and Computer Engineering

This section presents the requirements for programs in:

- M.A.Sc. Electrical and Computer Engineering
- M.Eng. Electrical and Computer Engineering
- M.A.Sc. Electrical and Computer Engineering with Concentration in Modeling and Simulation
- M.Eng. Electrical and Computer Engineering with Concentration in Modeling and Simulation
- M.A.Sc. Electrical and Computer Engineering with Concentration in Software Engineering
- M.Eng. Electrical and Computer Engineering with Concentration in Software Engineering
- M.A.Sc. Electrical and Computer Engineering with Collaborative Specialization in Climate Change
- M.Eng. Electrical and Computer Engineering with Collaborative Specialization in Climate Change

- M.A.Sc. Electrical and Computer Engineering with Specialization in Data Science
- M.Eng. Electrical and Computer Engineering with Specialization in Data Science
- Cooperative Master's Degree
- Ph.D. Electrical and Computer Engineering
- Ph.D. Electrical and Computer Engineering with Concentration in Software Engineering

Program Requirements

Subject to the approval of the departmental chair, a student may take up to half of the course credits in the program in other disciplines (e.g., Mathematics, Computer Science, Physics).

Master's programs with a thesis earn the Master of Applied Science degree, while other master's programs earn the Master of Engineering degree.

M.A.Sc. Electrical and Computer Engineering (5.0 credits)

Requirements:

1. 2.5 credits in courses	2.5
2. 2.5 credits in Thesis	2.5
Total Credits	5.0

M.Eng. Electrical and Computer Engineering (4.5 credits)

Requirements - by project:

1. 0.5 credit in:	0.5
SYSC 5902 [0.5] Research Methods for Engineers	
2. 0.5 credit in project	0.5
3. 3.5 credits in courses, which may include up to an additional 0.5 credit in project	3.5
Total Credits	4.5

Requirements - by coursework:

1. 0.5 credit in:	0.5
SYSC 5902 [0.5] Research Methods for Engineers	
2. 4.0 credits in courses	4.0
Total Credits	4.5

M.A.Sc. Electrical and Computer Engineering with Concentration in Modeling and Simulation (5.0 credits)

Requirements - by thesis (5.0 credits)

1. 1.5 credits from modeling and simulation core courses:	1.5
SYSC 5001 [0.5] Simulation and Modeling	
SYSC 5003 [0.5] Discrete Stochastic Models	
SYSC 5004 [0.5] Optimization for Engineering Applications	
SYSC 5006 [0.5] Design of Real-Time and Distributed Systems	
SYSC 5101 [0.5] Design of High Performance Software	
SYSC 5102 [0.5] Performance Measurement and Modeling of Distributed Applications	
SYSC 5103 [0.5] Software Agents	

SYSC 5104 [0.5] Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5207 [0.5] Distributed Systems Engineering	
SYSC 5405 [0.5] Pattern Classification and Experiment Design	
SYSC 5703 [0.5] Integrated Database and Cloud Systems	
2. 1.0 credit in courses	1.0
3. 2.5 credits in:	2.5
SYSC 5909 [2.5] M.A.Sc. Thesis (in the area of modeling and simulation)	
Total Credits	5.0

M.Eng. Electrical and Computer Engineering with Concentration in Modeling and Simulation (4.5 credits)

Requirements - by project

1. 0.5 credit in:	0.5
SYSC 5902 [0.5] Research Methods for Engineers	
2. 0.5 credit in project:	0.5
SYSC 5900 [0.5] Systems Engineering Project (in the area of modeling and simulation)	
3. 2.0 credits from modeling and simulation core courses:	2.0

SYSC 5001 [0.5] Simulation and Modeling	
SYSC 5003 [0.5] Discrete Stochastic Models	
SYSC 5004 [0.5] Optimization for Engineering Applications	
SYSC 5006 [0.5] Design of Real-Time and Distributed Systems	
SYSC 5101 [0.5] Design of High Performance Software	
SYSC 5102 [0.5] Performance Measurement and Modeling of Distributed Applications	
SYSC 5103 [0.5] Software Agents	
SYSC 5104 [0.5] Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5207 [0.5] Distributed Systems Engineering	
SYSC 5405 [0.5] Pattern Classification and Experiment Design	
SYSC 5703 [0.5] Integrated Database and Cloud Systems	
4. 1.5 credits in courses, which may include up to an additional 0.5 credit in project	1.5
Total Credits	4.5

Requirements - by coursework:

1. 0.5 credit in:	0.5
SYSC 5902 [0.5] Research Methods for Engineers	
2. 2.0 credits from modeling and simulation core courses:	2.0
SYSC 5001 [0.5] Simulation and Modeling	
SYSC 5003 [0.5] Discrete Stochastic Models	
SYSC 5004 [0.5] Optimization for Engineering Applications	
SYSC 5006 [0.5] Design of Real-Time and Distributed Systems	
SYSC 5101 [0.5] Design of High Performance Software	

SYSC 5102 [0.5]	Performance Measurement and Modeling of Distributed Applications	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5405 [0.5]	Pattern Classification and Experiment Design	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
3. 2.0 credits in courses		2.0
Total Credits		4.5

M.A.Sc. Electrical and Computer Engineering with Concentration in Software Engineering (5.0 credits)

Requirements - thesis pathway:

1. 1.5 credits from Software Engineering core:		1.5
SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5105 [0.5]	Software Quality Engineering and Management	
SYSC 5206 [0.5]	Resource Management on Distributed Systems	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5701 [0.5]	Operating System Methods for Real-Time Applications	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5708 [0.5]	Model-Driven Development of Real-Time and Distributed Software	
SYSC 5709 [0.5]	Advanced Topics in Software Engineering	
SYSC 5803 [0.5]	Logic Programming	
SYSC 5806 [0.5]	Object Oriented Design of Real-Time and Distributed Systems	
SYSC 5807 [0.5]	Advanced Topics in Computer Systems	
2. 1.0 credit in courses		1.0
3. 2.5 credits in:		2.5
SYSC 5909 [2.5]	M.A.Sc. Thesis in the area of Software Engineering (each candidate submitting a thesis will be required to undertake an oral defence of the thesis)	
Total Credits		5.0

M.Eng. Electrical and Computer Engineering with Concentration in Software Engineering (4.5 credits)

Requirements (by coursework):

1. 0.5 credit in:		0.5
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SYSC 5902 [0.5]	Research Methods for Engineers	
2. 2.0 credits from software engineering core courses:		2.0
SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5105 [0.5]	Software Quality Engineering and Management	
SYSC 5206 [0.5]	Resource Management on Distributed Systems	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5701 [0.5]	Operating System Methods for Real-Time Applications	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5708 [0.5]	Model-Driven Development of Real-Time and Distributed Software	
SYSC 5709 [0.5]	Advanced Topics in Software Engineering	
SYSC 5803 [0.5]	Logic Programming	
SYSC 5806 [0.5]	Object Oriented Design of Real-Time and Distributed Systems	
SYSC 5807 [0.5]	Advanced Topics in Computer Systems	
3. 2.0 credits in courses		2.0
Total Credits		4.5

Requirements (by project):

1. 0.5 credit in:		0.5
SYSC 5902 [0.5]	Research Methods for Engineers	
2. 0.5 credit in:		0.5
SYSC 5900 [0.5]	Systems Engineering Project in the area of Software Engineering	
3. 2.0 credits from software engineering core courses:		2.0
SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5105 [0.5]	Software Quality Engineering and Management	
SYSC 5206 [0.5]	Resource Management on Distributed Systems	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5701 [0.5]	Operating System Methods for Real-Time Applications	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5708 [0.5]	Model-Driven Development of Real-Time and Distributed Software	

SYSC 5709 [0.5]	Advanced Topics in Software Engineering	
SYSC 5803 [0.5]	Logic Programming	
SYSC 5806 [0.5]	Object Oriented Design of Real-Time and Distributed Systems	
SYSC 5807 [0.5]	Advanced Topics in Computer Systems	
4. 1.5 credits in courses, which may include up to an additional 0.5 credits in project in the area of Software Engineering		1.5
Total Credits		4.5

M.A.Sc. Electrical and Computer Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		0.0
CLIM 5800 [0.0]	Climate Seminar Series	
3. 1.5 credits in courses		1.5
4. 2.5 credits in:		2.5
SYSC 5909 [2.5]	M.A.Sc. Thesis (in the area of climate change)	
Total Credits		5.0

M.Eng. Electrical and Computer Engineering with Collaborative Specialization in Climate Change (4.5 credits)

Requirements - by Project (4.5 credits)

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		0.0
CLIM 5800 [0.0]	Climate Seminar Series	
3. 0.5 credit in:		0.5
ELEC 5302 [0.5]	Renewable and Distributed Energy Resource Technologies	
SERG 5001 [0.5]	Sustainable Energy Policy for Engineers	
SERG 5003 [0.5]	Energy Evaluation and Assessment Tools	
SYSC 5005 [0.5]	Optimization Theory and Methods	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
or approved Advanced Topic in the area of climate change		
4. 2.5 credits in courses		2.5
5. 0.5 credit in:		0.5
SYSC 5900 [0.5]	Systems Engineering Project (in the area of climate change)	
Total Credits		4.5

Requirements - by Coursework (4.5 credits)

1. 1.0 credit in:		1.0
CLIM 5000 [1.0]	Climate Collaboration	
2. 0.0 credit in:		0.0
CLIM 5800 [0.0]	Climate Seminar Series	
3. 0.5 credit in:		0.5
ELEC 5302 [0.5]	Renewable and Distributed Energy Resource Technologies	

SERG 5001 [0.5]	Sustainable Energy Policy for Engineers	
SERG 5003 [0.5]	Energy Evaluation and Assessment Tools	
SYSC 5005 [0.5]	Optimization Theory and Methods	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
or approved Advanced Topic in the area of climate change		
4. 3.0 credits in courses		3.0
Total Credits		4.5

M.A.Sc. Electrical and Computer Engineering with Specialization in Data Science (5.0 credits)

Requirements - by Thesis (5.0 credits)

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit from data science elective courses:		0.5
SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5003 [0.5]	Discrete Stochastic Models	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5201 [0.5]	Computer Communication	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5300 [0.5]	Advanced Health Care Engineering	
SYSC 5303 [0.5]	Interactive Networked Systems and Telemedicine	
SYSC 5306 [0.5]	Mobile Computing Systems	
SYSC 5401 [0.5]	Adaptive and Learning Systems	
SYSC 5404 [0.5]	Multimedia Compression, Scalability, and Adaptation	
SYSC 5405 [0.5]	Pattern Classification and Experiment Design	
SYSC 5407 [0.5]	Planning and Design of Computer Networks	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems	
3. 1.5 credits in courses		1.5
4. 2.5 credits in:		2.5
SYSC 5909 [2.5]	M.A.Sc. Thesis	
in the area of data science (each candidate submitting a thesis will be required to undertake an oral defence of the thesis)		
Total Credits		5.0

M.Eng. Electrical and Computer Engineering with Specialization in Data Science (4.5 credits)

Requirements - by Project (4.5 credits)

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 1.0 credit from data science elective courses:		1.0

SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5003 [0.5]	Discrete Stochastic Models	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5201 [0.5]	Computer Communication	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5300 [0.5]	Advanced Health Care Engineering	
SYSC 5303 [0.5]	Interactive Networked Systems and Telemedicine	
SYSC 5306 [0.5]	Mobile Computing Systems	
SYSC 5401 [0.5]	Adaptive and Learning Systems	
SYSC 5404 [0.5]	Multimedia Compression, Scalability, and Adaptation	
SYSC 5405 [0.5]	Pattern Classification and Experiment Design	
SYSC 5407 [0.5]	Planning and Design of Computer Networks	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems	
3. 2.5 credits in courses		2.5
4. 0.5 credit in:		0.5
SYSC 5900 [0.5]	Systems Engineering Project in the area of data science	
Total Credits		4.5
Requirements - by Coursework (4.5 credits)		
1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 1.5 credits from data science elective courses:		1.5
SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5003 [0.5]	Discrete Stochastic Models	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5201 [0.5]	Computer Communication	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5300 [0.5]	Advanced Health Care Engineering	
SYSC 5303 [0.5]	Interactive Networked Systems and Telemedicine	
SYSC 5306 [0.5]	Mobile Computing Systems	
SYSC 5401 [0.5]	Adaptive and Learning Systems	
SYSC 5404 [0.5]	Multimedia Compression, Scalability, and Adaptation	
SYSC 5405 [0.5]	Pattern Classification and Experiment Design	
SYSC 5407 [0.5]	Planning and Design of Computer Networks	

SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5706 [0.5]	Analytical Performance Models of Computer Systems	

3. 2.5 credits in courses **2.5**

Total Credits **4.5**

Cooperative Master's Degree (5.0 credits)

Participation in the Cooperative Master's program is subject to acceptance by a suitable sponsoring organization.

Requirements - by thesis

1. 3.0 credits in courses **3.0**

2. 2.0 credits in Thesis **2.0**

Total Credits **5.0**

Requirements - by project

1. 4.0 credits in courses **4.0**

2. 1.0 credit in two 0.5-credit projects (Each project conducted in one of two work terms) **1.0**

Total Credits **5.0**

Ph.D. Electrical and Computer Engineering (1.5 credits)

Subject to the approval of the advisory committee, a student may take up to half of the course credits in the program in other disciplines (e.g., Mathematics, Computer Science, Physics).

Requirements:

1. 1.5 credits in courses **1.5**

2. A comprehensive examination involving written and oral examinations and a written thesis proposal, to take place before the end of the fourth term of registration

3. 0.0 credits in a thesis which must be defended at an oral examination **0.0**

Total Credits **1.5**

Ph.D. Electrical and Computer Engineering with Concentration in Software Engineering (1.5 credits)

Requirements:

1. 1.0 credit from software engineering core courses: **1.0**

SYSC 5001 [0.5]	Simulation and Modeling	
SYSC 5004 [0.5]	Optimization for Engineering Applications	
SYSC 5101 [0.5]	Design of High Performance Software	
SYSC 5103 [0.5]	Software Agents	
SYSC 5104 [0.5]	Methodologies For Discrete-Event Modeling And Simulation	
SYSC 5105 [0.5]	Software Quality Engineering and Management	
SYSC 5206 [0.5]	Resource Management on Distributed Systems	
SYSC 5207 [0.5]	Distributed Systems Engineering	
SYSC 5500 [0.5]	Designing Secure Networking and Computer Systems	

SYSC 5701 [0.5]	Operating System Methods for Real-Time Applications	
SYSC 5703 [0.5]	Integrated Database and Cloud Systems	
SYSC 5708 [0.5]	Model-Driven Development of Real-Time and Distributed Software	
SYSC 5709 [0.5]	Advanced Topics in Software Engineering	
SYSC 5803 [0.5]	Logic Programming	
SYSC 5806 [0.5]	Object Oriented Design of Real-Time and Distributed Systems	
SYSC 5807 [0.5]	Advanced Topics in Computer Systems	
2. 0.5 credit in courses		0.5
3. 0.0 credit in comprehensive examination (one topic of which must be in the area of software engineering)		
4. 0.0 credits in:		0.0
SYSC 6909 [0.0]	Ph.D. Thesis	
in the area of Software Engineering (each candidate submitting a thesis will be required to undertake an oral defence of the thesis)		
Total Credits		1.5

Graduate Courses

In all programs, the student may choose graduate courses from either university with the approval of the adviser or advisory committee. Course descriptions may be found in the departmental section of the calendar. All courses are of one term duration. Only a selection of courses listed is given in a particular academic year. The following codes identify the department offering the course.

Carleton University

- ELEC Department of Electronics
- SYSC Department of Systems and Computer Engineering

University of Ottawa

- EACJ School of Electrical Engineering and Computer Science

Course List by Research Area

BIOMEDICAL ENGINEERING

Systems and Computer Engineering (Carleton)

SYSC 5300 (ELG 6130)	Advanced Health Care Engineering
SYSC 5301 (ELG 6131)	Advanced Topics in Biomedical Engineering
SYSC 5302 (ELG 6321)	Biomedical Instrumentation
SYSC 5303 (ELG 6133)	Interactive Networked Systems and Telemedicine
SYSC 5304 (ELG 5127)	Medical Imaging Modalities
SYSC 5307 (ELG 6307)	Biological Signals

School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5303 (ELG 5123)	Health Care Engineering
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COMPUTER AIDED DESIGN FOR ELECTRONIC CIRCUITS

Department of Electronics (Carleton)

ELEC 5401 (ELG 6341)	Signal Integrity in High-Speed Designs: Modeling and Analysis
ELEC 5402 (ELG 6342)	Introduction to Electronic Design Automation Algorithms and Techniques
ELEC 5404 (ELG 6344)	Neural Networks for High-Speed/High-Frequency Circuit Design
ELEC 5405 (ELG 6340)	Advanced Linear and Nonlinear Circuit Theory and Applications
ELEC 5504 (ELG 6354)	Analysis of High-Speed Electronic Packages and Interconnects
ELEC 5506 (ELG 6356)	Simulation and Optimization of Electronic Circuits
ELEC 5508 (ELG 6358)	Computer Methods for Analysis and Design of VLSI Circuits
ELEC 5704 (ELG 6374)	Advanced Topics in CAD
ELEC 5803 (ELG 6383)	Behavioural Synthesis of ICs

School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5705 (ELG 5195)	Digital Logic Design
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COMPUTER AND SOFTWARE ENGINEERING

Systems and Computer Engineering (Carleton)

SYSC 5003 (ELG 6103)	Discrete Stochastic Models
SYSC 5005 (ELG 6105)	Optimization Theory and Methods
SYSC 5006 (ELG 6106)	Design of Real-Time and Distributed Systems
SYSC 5409	Interactive Media and Digital Art
SYSC 5101 (ELG 6111)	Design of High Performance Software
SYSC 5102 (ELG 6112)	Performance Measurement and Modeling of Distributed Applications
SYSC 5103 (ELG 6113)	Software Agents
SYSC 5104 (ELG 6114)	Methodologies For Discrete-Event Modeling And Simulation
SYSC 5105 (ELG 6115)	Software Quality Engineering and Management
SYSC 5108 (ELG 6118)	Topics in Information Systems
SYSC 5508 (ELG 6158)	Digital Systems Architecture
SYSC 5701 (CSI 5117)	Operating System Methods for Real-Time Applications
SYSC 5703 (ELG 6173)	Integrated Database and Cloud Systems
SYSC 5704 (ELG 6174)	Elements of Computer Systems
SYSC 5706 (ELG 6176)	Analytical Performance Models of Computer Systems
SYSC 5708 (ELG 6178)	Model-Driven Development of Real-Time and Distributed Software
SYSC 5709 (ELG 6179)	Advanced Topics in Software Engineering

SYSC 5806 (ELG 6186)	Object Oriented Design of Real-Time and Distributed Systems
SYSC 5807 (ELG 6187)	Advanced Topics in Computer Systems
School of Electrical Engineering and Computer Science (Ottawa)	
EACJ 5102 (ELG 5197)	Intro to Embedded Systems
EACJ 5100 (ELG 5200)	Machine Vision
EACJ 5203 (ELG 5191)	Distributed System Software
EACJ 5204 (ELG 5124)	Virtual Environments
EACJ 5205 (ELG 5125)	Quality Service Mgmt/Multimed
EACJ 5703 (ELG 5194)	Reliable Digital Systems
EACJ 5705 (ELG 5195)	Digital Logic Design
EACJ 5807 (ELG 7186)	Topics in Computers I
EACJ 5808 (ELG 7187)	Topics in Computers II
EACJ 5900 (ELG 7573)	Sujets choisis sur les ordinat

COMPUTER COMMUNICATIONS, DISTRIBUTED SYSTEMS, AND MULTIMEDIA

Systems and Computer Engineering (Carleton)

SYSC 5109 (ELG 6119)	Teletraffic Engineering
SYSC 5201 (ELG 6121)	Computer Communication
SYSC 5207 (ELG 6127)	Distributed Systems Engineering
SYSC 5306 (ELG 6136)	Mobile Computing Systems
SYSC 5403 (ELG 6143)	Network Access Techniques
SYSC 5406	Network Routing Technologies
SYSC 5407	Planning and Design of Computer Networks
SYSC 5408	Cross Layer Design for Wireless Networks
SYSC 5500	Designing Secure Networking and Computer Systems
SYSC 5502 (ELG 6152)	Advanced Linear Systems
SYSC 5800 (ELG 6180)	Network Computing
SYSC 5801 (ELG 6181)	Advanced Topics in Computer Communications
SYSC 5808 (ELG 6188)	Communications Network Management

School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5009 (ELG 5383)	Survivable Optical Networks
EACJ 5104 (ELG 5199)	Distributed Database Systems

EACJ 5108 (ELG 5382)	Switching and Traffic Theory
EACJ 5200 (ELG 5120)	Queuing Systems
EACJ 5202 (ELG 5122)	Analysis/Perf Eval: Comp Comm
EACJ 5206 (ELG 5126)	Source Coding and Data Compress.
EACJ 5208 (ELG 7185)	Wireless Ad Hoc Networking
EACJ 5500 (ELG 5371)	Digital Comm by Satellite
EACJ 5605 (ELG 7177)	Topics in Communications I
EACJ 5606 (ELG 7178)	Topics in Communications II
EACJ 5607 (ELG 5374)	Computer-Communication Network
EACJ 5369 (ELG 5396)	Internetworking Technologies
EACJ 5384/COMP 5405 (ELG 5384,CSI 5105,LEG 5384)	Network Security and Cryptography

DIGITAL AND OPTICAL COMMUNICATIONS

Department of Electronics (Carleton)

ELEC 5605 (ELG 6365)	Optical Fibre Communications
ELEC 5606 (ELG 6366)	Phase-Locked Loops and Receiver Synchronizers

Systems and Computer Engineering (Carleton)

SYSC 5200 (ELG 6120)	Algebraic Coding Theory
SYSC 5503 (ELG 6153)	Stochastic Processes
SYSC 5504 (ELG 6154)	Principles of Digital Communication
SYSC 5506 (ELG 5170)	Information Theory
SYSC 5605 (ELG 6165)	Advanced Digital Communication
SYSC 5606 (ELG 6166)	Introduction to Mobile Communications
SYSC 5607 (ELG 6167)	Source Coding and Data Compression
SYSC 5608 (ELG 6168)	Wireless Communications Systems Engineering
SYSC 5609 (ELG 6169)	Digital Television
SYSC 5700 (ELG 6170)	Spread Spectrum Systems
SYSC 5802 (ELG 6182)	Introduction to Information and System Science
SYSC 5804 (ELG 6184)	Advanced Topics in Communications Systems
School of Electrical Engineering and Computer Science (Ottawa)	
EACJ 5002 (ELG 5380)	Advanced Channel Coding
EACJ 5003 (ELG 5106)	Fourier Optics

EACJ 5105 (ELG 5373)	Secure Comm and Data Encryption
EACJ 5106 (ELG 5113)	Stochastic Systems
EACJ 5109 (ELG 5119)	Stochastic Processes
EACJ 5131 (ELG 5131)	Topics in Electromagnetics
EACJ 5132 (ELG 5132)	Smart Antennas
EACJ 5133 (ELG 5133)	Intro to Mobile Communications
EACJ 5300 (ELG 7114)	Topics in Systems and Control II
EACJ 5301 (ELG 7574)	Sujets choisis en systemes
EACJ 5360 (ELG 5360)	Digital Watermarking
EACJ 5501 (ELG 5170)	Information Theory
EACJ 5503 (ELG 5179)	Detection and Estimation
EACJ 5504 (ELG 5372)	Error Control Coding
EACJ 5506 (ELG 5375)	Principles of Digital Comm
EACJ 5605 (ELG 7177)	Topics in Communications I
EACJ 5606 (ELG 7178)	Topics in Communications II
EACJ 5702 (ELG 7572)	Sujets choisis en telecommun
EACJ 5704 (ELG 5180)	Advanced Digital Communication

INTEGRATED CIRCUITS AND DEVICES

Department of Electronics (Carleton)

ELEC 5502 (ELG 6352)	Analog Integrated Filters
ELEC 5503 (ELG 6353)	Radio Frequency Integrated Circuit Design
ELEC 5509 (ELG 6359)	Integrated Circuit Technology
ELEC 5600 (ELG 6360)	Digital Integrated Circuit Testing
ELEC 5703 (ELG 6373)	Advanced Topics in Solid State Devices and IC Technology
ELEC 5705 (ELG 6375)	Advanced Topics in VLSI
ELEC 5706 (ELG 6376)	Submicron CMOS and BiCMOS Circuits for Sampled Data Applications
ELEC 5707 (ELG 6377)	Microsensors and MEMS
ELEC 5800 (ELG 6380)	Theory of Semiconductor Devices
ELEC 5801 (ELG 6381)	High-Speed and Low-Power VLSI
ELEC 5802 (ELG 6382)	Surface-Controlled Semiconductor Devices
ELEC 5804 (ELG 6384)	VLSI Design

ELEC 5805 (ELG 6385)	VLSI Design Project
ELEC 5808 (ELG 6388)	Signal Processing Electronics
ELEC 5809 (ELG 6389)	Nonlinear Electronic Circuits

Systems and Computer Engineering (Carleton)

SYSC 5803 (ELG 6183)	Logic Programming
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School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5006 (ELG 7132)	Topics in Electronics I
EACJ 5007 (ELG 7133)	Topics in Electronics II
EACJ 5008 (ELG 7575)	Sujets choisis en electronique
EACJ 5103 (ELG 5198)	Parallel Processing with VLSI
EACJ 5208/ELEC 5200 (ELG 6320)	Wireless Ad Hoc Networking

MICROWAVES AND ELECTROMAGNETICS

Department of Electronics (Carleton)

ELEC 5409 (ELG 6349)	Microwave and Millimeterwave Integrated Circuits
ELEC 5501 (ELG 6351)	Passive Microwave Circuits
ELEC 5602 (ELG 6362)	Microwave Semiconductor Devices and Applications
ELEC 5604 (ELG 6364)	Radar Systems
ELEC 5607 (ELG 6367)	Fundamentals of Antenna Engineering
ELEC 5608 (ELG 6368)	Fourier Optics
ELEC 5609 (ELG 6369)	Nonlinear Microwave Devices and Effects
ELEC 5707 (ELG 6377)	Microsensors and MEMS
ELEC 5709 (ELG 6379)	Advanced Topics in Electromagnetics

School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5305 (ELG 5108)	Electromagnetic Compatibility
EACJ 5308 (ELG 7500)	Sujets choisis electromagnetiq
EACJ 5401 (ELG 5104)	Electromagnetic Waves
EACJ 5402 (ELG 5379)	Numerical Methods: Electromag
EACJ 5403 (ELG 5504)	Ondes Electromagnetiques
EACJ 5404 (ELG 7100)	Topics in Electromagnetics I
EACJ 5405 (ELG 7101)	Topics in Electromagnetics II
EACJ 5406 (ELG 5779)	Methodes numeriques en genie

PHOTONIC SYSTEMS

Department of Electronics (Carleton)

ELEC 5701 (ELG 6371)	Fibre and Waveguide Components for Communications and Sensors
ELEC 5702 (ELG 6372)	Principles of Photonics
ELEC 5705 (ELG 6375)	Advanced Topics in VLSI
ELEC 5708 (ELG 6378)	ASICs in Telecommunications
ELEC 5709 (ELG 6379)	Advanced Topics in Electromagnetics
EACJ 5004 (ELG 5381)	Photonics Networks
EACJ 5201 (ELG 5103)	Optical Communications Systems
EACJ 5404 (ELG 7100)	Topics in Electromagnetics I

SIGNAL, SPEECH, AND IMAGE PROCESSING

Systems and Computer Engineering (Carleton)

SYSC 5304 (ELG 5127)	Medical Imaging Modalities
SYSC 5370 (ELG 5370)	Multiresolution Signal Decomposition: Analysis and Applications
SYSC 5404	Multimedia Compression, Scalability, and Adaptation
SYSC 5600 (ELG 6160)	Adaptive Signal Processing
SYSC 5601 (ELG 6161)	Neural Signal Processing
SYSC 5602 (ELG 6162)	Digital Signal Processing
SYSC 5603 (ELG 6163)	Digital Signal Processing: Microprocessors, Software and Applications
SYSC 5604 (ELG 6164)	Advanced Topics in Digital Signal Processing

School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5360 (ELG 5360)	Digital Watermarking
EACJ 5385 (ELG 5385)	Matrix Method and Algor Sign Proce
EACJ 5507 (ELG 5376)	Digital Signal Processing
EACJ 5508 (ELG 5776)	Traitement numer des signaux
EACJ 5509 (ELG 5378)	Image Proc and Image Comm
EACJ 5600 (ELG 7172)	Topics in Signal Processing I
EACJ 5601 (ELG 7173)	Topics in Signal Processing II
EACJ 5603 (ELG 7179)	Topics in Signal Processing 3
EACJ 5800 (ELG 5377)	Adaptive Signal Processing

SYSTEMS AND MACHINE INTELLIGENCE

Systems and Computer Engineering (Carleton)

SYSC 5001 (ELG 6101)	Simulation and Modeling
SYSC 5004 (ELG 6104)	Optimization for Engineering Applications
SYSC 5005 (ELG 5162)	Optimization Theory and Methods
SYSC 5007 (ELG 6107)	Expert Systems
SYSC 5401 (ELG 6141)	Adaptive and Learning Systems
SYSC 5402 (ELG 6142)	Advanced Dynamics With Applications to Robotics
SYSC 5405 (ELG 6102)	Pattern Classification and Experiment Design
SYSC 5803 (ELG 6183)	Logic Programming

School of Electrical Engineering and Computer Science (Ottawa)

EACJ 5100 (ELG 5163)	Machine Vision
EACJ 5204 (ELG 5124)	Virtual Environments
EACJ 5207 (ELG 5161)	Robotics: Control/Sensing/Intel
EACJ 5209 (ELG 7113)	Topics in Systems and Control I
EACJ 5706 (CSI 5387)	Data Mining and Concept Learning
EACJ 5709 (ELG 5196)	Neural Networks and Fuzzy System
EACJ 7116 (ELG 7116)	Signal Proc: Intr Convex Optim
EACJ 5386 (ELG 5386)	Neural Networks and Fuzzy System

Admission

The normal requirement for admission to a master's program is a bachelor's degree in electrical engineering or a related discipline with a CGPA of B+.

Accelerated Pathway

The accelerated pathway in the M.A.Sc. and M.Eng. Electrical and Computer Engineering program is a flexible and individualized plan of graduate study for students in their final year of a Carleton B.Eng degree. Students with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third-year of study in the B.Eng. degree should consult with both the Undergraduate Chair and the Graduate Chair to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. At least 0.5 credit in ELEC or SYSC courses, or other approved courses, at the 5000-level with a grade of B+ or higher.
2. Minimum overall CGPA of A-.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission

The normal requirement for admission into the Ph.D. program is a master's degree with thesis in electrical engineering or a related discipline.

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.Eng. Electrical and Computer Engineering (coursework and research project pathways only), including all concentrations and specializations, is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Electrical Engineering - Joint (EACJ) Courses

EACJ 5002 [0.5 credit]

Advanced Channel Coding

EACJ 5003 [0.5 credit]

Fourier Optics

EACJ 5004 [0.5 credit]

Photonics Networks

EACJ 5005 [0.5 credit]

Knowledge-Based Systems

Includes: Experiential Learning Activity

EACJ 5006 [0.5 credit]

Topics in Electronics I

EACJ 5007 [0.5 credit]

Topics in Electronics II

EACJ 5008 [0.5 credit]

Sujets choisis en électronique

EACJ 5009 [0.5 credit]

Survivable Optical Networks

EACJ 5100 [0.5 credit]

Machine Vision

EACJ 5101 [0.5 credit]

Directed Studies

EACJ 5102 [0.5 credit]

Intro to Embedded Systems

EACJ 5103 [0.5 credit]

Parallel Processing with VLSI

EACJ 5104 [0.5 credit]

Distributed Database Systems

EACJ 5105 [0.5 credit]

Secure Comm and Data Encryption

EACJ 5106 [0.5 credit]

Stochastic Systems

EACJ 5107 [0.5 credit]

Multimedia Communications

EACJ 5108 [0.5 credit]

Switching and Traffic Theory

EACJ 5109 [0.5 credit]

Stochastic Processes

EACJ 5131 [0.5 credit]

Topics in Electromagnetics

EACJ 5132 [0.5 credit]

Smart Antennas

EACJ 5133 [0.5 credit]

Intro to Mobile Communications

EACJ 5200 [0.5 credit]

Queuing Systems

EACJ 5201 [0.5 credit]

Optical Communications Systems

EACJ 5202 [0.5 credit]

Analysis/Perf Eval: Comp Comm

EACJ 5203 [0.5 credit]

Distributed System Software

EACJ 5204 [0.5 credit]

Virtual Environments

Includes: Experiential Learning Activity

EACJ 5205 [0.5 credit]

Quality Service Mgmt/Multimed

EACJ 5206 [0.5 credit]

Source Coding and Data Compress.

EACJ 5207 [0.5 credit]

Robotics:Control/Sensing/Intel

EACJ 5208 [0.5 credit]

Wireless Ad Hoc Networking

EACJ 5209 [0.5 credit]

Topics in Systems and Control I

EACJ 5211 [0.5 credit]

Software Engineering Proj Mgmt

EACJ 5300 [0.5 credit]

Topics in Systems and Control II

EACJ 5301 [0.5 credit]

Sujets choisis en systemes

EACJ 5303 [0.5 credit]

Health Care Engineering

EACJ 5305 [0.5 credit]

Electromagnetic Compatibility

EACJ 5308 [0.5 credit]
Sujets choisis electromagnetiq

EACJ 5360 [0.5 credit]
Digital Watermarking

EACJ 5369 [0.5 credit]
Internetworking Technologies

EACJ 5384 [0.5 credit]
Network Security and Cryptography

EACJ 5385 [0.5 credit]
Matrix Method and Algor Sign Proce

EACJ 5386 [0.5 credit]
Neural Networks and Fuzzy System

EACJ 5401 [0.5 credit]
Electromagnetic Waves

EACJ 5402 [0.5 credit]
Numerical Methods: Electromag

EACJ 5403 [0.5 credit]
Ondes Electromagnetiques

EACJ 5404 [0.5 credit]
Topics in Electromagnetics I

EACJ 5405 [0.5 credit]
Topics in Electromagnetics II

EACJ 5406 [0.5 credit]
Methodes numeriques en genie

EACJ 5500 [0.5 credit]
Digital Comm by Satellite

EACJ 5501 [0.5 credit]
Information Theory

EACJ 5503 [0.5 credit]
Detection and Estimation

EACJ 5504 [0.5 credit]
Error Control Coding

EACJ 5506 [0.5 credit]
Principles of Digital Comm

EACJ 5507 [0.5 credit]
Digital Signal Processing

EACJ 5508 [0.5 credit]
Traitement numer des signaux

EACJ 5509 [0.5 credit]
Image Proc and Image Comm

EACJ 5600 [0.5 credit]
Topics in Signal Processing I

EACJ 5601 [0.5 credit]
Topics in Signal Processing II

EACJ 5603 [0.5 credit]
Topics in Signal Processing 3

EACJ 5605 [0.5 credit]
Topics in Communications I

EACJ 5606 [0.5 credit]
Topics in Communications II

EACJ 5607 [0.5 credit]
Computer-Communication Network

EACJ 5702 [0.5 credit]
Sujets choisis en telecommun

EACJ 5703 [0.5 credit]
Reliable Digital Systems
Includes: Experiential Learning Activity

EACJ 5704 [0.5 credit]
Advanced Digital Communication

EACJ 5705 [0.5 credit]
Digital Logic Design

EACJ 5706 [0.5 credit]
Data Mining and Concept Learning
Also listed as COMP 5706.

EACJ 5709 [0.5 credit]
Neural Networks and Fuzzy System

EACJ 5800 [0.5 credit]
Adaptive Signal Processing

EACJ 5807 [0.5 credit]
Topics in Computers I

EACJ 5808 [0.5 credit]
Topics in Computers II

EACJ 5900 [0.5 credit]
Sujets choisis sur les ordinat

EACJ 7116 [0.5 credit]
Signal Proc: Intr Convex Optim

Electronics (ELEC) Courses

Note: The Departments of Electronics and Systems and Computer Engineering offer courses in: Biomedical and Electrical Engineering, Communications Engineering, Computer Systems Engineering, Electrical Engineering, Software Engineering and Engineering Physics.

ELEC 5200 [0.5 credit] (ELG 6320)
Advanced Topics in Integrated Circuits and Devices
Topics vary from year to year.

ELEC 5301 [0.5 credit]**Silicon Photonics**

Fundamentals of silicon photonics, advanced electromagnetic theory, guided wave optics, interferometry, silicon-on-insulator (SOI) photonics, silicon based waveguide devices (planar, rib, strip), fabrication of photonic devices, passive and active silicon photonic devices such as modulators, lasers, detectors, silicon opto-electronic integration.

ELEC 5302 [0.5 credit]**Renewable and Distributed Energy Resource Technologies**

Topics covered include renewable energy resources, photovoltaic systems, wind generation systems, energy storage units, electric vehicles, grid integration, distributed generation, microgrid, active distribution network, modeling and analysis of power system components, state-of-the-art power system simulation tools.

ELEC 5401 [0.5 credit] (ELG 6341)**Signal Integrity in High-Speed Designs: Modeling and Analysis**

Crosstalk, distortion, ground bounce, skin effect. Interconnect modeling/simulation, packages, ground/power planes, Elmore delay, lossy-coupled, frequency-dependent transmission lines, telegrapher's equations, extraction, measured parameters, macromodeling: passivity/causality, MoC/MRA, vector fit, model reduction, electromagnetic compatibility/interference, mixed-domain systems, concurrent analysis. Precludes additional credit for ELEC 5704 (ELG 6374). Prerequisite(s): permission of the Department.

ELEC 5402 [0.5 credit] (ELG 6342)**Introduction to Electronic Design Automation Algorithms and Techniques**

Digital design process; overview of design automation tools/methodologies; theory of computational complexity; layout compaction; placement and partitioning; floorplanning; routing; digital simulation; switch-level simulation; logic synthesis; verification; analog and RF simulation.

Precludes additional credit for ELEC 5704 Section "Y" (ELG 6374 Section "Y").

ELEC 5404 [0.5 credit] (ELG 6344)**Neural Networks for High-Speed/High-Frequency Circuit Design**

Introduction to neural network methodologies for computer-aided design of high-speed/high-frequency circuits, including modeling of passive and active devices/circuits, and their applications in high-level design and optimization in wired and wireless electronic systems.

ELEC 5405 [0.5 credit] (ELG 6340)**Advanced Linear and Nonlinear Circuit Theory and Applications**

Graph theory, incidence matrices, cutset matrices, generalized KCL, topological formulation, state-space equations, Tellegen's theorem, state-transition matrix, multi-port representation, stability, passivity, causality, synthesis of passive circuits, active networks, nonlinear dynamic circuits.

ELEC 5409 [0.5 credit] (ELG 6349)**Microwave and Millimeterwave Integrated Circuits**

Design of communications electronics components with emphasis on GaAs MMIC implementation. Overview of MESFET, HEMT, HBT device modeling. Integrated lumped/distributed passive element modeling. Broadband impedance matching. Design of direct-coupled amplifiers, distributed amplifiers, power devices and amplifiers, phase shifters, switches, attenuators, mixers, oscillators.

ELEC 5501 [0.5 credit] (ELG 6351)**Passive Microwave Circuits**

Characteristics of homogeneous and inhomogeneous transmission lines and waveguides. Planar transmission lines: stripline, microstrip, coplanar line, slotline. Coupled transmission lines. Modeling of discontinuities. Ferrite components. Microwave network analysis: s-parameters, CAD models. Design of impedance-matching networks, directional couplers, power splitters, filters. Applications in MICs and MMICs.

ELEC 5502 [0.5 credit] (ELG 6352)**Analog Integrated Filters**

The fundamentals and details of analog continuous-time and SAW filters. Comparison to switched-capacitor filters. Review of filter concepts, types of filters, approximations, transformations. Building blocks such as op amps, transconductance amplifiers, and gyrators. Design using cascaded second-order sections, multiple loop feedback and LC ladder simulations.

ELEC 5503 [0.5 credit] (ELG 6353)**Radio Frequency Integrated Circuit Design**

Integrated radio front-end component design. Overview of radio systems, frequency response, gain, noise, linearity, intermodulation, image rejection, impedance matching, stability, and power dissipation. Detailed design of low-noise amplifiers, mixers, oscillators and power amplifiers. Use of on-chip inductors and baluns. Process variations, parasitics, and packaging.

ELEC 5504 [0.5 credit] (ELG 6354)**Analysis of High-Speed Electronic Packages and Interconnects**

Introduction to modeling, simulation and optimization of high-speed VLSI packages; models for packages, interconnects and ground/power planes; lumped, distributed and EM models for interconnects; delay, crosstalk and switching noise; moment matching techniques; concurrent thermal/electrical analysis of IC packages and boards.

ELEC 5506 [0.5 credit] (ELG 6356)**Simulation and Optimization of Electronic Circuits**

Introduction to computer simulation and optimization of electrical circuits. Time- and frequency-domain formulations for sensitivity analysis and optimization. Optimization techniques for performance-, cost- and yield-driven design of electronic circuits. Optimization approaches to modeling and parameter extraction of active and passive elements.

ELEC 5508 [0.5 credit] (ELG 6358)**Computer Methods for Analysis and Design of VLSI Circuits**

Formulation of circuit equations. Sparse matrix techniques. Frequency and time-domain solutions. Relaxation techniques and timing analysis. Noise and distortion analysis. Transmission line effects. Interconnect analysis and crosstalk simulation. Numerical inversion techniques. Asymptotic waveform estimation. Mixed frequency/time domain techniques. Sensitivity analysis.

ELEC 5509 [0.5 credit] (ELG 6359)**Integrated Circuit Technology**

Survey of technology used in silicon VLSI integrated circuit fabrication. Crystal growth and crystal defects, oxidation, diffusion, ion implantation and annealing, gettering, CVD, etching, materials for metallization and contacting, and photolithography. Structures and fabrication techniques required for submicron MOSFETs. Applications in advanced CMOS processes.

ELEC 5600 [0.5 credit] (ELG 6360)**Digital Integrated Circuit Testing**

Production testing of digital integrated circuits. Outline of methods of testing used in production. Testing schemes and design for testability. Faults and fault models, yield estimates, testability measures, fault simulation, test generation methods, sequential testing, scan design, boundary scan, built-in self test, CMOS testing.

ELEC 5602 [0.5 credit] (ELG 6362)**Microwave Semiconductor Devices and Applications**

Theory of operation for microwave diodes (varactor, p-i-n, Gunn, IMPATT) and transistors (BJT, MESFET, HBT, HEMT). Small-signal, large-signal, and noise models for CAD. Diode oscillators and reflection amplifiers. Design of transistor oscillators and amplifiers. Discussion of technology/fabrication issues and MMIC applications.

ELEC 5604 [0.5 credit] (ELG 6364)**Radar Systems**

Fundamentals; range equation, minimum detectable signal, radar cross-section, pulse repetition frequency, range ambiguities. Radar classes: CW, FM-CW, MTI, tracking, air surveillance, SSR, PAR, MLS, SAR, SLAR, OTH, 3D and bistatic radars. Radar subsystems; transmitters, antennas, receivers, processors, displays, detection criteria; CFAR receivers, noise, clutter precipitation.

ELEC 5605 [0.5 credit] (ELG 6365)**Optical Fibre Communications**

Transmission characteristics of and design considerations for multi-mode and single-mode optical fibre waveguides; materials, structures, and device properties of laser light sources; properties and performance of p-i-n and avalanche photodiodes; types of optical fibre signal formats, preamplifier topologies, noise, receiver sensitivity, transmitter design, link design.

ELEC 5606 [0.5 credit] (ELG 6366)**Phase-Locked Loops and Receiver Synchronizers**

Phase-locked loops; components, fundamentals, stability, transient response, sinusoidal operation, noise performance, tracking, acquisition and optimization. Receiver synchronizers: carrier synchronizers including squaring loop, Costas loop, and remodulator for BPSK, QPSK BER performance; clock synchronizers including early-late gate, in-phase/midphase, and delay line multiplier.

ELEC 5607 [0.5 credit] (ELG 6367)**Fundamentals of Antenna Engineering**

Basic properties of antennas (gain, radiation patterns, polarization, antenna temperature). Analysis of common antennas (dipoles, loops, helices, aperture antennas, microstrip, dielectric resonator antennas, reflectors). Analysis and design of linear and planar arrays (array factors, beam scanning, amplitude weighting, feed networks).

ELEC 5608 [0.5 credit] (ELG 6368)**Fourier Optics**

The theory and applications of diffractive and non-diffractive coherent optics, with emphasis on holograms, tomography and high-speed optical computing. Mathematical basis: generalized 2-D Fourier transforms, transfer function of an optical system, 2-D sampling theory, Helmholtz equation, Green's theorem, and the classical diffraction theories.

ELEC 5609 [0.5 credit] (ELG 6369)**Nonlinear Microwave Devices and Effects**

The physical basis and mathematical modeling of a variety of microwave/millimeter-wave devices, (some of which exhibit the most extreme nonlinear behaviour known), how they can be exploited in practical circuits and systems, and how the resulting device/circuit interactions can be analyzed.

ELEC 5701 [0.5 credit] (ELG 6371)**Fibre and Waveguide Components for Communications and Sensors**

Optical wave propagation in dielectric waveguides. Theory and practice for passive photonic devices used for routing, filtering, and signal processing, including structural and biochemical sensors. Directional couplers and splitters, filters (gratings and etalons), Mach-Zehnder interferometers, Arrayed waveguide gratings, and dispersion compensators.

ELEC 5702 [0.5 credit] (ELG 6372)**Principles of Photonics**

Electromagnetic wave propagation in crystals; review of geometric optics; Gaussian beam propagation; optical fibres; dielectric waveguides for optical integrated circuits; optical resonators; optical properties of materials; theory of laser oscillation; specific laser systems; electro-optic modulators; photorefractive materials and applications; holography; optical interconnects.

ELEC 5703 [0.5 credit] (ELG 6373)**Advanced Topics in Solid State Devices and IC Technology**

Recent and advanced topics in semiconductor device physics, modeling, and integrated circuit fabrication technology. Topic varies from year to year according to departmental research interests. Students may be expected to contribute lectures or seminars on selected topics.

ELEC 5704 [0.5 credit] (ELG 6374)**Advanced Topics in CAD**

Recent and advanced topics in computer-aided techniques for the design of VLSI and telecommunications circuits. Topics will vary from year to year according to the departmental research interests. Students may be expected to contribute lectures or seminars on selected topics.

ELEC 5705 [0.5 credit] (ELG 6375)**Advanced Topics in VLSI**

Recent and advanced topics in the design of very large scale integrated circuits, with emphasis on mixed analog/digital circuits for telecommunications applications. Topic varies from year to year according to departmental research interests. Students may be expected to contribute lectures or seminars on selected topics.

ELEC 5706 [0.5 credit] (ELG 6376)**Submicron CMOS and BiCMOS Circuits for Sampled Data Applications**

The analog aspects of digital CMOS and BiCMOS circuit design in submicron technologies including reliability; sampled analog circuits, including amplifier non-ideal characteristics and switch charge injection; CMOS/BiCMOS amplifier design considerations, leading up to standard folded-cascode and two-stage circuits.

ELEC 5707 [0.5 credit] (ELG 6377)**Microsensors and MEMS**

Physical design of microelectromechanical systems (MEMS) and microfabricated sensors and actuators. An overview of thin and thick film processes and micromachining techniques will provide fabrication background. Device design including piezoresistive, piezoelectric, electromagnetic, thermal, optical, and chemical sensors and actuators.

ELEC 5708 [0.5 credit] (ELG 6378)**ASICs in Telecommunications**

Introduction to modern ASIC technologies for Telecom. Review of circuit-level building blocks for typical wireline and wireless applications, including power/performance tradeoffs. Corresponding FPGA analog and digital IO circuits are discussed. A topical literature study and circuit level design exercises.

ELEC 5709 [0.5 credit] (ELG 6379)**Advanced Topics in Electromagnetics**

Recent and advanced topics in electro-magnetics, antennas, radar systems, microwave devices and circuits, or optoelectronics. The subject material will vary from year to year according to research interests in the department and/or expertise provided by visiting scholars or sessional lecturers.

ELEC 5800 [0.5 credit] (ELG 6380)**Theory of Semiconductor Devices**

Equilibrium and non-equilibrium conditions in a semiconductor. Carrier transport theory. Physical theory of basic semiconductor device structures and aspects of design: PN junctions and bipolar transistors, field effect devices. Current transport relationships for transistors. Charge control theory. Modeling of device mechanisms. Performance limitations of transistors.

ELEC 5801 [0.5 credit] (ELG 6381)**High-Speed and Low-Power VLSI**

High-Speed and Low-Power CMOS VLSI circuit techniques. Low and high levels of abstraction; transistor, switch, logic-gate, module, system levels. State-of-the-art techniques to optimize the performance and energy consumption of a circuit. One or more of these techniques are used in a design project. Prerequisite(s): ELEC 4708 or ELEC 5804 or the equivalent or permission of the instructor.

ELEC 5802 [0.5 credit] (ELG 6382)**Surface-Controlled Semiconductor Devices**

Fundamentals of the MOS system; MOS capacitors. Long channel behaviour: theory, limitations and performance of the SPICE level 1 and 2 models. Small geometry effects. Subthreshold operation and modeling. Hot electron effects and reliability.

ELEC 5803 [0.5 credit] (ELG 6383)**Behavioural Synthesis of ICs**

Various topics related to computer analysis and synthesis of VLSI circuits including: logic synthesis, finite state machine synthesis, design methodologies, design for reuse, testing, common VLSI functions, a review of Verilog. Prerequisite(s): Some IC design knowledge such as given in ELEC 4708.

ELEC 5804 [0.5 credit] (ELG 6384)**VLSI Design**

IC design course with strong emphasis on design methodology, to be followed by ELEC 5805 (ELG 6385) in the second term. Design philosophies considered will include Full Custom design, standard cells, gate-arrays and sea-of-gates using CMOS and BiCMOS technology. State-of-the-art computer-aided design tools are used.

ELEC 5805 [0.5 credit] (ELG 6385)**VLSI Design Project**

Using state-of-the-art CMOS and BiCMOS technologies, students will initiate their own design of an integrated circuit using tools in the CAD lab and submit it for fabrication where the design warrants.

ELEC 5808 [0.5 credit] (ELG 6388)**Signal Processing Electronics**

CCDs, transversal filters, recursive filters, switched capacitor filters, with particular emphasis on integration of analog signal processing techniques in monolithic MOS ICs. Detailed op amp design in CMOS technology. Implications of nonideal op amp behaviour in filter performance. Basic sampled data concepts.

ELEC 5809 [0.5 credit] (ELG 6389)**Nonlinear Electronic Circuits**

Introduction to non-linear circuits used in today's telecommunications ICs; CMOS non-linear circuits such as direct-RF-sampling mixers, phase-detectors; digital loop-filters, DCOs, frequency synthesizers and clock-and-data-recovery are introduced. Modeling of these non-linear circuits and existing options for simulations and closed form circuit analysis is presented.

Precludes additional credit for ELEC 5705 (ELG 6375).

Prerequisite(s): permission of the Department.

ELEC 5900 [0.5 credit] (ELG 6389)**Engineering Project I**

A one-term course, carrying 0.5 credit, for students pursuing the course work M.Eng. program. An engineering study, analysis and/or design project under the supervision of a faculty member. Written and oral reports are required. This course may be repeated for credit.

Includes: Experiential Learning Activity

ELEC 5901 [1.0 credit] (ELG 6389)**Engineering Project II**

A one-term course, carrying full-course credit, for students pursuing the course work or co-op M.Eng. program. An engineering study, analysis and/or design project under the supervision of a faculty member. Written and oral reports are required. This course may be repeated for credit.

Includes: Experiential Learning Activity

ELEC 5906 [0.5 credit] (ELG 6389)**Directed Studies**

Various possibilities exist for pursuing directed studies on topics approved by a course supervisor, including the above listed course topics where they are not offered on a formal basis.

ELEC 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

ELEC 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Systems and Computer Engineering (SYSC) Courses**SYSC 5001 [0.5 credit] (ELG 6101)****Simulation and Modeling**

Simulation as a problem solving tool. Random variable generation, general discrete simulation procedure: event table and statistical gathering. Analyses of simulation data: point and interval estimation. Confidence intervals. Overview of modeling, simulation and problem solving using SIMSCRIPT, MODSIM and other languages.

Also offered at the undergraduate level, with different requirements, as SYSC 4005, for which additional credit is precluded.

SYSC 5003 [0.5 credit] (ELG 6103)**Discrete Stochastic Models**

Models for software, computer systems, and communications networks, with discrete states, instantaneous transitions and stochastic behaviour. Communicating finite state machines and Petri Nets. Review of concepts of probability, and of Markov Chains with discrete and continuous parameters. Basic queuing theory. Numerical methods for Markov Models.

SYSC 5004 [0.5 credit] (ELG 6104)**Optimization for Engineering Applications**

Introduction to algorithms and computer methods for optimizing complex engineering systems. Includes linear programming, networks, nonlinear programming, integer and mixed-integer programming, genetic algorithms and search methods, and dynamic programming. Emphasizes practical algorithms and computer methods for engineering applications.

SYSC 5005 [0.5 credit] (ELG 6105)**Optimization Theory and Methods**

Advanced theory, algorithms and computer methods for optimization. Interior point methods for linear optimization, advanced methods for nonlinear and mixed-integer optimization. Search methods. Applications in engineering. Prerequisite(s): SYSC 5004 (ELG 6104) or equivalent.

SYSC 5006 [0.5 credit] (ELG 6106)**Design of Real-Time and Distributed Systems**

Characteristics of real-time and distributed systems. Modern middleware systems, such as CORBA, DCE, RMI for building distributed applications: advantages and disadvantages. Analyzing designs for robustness, modularity, extensibility, portability and performance. Implementation issues. Major course project.

Includes: Experiential Learning Activity

Prerequisite(s): SYSC 3303 and SYSC 5708 (ELG 6178) or similar experience.

SYSC 5007 [0.5 credit] (ELG 6107)**Expert Systems**

Survey of some landmark expert systems; types of architecture and knowledge representation; interfering techniques; approximate reasoning; truth maintenance; explanation facilities; knowledge acquisition. A project to implement a small expert system will be assigned.

Also listed as COMP 5007.

Prerequisite(s): COMP 4007 or COMP 5001 (CSI 5113) or permission of the Department.

SYSC 5101 [0.5 credit] (ELG 6111)**Design of High Performance Software**

Designing software to demanding performance specifications. Design analysis using models of computation, workload, and performance. Principles to govern design improvement for sequential, concurrent and parallel execution, based on resource architecture and quantitative analysis.

Prerequisite(s): SYSC 5704 (ELG 6174) and a course in software engineering, or equivalent.

Also offered at the undergraduate level, with different requirements, as SYSC 4102, for which additional credit is precluded.

SYSC 5102 [0.5 credit] (ELG 6112)**Performance Measurement and Modeling of Distributed Applications**

Performance measurements, metrics and models of middleware based systems and applications. Benchmarks, workload characterization, and methods for capacity planning and system sizing. Performance monitoring infrastructures for operating systems and applications. Introduction to the design and analysis of experiments and the interpretation of measurements.

Prerequisite(s): SYSC 5101 (ELG 6611) or equivalent.

SYSC 5103 [0.5 credit] (ELG 6113)**Software Agents**

Agent-based programming; elements of Distributed Artificial Intelligence; beliefs, desires and intentions; component-based technology; languages for agent implementations; interface agents; information sharing and coordination; KIF; collaboration; communication; ontologies; KQML; autonomy; adaptability; security issues; mobility; standards; agent design issues and frameworks, applications in telecommunications.

Prerequisite(s): Knowledge of Java, C/C++ or Smalltalk.

SYSC 5104 [0.5 credit] (ELG 6114)**Methodologies For Discrete-Event Modeling And Simulation**

Methodological aspects of simulation. Modeling discrete events systems. Modeling formalisms: FSA, FSM, Petri Nets, DEVS, others. Verification and validation. Cellular models: Cellular Automata, Cell-DEVS. Continuous and hybrid models. Parallel and Distributed simulation (PADS) techniques. PADS middleware: HLA, Parallel-DEVS, Time-Warp.

Prerequisite(s): knowledge of C++ and of basic concepts of concurrency and distributed systems.

SYSC 5105 [0.5 credit] (ELG 6115)**Software Quality Engineering and Management**

All aspects of software quality engineering. Software testing, at all stages of the software development and maintenance life cycle. Software reviews and inspections. Use of software measurement and quantitative modeling for the purpose of software quality control and improvement.

Precludes additional credit for CSI 5111 (COMP 5501).

Prerequisite(s): an undergraduate course in software engineering such as SYSC 4800 or SEG 3300, or equivalent, and basic statistics.

SYSC 5108 [0.5 credit] (ELG 6118)**Topics in Information Systems**

Recent and advanced topics in the field of Information Systems and its related areas.

SYSC 5109 [0.5 credit] (ELG 6119)**Teletraffic Engineering**

Congestion phenomena in telephone systems, and related telecommunications networks and systems, with an emphasis on the problems, notation, terminology, and typical switching systems and networks of the operating telephone companies. Analytical queuing models and applications to these systems.

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent.

SYSC 5200 [0.5 credit] (ELG 6120)**Algebraic Coding Theory**

Review of Algebra, Finite Fields, Linear Block Codes and their Properties, Hamming Codes, Cyclic Codes, Hadamard Matrices and Hadamard Codes, Golay Codes, Reed-Muller Codes, BCH and Reed-Solomon Codes, Decoding Algorithms, Coding Bounds.

Precludes additional credit for SYSC 5507 (ELG 6157).

SYSC 5201 [0.5 credit] (ELG 6121)**Computer Communication**

Computer network types, introductory queuing theory and performance analysis. OSI layering and BISDN layering modifications. Data link layer. Local area networks and random access (CSMA- CD, switched ethernet, token ring, wireless LAN). Public Networks. IP networks, addressing, routing. Transport layer, flow control. Introduction to ISDN. Precludes additional credit for EACJ 5607 (ELG 5374) or SYSC 4602 (ELG 4181).

Prerequisite(s): Undergraduate preparation in probability theory equivalent to STAT 3502.

SYSC 5202 [0.5 credit] (BMG 5107)**Applications in Biomedical Image Processing**

Image processing methods applied to biomedical images. Overview of medical imaging modalities. Image enhancement, segmentation, registration and fusion. Image quality metrics. Image formats. Application examples.

Includes: Experiential Learning Activity

Also listed as BIOM 5202.

SYSC 5206 [0.5 credit]**Resource Management on Distributed Systems**

Principles and techniques for resource management on distributed systems including clouds, grids and data analytics platforms; management of computing and storage resources; service level agreements; performance and energy aware techniques for scheduling, allocation, dynamic resource provisioning; cyber-physical systems and BigData; resource management for BigData analytics. Includes: Experiential Learning Activity

SYSC 5207 [0.5 credit] (ELG 6127)**Distributed Systems Engineering**

Techniques for representing distributed systems: graphical and textual models. Processes, threads, synchronization and inter-process communication techniques, RPC. Middleware: client-server (CORBA), grids, Web services. Resource management: processor allocation, load sharing, Grid scheduling, real-time issues. Protocol: OSI model, application and presentation layers. Prerequisite(s): permission of the Department.

SYSC 5300 [0.5 credit] (ELG 6130)**Advanced Health Care Engineering**

Healthcare and technology; overview of medical devices and sensors; safe and effective use and management of technology; telemedicine; medical databases, data collection, storage, retrieval and computers in medicine; electronic patient records, PACS; clinical decision-support systems.

Also listed as BIOM 5401 (BMG 5318).

Precludes additional credit for EACJ 5303 (ELG 5123).

Prerequisite(s): permission of the instructor.

SYSC 5301 [0.5 credit] (ELG 6131)**Advanced Topics in Biomedical Engineering**

Topics vary from year to year.

Also listed as EACJ 5127 (ELG 6131).

Prerequisite(s): permission of the Department.

SYSC 5302 [0.5 credit] (ELG 6321)**Biomedical Instrumentation**

Instrumentation designed to measure physiological variables related to the function of the heart, lungs, kidney, nervous and musculo-skeletal system; emergency, critical care, surgery and anaesthesia equipment.

Also listed as EACJ 5302 (ELG 6321).

Precludes additional credit for BIOM 5100 (BMG 5103).

Prerequisite(s): permission of the instructor.

SYSC 5303 [0.5 credit] (ELG 6133)**Interactive Networked Systems and Telemedicine**

Telemanipulator; human motoring and sensory capabilities; typical interface devices; mathematical model of haptic interfaces; haptic rendering; stability and transparency; remote control schemes; time delay compensation; networking and realtime protocols, history and challenges of telemedicine; telemedicine applications: telesurgery, telemonitoring, telediagnosis and telehomecare.

Also listed as BIOM 5402 (BMG 5304).

Prerequisite(s): permission of the Department.

SYSC 5304 [0.5 credit] (ELG 5127)**Medical Imaging Modalities**

Mathematical models of image formation based on the image modality and tissue properties. Linear models of image degradation and reconstruction. Inverse problems and regularization for image reconstruction. Image formation in radiology, computed tomography, magnetic resonance imaging, nuclear medicine, ultrasound, positron emission tomography.

Also listed as BIOM 5200 (BMG 5105).

SYSC 5306 [0.5 credit] (ELG 6136)**Mobile Computing Systems**

Systems to build mobile applications. Covers data link layer to application layer. Emphasis on existing wireless infrastructure and IETF protocols. Focuses on view of mobile application developer; communication systems, middleware and application frameworks, defacto standards proposed/developed by industry consortia. Precludes additional credit for COMP 5402 (CSI 5142). Prerequisite(s): EACJ 5607 (ELG 5374) or SYSC 5201 (ELG 6121) or permission of the Department.

SYSC 5307 [0.5 credit] (ELG 6307)**Biological Signals**

Modeling of neuromuscular biological signals, including subthreshold phenomena, active behaviour of cell membranes, and innervation processes. Measurement of biological signals, including electrode effects. Time domain, frequency domain, and adaptive filtering techniques for noise reduction.

Precludes additional credit for BIOM 5101 (BMG 5104).

SYSC 5370 [0.5 credit] (ELG 5370)**Multiresolution Signal Decomposition: Analysis and Applications**

Multirate signal processing: sampling rate conversion, polyphase representation. Bases, filter banks: series expansion of discrete-time signals, series expansion of continuous-time signals, multiresolution concept and analysis, construction of wavelet, wavelet series. Complexity of multirate discrete-time processing, filter banks, and wavelet series computation.

SYSC 5401 [0.5 credit] (ELG 6141)**Adaptive and Learning Systems**

System identification. Least squares and recursive identification techniques. Asymptotic and theoretical properties. Model structure selection. Prediction and estimation. Model reference adaptive control and self-tuning regulators. Nonlinear adaptive systems. Stability. Neural networks and neuro-control. Applications to robotics, control and pattern recognition.

Prerequisite(s): SYSC 5502 (ELG 6152) or equivalent.

SYSC 5402 [0.5 credit] (ELG 6142)**Advanced Dynamics With Applications to Robotics**

Lagrange equations and Hamilton's principle. Dynamics of lumped parameter and continuous systems. Natural modes and natural frequencies. Forced vibrations. Stability and bifurcation. Kinematics and dynamics of rigid bodies. Gyroscopic effects. Forward and inverse kinematics of robot manipulators. Denavit-Hartenberg notation. Derivation of manipulator dynamics.

SYSC 5403 [0.5 credit] (ELG 6143)**Network Access Techniques**

A range of access technologies with emphasis on broadband access. Physical channels and the state-of-the-art of coding, modulation, multiplexing strategies to overcome physical impairments. including high-speed transmission over twisted pair, wireless, fibre and co-axial media.

Prerequisite(s): SYSC 5503 (ELG 6153), and SYSC 5504 (ELG 6154) or ELG 5375 (EACJ 5506).

SYSC 5404 [0.5 credit]**Multimedia Compression, Scalability, and Adaptation**

This course covers media compression, in-depth issues of scalability in the compression domain (including audio, images, video, 2D and 3D graphics), and adaptation towards various contexts; as well is covering various popular media encoding standards (including JPEG and MPEG).

SYSC 5405 [0.5 credit] (ELG 6102)**Pattern Classification and Experiment Design**

Introduction to a variety of supervised and unsupervised pattern classification techniques with emphasis on correct application. Statistically rigorous experimental design and reporting of performance results. Case studies will be drawn from various fields including biomedical informatics. Includes: Experiential Learning Activity

Also listed as BIOM 5405.

Prerequisite(s): undergraduate introductory probability and statistics.

SYSC 5406 [0.5 credit]**Network Routing Technologies**

The course covers routing technologies for high-speed networks. The course addresses in-depth issues and technologies in traffic engineering, MPLS (Multiprotocol Label Switching) system components and architecture, constraint-based routing, quality of service, protection and restoration, virtual private networks, cross layer interworking, and special topics.

SYSC 5407 [0.5 credit]**Planning and Design of Computer Networks**

Planning process of computer networks; needs and technical requirements; modeling of different network planning problems; exact and approximate algorithms; topological planning and expansion problems; equipment (switch, router) location problem; approximate and optimal routing algorithms; presentation of various case studies. Includes: Experiential Learning Activity

SYSC 5408 [0.5 credit]**Cross Layer Design for Wireless Networks**

Quality of service measures at different layers. Parameter adaptation, tradeoffs, and optimization at physical, data-link, network, transport, and application layers. Examples of cross-layer design in cellular, ad hoc, sensor, local area, green, and cognitive radio networks.

SYSC 5409 [0.5 credit]**Interactive Media and Digital Art**

Interactive digital technologies as new media for art and entertainment. Topics include essential features of the digital media, interactivity, computer games and gamification, interactive stories, serious games, virtual worlds and social networks, and digital art.

Precludes additional credit for SYSC 5807 (ELG 6187).

SYSC 5500 [0.5 credit]**Designing Secure Networking and Computer Systems**

Network security with coverage of computer security in support of networking concepts. Covers various security issues in data networks at different protocol layers. Routing security, worm attacks, and botnets. Security of new mobile networks and emerging networked paradigms such as social networks and cloud computing. Precludes additional credit for SYSC 5801 Section "X" (ELG 6181).

SYSC 5502 [0.5 credit] (ELG 6152)**Advanced Linear Systems**

Modeling and state space realization. Review of signals and systems. Solution to the matrix DE. Discrete time systems and the Z transform. Canonical representations and transformations. Controllability, observability and controller and observer design. LQR design and the Kalman filter. Numerous examples and applications. Precludes additional credit for MECH 4501.

SYSC 5503 [0.5 credit] (ELG 6153)**Stochastic Processes**

Basic concepts of randomness, as applied to communications, signal processing, and queuing systems; probability theory, random variables, stochastic processes; random signals in linear systems; introduction to decision and estimation; Markov chains and elements of queuing theory.

Precludes additional credit for EACJ 5109 (ELG 5119).

SYSC 5504 [0.5 credit] (ELG 6154)**Principles of Digital Communication**

Elements of communication theory and information theory applied to digital communications systems. Characterization of noise and channel models. Optimum Receiver theory. Modulation and coding for reliable transmission: MPSK, MQAM, M-ary orthogonal modulation. Channel coding, trellis coded modulation. Spread spectrum and CDMA communications.

Precludes additional credit for EACJ 5506 (ELG 5375). Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent (may be taken concurrently).

SYSC 5506 [0.5 credit] (ELG 5170)**Information Theory**

Measure of information: entropy, relative entropy, mutual information, asymptotic equipartition property, entropy rates for stochastic processes; data compression: Huffman code, arithmetic coding; channel capacity: random coding bound, reliability function, Blahut-Arimoto algorithm, Gaussian channels, coloured Gaussian noise and 'water-filling'; rate distortion theory; network information theory. Precludes additional credit for EACJ 5501 (ELG 5170). Prerequisite(s): SYSC 5503 (ELG 6153) or EACJ 5109 (ELG 5119) or equivalent.

SYSC 5508 [0.5 credit] (ELG 6158)**Digital Systems Architecture**

New architectural concepts are introduced. Discussion of programmable architectures (micro-controllers, DSPs, GP) and FPGAs. Memory interfacing. Scalable, superscalar, RISC, CISC, and VLIW concepts. Parallel structures: SIMD, MISD and MIMD. Fault tolerant systems and DSP architectures. Examples of current systems are used for discussions.

Prerequisite(s): SYSC 4507 or equivalent.

SYSC 5600 [0.5 credit] (ELG 6160)**Adaptive Signal Processing**

Theory and techniques of adaptive filtering, including Wiener filters, gradient and LMS methods; adaptive transversal and lattice filters; recursive and fast recursive least squares; convergence and tracking performance; implementation. Applications, such as adaptive prediction, channel equalization, echo cancellation, source coding, antenna beamforming, spectral estimation.

Precludes additional credit for EACJ 5800 (ELG 5377). Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent; SYSC 5602 (ELG 6162) or ELG 5376 (EACJ 5507) or equivalent.

SYSC 5601 [0.5 credit] (ELG 6161)**Neural Signal Processing**

Multidimensional function approximation. The least squares adaptive algorithm and the generalized delta rule. Multi-layered perceptrons and the back-propagation algorithm. Approximation of non-linear functions. Radial basis functions. Self-organizing maps. Applications of neural signal processing to control, communications and pattern recognition.

Precludes additional credit for EACJ 5709 (ELG 5796).

Prerequisite(s): SYSC 5503 (ELG 6153) or equivalent.

May be taken concurrently with SYSC 5503 (ELG 5503).

SYSC 5602 [0.5 credit] (ELG 6162)**Digital Signal Processing**

Review of discrete time signals and systems, A/D and D/A conversions, representation in time, frequency, and Z domain, DFT/FFT transforms, FIR/IIR filter design, quantization effects. Correlation functions. Cepstrum analysis. Multi-rate signal processing. Power spectrum estimation. Introduction to joint time-frequency analysis. DSP architecture: implementation approaches. Applications.

Precludes additional credit for EACJ 5507 (ELG 5376).

SYSC 5603 [0.5 credit] (ELG 6163)**Digital Signal Processing: Microprocessors, Software and Applications**

Characteristics of DSP algorithms and architectural features of current DSP chips: TMS320, DSP-56xxx, AD-21xxx and SHARC. DSP multiprocessors and fault tolerant systems. Algorithm/software/hardware architecture interaction, program activity analysis, development cycle, and design tools. Case studies: LPC, codecs, FFT, echo cancellation, Viterbi decoding.

Includes: Experiential Learning Activity

Prerequisite(s): SYSC 5602 (ELG 6162) or ELG 5376

(EACJ 5507) or equivalent.

SYSC 5604 [0.5 credit] (ELG 6164)**Advanced Topics in Digital Signal Processing**

Recent and advanced topics in the field of digital signal processing and its related areas.

Prerequisite(s): SYSC 5602 (ELG 6162) or ELG 5376 (EACJ 5507) or equivalent.

SYSC 5605 [0.5 credit] (ELG 6165)**Advanced Digital Communication**

Techniques and performance of digital signalling and equalization over linear bandlimited channels with additive Gaussian noise. Fading multipath channels: diversity concepts, modeling and error probability performance evaluation. Synchronization in digital communications. Spread spectrum in digital transmission over multipath fading channels.

Precludes additional credit for EACJ 5704 (ELG 5780).

Prerequisite(s): SYSC 5504 (ELG 6154) or equivalent.

SYSC 5606 [0.5 credit] (ELG 6166)**Introduction to Mobile Communications**

Mobile radio channel characterization: signal strength prediction techniques and statistical coverage; fading; delay spread; interference models and outage probabilities. Digital modulation and transmission system performance. Signal processing techniques: diversity and beamforming, adaptive equalization, coding. Applications to TDMA and CDMA cellular systems.

Prerequisite(s): SYSC 5503 (ELG 5503) and SYSC 5504 (ELG 6154) (may be taken concurrently with SYSC 5606).

SYSC 5607 [0.5 credit] (ELG 6167)**Source Coding and Data Compression**

Discrete and continuous sources. Discrete sources: Huffman coding & run length encoding. Continuous sources: waveform construction coding; PCM, DPMC, delta modulation; speech compression by parameter extraction; predictive encoding; image coding by transformation and block quantization. Fourier and Walsh transform coding. Applications to speech, television, facsimile.

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent.

SYSC 5608 [0.5 credit] (ELG 6168)**Wireless Communications Systems Engineering**

Multi-user cellular and personal radio communication systems; frequency reuse, traffic engineering, system capacity, mobility and channel resource allocation. Multiple access principles, cellular radio systems, signalling and interworking. Security and authentication. Wireless ATM, satellite systems, mobile location, wireless LANs, wireless local loops, broadband wireless, etc.

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109), and SYSC 5504 (ELG 6154) or ELG 5375 (EACJ 5506), or their equivalents. May be taken concurrently.

SYSC 5609 [0.5 credit] (ELG 6169)**Digital Television**

Television standards: NTSC, PAL, SECAM, and HDTV. Sampling and quantization of television signals: rec 601-1. Digital video compression: inter and intra-frame methods, spatial and transform/wavelet coding; H.261 and MPEG standards. Video conferencing systems and other digital video processing applications.

SYSC 5700 [0.5 credit] (ELG 6170)**Spread Spectrum Systems**

Types of spread spectrum systems, FH, DS-SS, TH-SS using impulse-radio. Hybrid DS/FH-SS. Pseudo-noise generators: statistical properties of M sequences, Galois field connections, Gold codes, OVFS codes. Code tracking loops, initial synchronization of receiver spreading code. Performance in interference environments and fading channels. CDMA systems. SS applications.

Prerequisite(s): SYSC 5504 (ELG 6154) or equivalent.

SYSC 5701 [0.5 credit] (CSI 5117)**Operating System Methods for Real-Time Applications**

Principles and methods for operating system design with application to real-time, embedded systems. Concurrent programming: mechanisms and languages; design approaches and issues; run-time support (kernel). Methods for hard real-time applications. Methods for distributed systems. Programming assignments in a suitable programming language.

Prerequisite(s): SYSC 3303 or SYSC 5704 (ELG 6174) or equivalent courses and/or experience. Programming experience in high level and assembly languages.

SYSC 5703 [0.5 credit] (ELG 6173)**Integrated Database and Cloud Systems**

Database definitions, applications, architectures. Conceptual design based on entity-relationship, object-oriented models. Relational data model: relational algebra and calculus, normal forms, data definition and manipulation languages. Database management systems: transaction management, recovery and concurrency control. Current trends: object-oriented, knowledge-based, multimedia, distributed databases.

SYSC 5704 [0.5 credit] (ELG 6174)**Elements of Computer Systems**

Concepts in basic computer architecture, assembly languages, high level languages including object orientation, compilers and operating system concepts (including concurrency mechanisms such as processes and threads and computer communication). Designed for graduate students without extensive undergraduate preparation in computer system engineering (or equivalent experience).

Prerequisite(s): programming experience with at least one high level language and permission of the Department.

SYSC 5706 [0.5 credit] (ELG 6176)**Analytical Performance Models of Computer Systems**

Analytical modeling techniques for performance analysis of computing systems. Theoretical techniques covered include single and multiple class queuing network models, together with a treatment of computational techniques, approximations, and limitations. Applications include scheduling, memory management, peripheral devices, databases, multiprocessing, and distributed computing.

Prerequisite(s): SYSC 5003 (ELG 6103), SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109), or equivalent.

SYSC 5708 [0.5 credit] (ELG 6178)**Model-Driven Development of Real-Time and Distributed Software**

Advanced development of real-time and distributed systems by model-driven development that shifts the focus from coding to modeling. Different types of models. Generating code by model transformations. Design patterns for distributed/concurrent systems with examples from communication applications. Design issues for reusable software.

Prerequisite(s): knowledge of UML and operating systems concepts, and permission of the Department.

SYSC 5709 [0.5 credit] (ELG 6179)**Advanced Topics in Software Engineering**

Recent and advanced topics in the field of software engineering and related areas. Primary references are recent publications in the field.

Prerequisite(s): permission of the Department.

SYSC 5800 [0.5 credit] (ELG 6180)**Network Computing**

Design and Java implementation of distributed applications that use telecommunication networks as their computing platform. Basics of networking; Java networking facilities. Introduction to open distributed processing; CORBA, JavaIDL, JavaRMI, CGI/HTTP, DCOM, Componentware; Enterprise JavaBeans, ActiveX. Agents: Java code mobility facilities. Security issues; Java security model.

SYSC 5801 [0.5 credit] (ELG 6181)**Advanced Topics in Computer Communications**

Recent and advanced topics in computer-communication networks intended as a preparation for research. Students are expected to contribute to seminars or present lectures on selected topics.

Prerequisite(s): SYSC 5201(ELG 6121) or ELG 5374 (EACJ 5607) or equivalent and permission of the Department.

SYSC 5802 [0.5 credit] (ELG 6182)**Introduction to Information and System Science**

An introduction to the process of applying computers in problem solving. Emphasis on the design and analysis of efficient computer algorithms for large, complex problems. Applications in a number of areas are presented: data manipulation, databases, computer networks, queuing systems, optimization.

Also listed as MATH 5802, COMP 5802, ISYS 5802.

SYSC 5803 [0.5 credit] (ELG 6183)**Logic Programming**

Review of relational databases, first order predicate calculus, semantics of first order models, deductive querying. Proof theory, unification and resolution strategies. Introduction to Prolog, and/or parallelism and Concurrent Prolog. Applications in knowledge representation and rule-based expert systems.

SYSC 5804 [0.5 credit] (ELG 6184)**Advanced Topics in Communications Systems**

Recent and advanced topics in communications systems. Prerequisite(s): permission of the Department.

SYSC 5806 [0.5 credit] (ELG 6186)**Object Oriented Design of Real-Time and Distributed Systems**

Advanced course in software design dealing with design issues at a high level of abstraction. Design models: use case maps for high-level behaviour description; UML for traditional object-oriented concerns. Design patterns.

Forward, reverse, and re-engineering. Substantial course project on applications chosen by students.

Includes: Experiential Learning Activity
Prerequisite(s): permission of the Department.

SYSC 5807 [0.5 credit] (ELG 6187)**Advanced Topics in Computer Systems**

Recent and advanced topics in computer systems.

The course will generally focus on one or more of the following areas: specification, design, implementation, and modeling/analysis. Students may be expected to contribute to lectures or seminars on selected topics.

Prerequisite(s): permission of the Department.

SYSC 5808 [0.5 credit] (ELG 6188)**Communications Network Management**

Network management issues. WANs and LANs. The Internet and ISO models of network management. Network management protocols SNMP, CMIP, CMOT, etc. Events, Managed Objects and MIBs. Fault management techniques. Current diagnostic theory and its limitations. AI and Machine learning approaches. Monitoring and fault management tools.

Prerequisite(s): SYSC 5201 (ELG 6121) or equivalent.

SYSC 5900 [0.5 credit] (ELG 6188)**Systems Engineering Project**

Students pursuing the non-thesis M.Eng. program conduct an engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity

SYSC 5902 [0.5 credit]**Research Methods for Engineers**

Topics required to perform engineering research including literature surveys, identifying issues, objectives, and methodology. Technical writing, documenting and presenting engineering ideas and a review of statistics, simulation, optimization and data analysis.

Includes: Experiential Learning Activity

SYSC 5903 [0.5 credit]**Systems Engineering Project II**

Students pursuing the non-thesis M.Eng. program conduct an engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity
Prerequisite(s): permission of the Department.

SYSC 5905 [2.0 credits] (ELG 6188)**M.C.S. Thesis**

Also listed as MATH 5905, COMP 5905.

SYSC 5906 [0.5 credit]**Directed Studies**

SYSC 5908 [1.5 credit] (ELG 6196)**M.Sc. Thesis in Information and Systems Science**

Includes: Experiential Learning Activity

Also listed as MATH 5908, ISYS 5908, COMP 5908.

SYSC 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

SYSC 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

English

This section presents the requirements for programs in:

- M.A. English
- M.A. English with Specialization in African Studies
- M.A. English with Collaborative Specialization in Climate Change
- M.A. English with Specialization in Digital Humanities
- Ph.D. English

Program Requirements**M.A. English (4.5 credits)****Requirements - Coursework option (4.5 credits)**1. **4.0 credits in ENGL** at the 5000 level (excluding ENGL 5908 and ENGL 5909) 4.02. **0.5 credit in:** 0.5

ENGL 5005 [0.5] M.A. Seminar

Total Credits 4.5**Requirements - Research Essay Option (4.5 credits)**1. **3.0 credits in ENGL** at the 5000 level (excluding ENGL 5909) 3.02. **0.5 credit in:** 0.5

ENGL 5005 [0.5] M.A. Seminar

3. **1.0 credit in:** 1.0

ENGL 5908 [1.0] Research Essay

Total Credits 4.5**Requirements - Thesis Option (4.5 credits)**1. **2.0 credits in ENGL** at the 5000 level (excluding ENGL 5908) 2.02. **0.5 credit in ENGL 5005** 0.53. **2.0 credits in:** 2.0

ENGL 5909 [2.0] M.A. Thesis

An oral examination on the thesis will be required. A prospectus for the thesis must be submitted to the graduate committee by December 1 after registration in September, or at the end of three months for any other registration

Total Credits 4.5**M.A. English with Specialization in African Studies (4.5 credits)****Requirements - Coursework Option (4.5 credits)**1. **0.5 credit in:** 0.5

AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

2. **0.0 credit in:** 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. **0.5 credit from:** 0.5

ENGL 5008 [0.5] Studies in African Literature

ENGL 5010 [0.5] Studies in Caribbean Literature

Or an ENGL course approved by the Graduate Coordinator of the Institute of African Studies

4. **0.5 credit in:** 0.5

ENGL 5005 [0.5] M.A. Seminar

5. **3.0 credits in ENGL** at the 5000 level (excluding ENGL 5908 and ENGL 5909) 3.0**Total Credits** 4.5**Requirements - Research Essay Option (4.5 credits)**1. **0.5 credit in:** 0.5

AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

2. **0.0 credit in:** 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. **0.5 credit from:** 0.5

ENGL 5008 [0.5] Studies in African Literature

ENGL 5010 [0.5] Studies in Caribbean Literature

Or an ENGL course approved by the Graduate Coordinator of the Institute of African Studies

4. **0.5 credit in:** 0.5

ENGL 5005 [0.5] M.A. Seminar

5. **2.0 credits in ENGL** at the 5000 level (excluding ENGL 5909) 2.06. **1.0 credit in:** 1.0

ENGL 5908 [1.0] Research Essay

Total Credits 4.5**Requirements - Thesis Option (4.5 credits)**1. **0.5 credit in:** 0.5

AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

2. **0.0 credit in:** 0.0

AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. **0.5 credit from:** 0.5

ENGL 5008 [0.5] Studies in African Literature

ENGL 5010 [0.5] Studies in Caribbean Literature

Or an ENGL course approved by the Graduate Coordinator of the Institute of African Studies

4. **0.5 credit in:** 0.5

ENGL 5005 [0.5] M.A. Seminar

5. **1.0 credit in ENGL** at the 5000 level (excluding ENGL 5908) 1.06. **2.0 credits in:** 2.0

ENGL 5909 [2.0] M.A. Thesis

Total Credits 4.5

M.A. English with Collaborative Specialization in Climate Change (4.5 credits)

Requirements - Coursework option (4.5 credits)

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 2.5 credits in ENGL at the 5000-level (excluding ENGL 5908 and ENGL 5909)	2.5
4. 0.5 credit in a graduate seminar with sufficient Climate Change content in ENGL or another department, as approved by the Coordinator of the Climate Change Specialization.	0.5
5. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
Total Credits	4.5

Requirements - Research Essay option (4.5 credits)

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
4. 2.0 credits in ENGL at the 5000 level (excluding ENGL 5908)	2.0
5. 1.0 credit in:	1.0
ENGL 5908 [1.0] Research Essay (in the specialization)	
Total Credits	4.5

Requirements - Thesis option (4.5 credits)

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in ENGL at the 5000-level (excluding ENGL 5909)	1.0
4. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
5. 2.0 credits in:	2.0
ENGL 5909 [2.0] M.A. Thesis (in the specialization)	
Total Credits	4.5

M.A. English with Specialization in Digital Humanities (4.5 credits)

Requirements - Coursework Option (4.5 credits)

1. 2.5 credits in 5000-level ENGL (excluding ENGL 5908 and ENGL 5909)	2.5
2. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
3. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
3. 1.0 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	1.0
4. 0.0 credit in:	0.0

DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits 4.5

Requirements - Research Essay Option (4.5 credits)

1. 2.0 credits in ENGL at the 5000 level (excluding ENGL 5909)	2.0
2. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
3. 1.0 credit in:	1.0
ENGL 5908 [1.0] Research Essay (with mandatory oral examination)	
4. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
5. 0.5 credit in Digital Humanities (DIGH 5011, DIGH 5012, or annually listed Digital Humanities course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	4.5

Requirements - Thesis Option (4.5 credits)

1. 1.0 credit in ENGL at the 5000 level (excluding ENGL 5908)	1.0
2. 0.5 credit in:	0.5
ENGL 5005 [0.5] M.A. Seminar	
3. 2.0 credits in:	2.0
ENGL 5909 [2.0] M.A. Thesis	
4. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
5. 0.5 credit from:	0.5
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5] Directed Readings and Research in Digital Humanities	
- or annually listed DIGH course	
6. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	
Total Credits	4.5

Ph.D. English (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
ENGL 6003 [0.5] Theories and Foundations in the Production of Literature	
ENGL 6004 [0.5] Approaches to the Production of Literature	
2. 0.5 credit in:	0.5
ENGL 6002 [0.5] Proseminar	
3. 2.0 credits of approved courses	2.0
4. 1.0 credit in:	1.0
ENGL 6900 [1.0] Comprehensive Examination	
5. 0.5 credit in:	0.5
ENGL 6902 [0.5] Dissertation Proposal	
6. 0.0 credits in:	0.0
ENGL 6909 [0.0] Thesis	
Total Credits	5.0

ENGL 6002, ENGL 6003 and ENGL 6004 are required courses. Optional English courses will be selected from a list approved annually by the department. Students may take up to 1.0 credit of approved courses offered in other departments. Students may also choose directed reading courses with the core faculty of the program.

Comprehensive Examination

Students are required to complete one comprehensive examination. It has a 1.0 credit value. The comprehensive examination (ENGL 6900) will focus on relevant theoretical and methodological issues and will take the form of a written and oral examination set and marked by members of core faculty. This will normally take place at the beginning of the second year of full-time doctoral study.

Language Requirements

Students must demonstrate reading ability in a language other than English, normally by completing a university-level language reading course approved by the department with a minimum grade of B- or a pass/fail translation exam, administered by the Department of English. This requirement should be satisfied prior to the submission of the dissertation proposal. The choice of language used to fulfill this requirement may be determined either by its appropriateness to supporting the student's doctoral research or by its suitability for the student's professional development. Students whose transcripts demonstrate that they have already completed an MA level language requirement are exempt from this requirement.

Dissertation Proposal

The dissertation proposal must be defended at an oral examination. A student may proceed to writing the dissertation after they have the approval of their Dissertation Supervisory Committee that their project is ready to go forward.

Regulations

See the General Regulations section of this Calendar.

A standing of B- or better must be obtained in each credit counted towards the master's degree.

Each program is designed to be completed within the three-term academic year. Each program is of equal status.

Guidelines for Completion of Master's Degree

Full-time master's candidates are expected to complete all requirements in twelve months or three terms of registered full-time study. Part-time master's candidates are expected to complete their degree requirements within an elapsed period of three calendar years after the date of initial registration.

Regulations

See the General Regulations section of this Calendar.

Academic Standing

Doctoral students must normally obtain a grade of B- or better in each course counted toward the fulfilment of the degree requirements.

Admission Requirements

The normal admission requirement for the master's program is a B.A. (Honours) (or the equivalent) in English language and literature, with at least a high Honours standing (normally B+ or better).

Possession of the normal entrance standing is not in itself, however, an assurance of admission into the program.

Qualifying-Year Program

Applicants who hold a general (3-year) B.A. degree with at least a high Honours standing (normally B+), with a major in English language and literature or a related discipline, may be admitted to the qualifying-year program. Normally, these students will be required to complete 4.0 or 5.0 credits in English, as determined by the department, and to maintain a high Honours standing (normally B+) before being considered for admission into the master's program. For more information regarding the qualifying year, see the General Regulations section of this Calendar.

Accelerated Pathway

The accelerated pathway in the Department of English Language and Literature is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.A. Honours in English with demonstrated academic excellence and an aptitude for research may be invited to apply for this option.

Accelerated Pathway Requirements

Students accepted into the Accelerated Pathway will be allowed to enroll in up to two 5000-level graduate seminars during their final year of study. These courses will count towards the requirements for up to 1.0 credits of 4000-level courses in their BA Honours degree. Students who obtain satisfactory standing as determined by the graduate committee in these 5000-level courses may receive advance standing with transfer credit of up to 1.0 credit, which can reduce their time to completion if they are subsequently accepted into a Carleton University Master's degree in English.

A special committee is responsible for inviting students to apply for entrance to this pathway. A minimal overall CGPA of 11.0 is normally required for consideration; invited students should submit two reference letters from English Department faculty members and a writing sample to both Undergraduate Supervisor and Graduate Supervisor of the English Department. If accepted into the accelerated pathway, students must consult with both the Undergraduate and Graduate Supervisors to determine which graduate seminars they will take.

Admission Requirements

Applicants will normally hold a master's degree in English (or equivalent) with at least an A- average (10 G.P.A.)

Applicants judged to be deficient in preparation may be asked to complete course work in addition to the Ph.D. program requirements.

English (ENGL) Courses

ENGL 5002 [0.5 credit]

Studies in Theory I

Selected topics in literary and cultural theory.

ENGL 5004 [0.5 credit]

Studies in Transnational Literatures

Topics in transnational, diaspora and postcolonial literatures and theory. Topics vary from year to year.

ENGL 5005 [0.5 credit]

M.A. Seminar

Examines topics such as research resources and methodologies, current issues in literary theory and professional concerns. Graded Satisfactory/Unsatisfactory.

ENGL 5006 [0.5 credit]

Studies in Theory II

Selected topics in literary and cultural theory.

ENGL 5007 [0.5 credit]

Studies in Indigenous Literatures

Selected texts of Indigenous literature and culture. Topics may vary from year to year.

ENGL 5008 [0.5 credit]

Studies in African Literature

Selected texts of African literature and culture. Topics may vary from year to year.

ENGL 5009 [0.5 credit]

Studies in South Asian Literature

Selected texts of South Asian literature and culture. Topics vary from year to year and may be organized by theme, author, or genre.

ENGL 5010 [0.5 credit]

Studies in Caribbean Literature

Topics in Caribbean literatures and theory. Topics vary from year to year.

ENGL 5101 [0.5 credit]

Historical Linguistics: English

A theory-intensive course that will study the development of English starting with Proto-Indo-European progressing through Common Germanic to the stages of English itself. Topics include phonological sound changes, phonemic inventories, and morphological and syntactic typology. Also listed as LING 5802. Also offered at the undergraduate level, with different requirements, as LING 4802, for which additional credit is precluded.

ENGL 5120 [0.5 credit]

Book Arts Workshop

This course immerses graduate students in the practical arts and histories of book production. At least part of the course will take place in the Book Arts Lab in MacOdrum Library, where students will acquire skills in printing, bibliography, and/or bookmaking. Includes: Experiential Learning Activity

ENGL 5207 [0.5 credit]

Studies in Old English

Topics in the early medieval period. Topics vary from year to year and may include Old English, Old Norse, Latin texts in translation, or pre-Chaucerian texts.

ENGL 5208 [0.5 credit]

Studies in Middle English Literature

Studies in the literature and culture of England between 1100 and 1550. Topics vary from year to year and may include texts in Middle English, French and/or Latin (French and Latin texts are usually studies in translations).

ENGL 5303 [0.5 credit]

Studies in Early Modern Literature I

A study of early modern authors, texts, and problems. Topics may vary from year to year.

ENGL 5305 [0.5 credit]

Studies in Early Modern Literature II

A study of early modern authors, texts, and problems. Topics will vary from year to year.

ENGL 5402 [0.5 credit]

Studies in Eighteenth-Century Literature

Selected texts of eighteenth-century literature and culture. Topics may vary from year to year.

ENGL 5408 [0.5 credit]

Studies in Romanticism

Selected texts of Romantic literature and culture. Topics vary from year to year and may be organized by theme, author or genre.

ENGL 5501 [0.5 credit]

Studies in Nineteenth-Century Literature I

Selected readings in nineteenth-century British literature and culture. Topics vary from year to year and may be organized by theme, author, and/or genre.

ENGL 5503 [0.5 credit]

Studies in Nineteenth-Century Literature II

Selected readings in nineteenth-century British literature and culture. Topics vary from year to year and may be organized by theme, author, and/or genre.

ENGL 5606 [0.5 credit]

Studies in Twentieth-Century Literature

Selected texts of twentieth-century literature and culture. Topics may vary from year to year.

ENGL 5608 [0.5 credit]

Studies in Modernism

Special topics in studies in modernism will vary from year to year.

ENGL 5609 [0.5 credit]

Studies in American Literature I

Selected texts of American literature and culture. Topics may vary from year to year.

ENGL 5610 [0.5 credit]**Studies in Contemporary Literature I**

Selected texts of contemporary literature and culture. Topics may vary from year to year.

ENGL 5611 [0.5 credit]**Studies in Contemporary Literature II**

Selected texts of contemporary literature and culture.

ENGL 5708 [0.5 credit]**Studies in American Literature II**

Topic may vary from year to year.

ENGL 5804 [0.5 credit]**Studies in Canadian Literature I**

Topics vary from year to year and may include issues of genre, selected themes, literary movements, or developments in theory.

ENGL 5806 [0.5 credit]**Studies in Canadian Literature II**

Topics vary from year to year and may include issues of genre, selected themes, literary movements, or developments in theory.

ENGL 5900 [0.5 credit]**Selected Topic in English Studies I**

Topic may vary from year to year.

ENGL 5901 [0.5 credit]**Selected Topic in English Studies II**

Topic may vary from year to year.

ENGL 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

ENGL 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

ENGL 6002 [0.5 credit]**Proseminar**

Exploration of recent critical theory and discussion of issues related to the profession. Graded SAT/UNSAT.

ENGL 6003 [0.5 credit]**Theories and Foundations in the Production of Literature**

Survey of foundational theoretical texts from the fields of book history, manuscript and print cultural studies, media studies, and cultural theory.

ENGL 6004 [0.5 credit]**Approaches to the Production of Literature**

With a focus on one or more approaches, this course studies how literary and cultural production are shaped by economic, historical, institutional, sociological, legal, and technological forces.

ENGL 6101 [0.5 credit]**Directed Reading**

This tutorial is designed to permit students to pursue individual research. Topics will be chosen in consultation with at least one faculty member and the graduate supervisor.

ENGL 6102 [0.5 credit]**Studies in the Production of Literature**

Explores selected studies/themes related to the production of literature.

ENGL 6103 [0.5 credit]**Selected Topics in the Production of Literature**

Selected topics/themes related to the production of literature.

ENGL 6900 [1.0 credit]**Comprehensive Examination**

This examination will include a range of topics related to the production of literature as a material object, as an institutional site or practice, and as an enabling concept. One four-hour written exam, and one week later, a one-to-two hour oral exam.

ENGL 6902 [0.5 credit]**Dissertation Proposal**

The dissertation proposal is approved by the student's dissertation committee and defended at an oral examination. The dissertation proposal is completed after the comprehensive examination requirement has been satisfied. Graded SAT/UNS.

Includes: Experiential Learning Activity

ENGL 6909 [0.0 credit]**Thesis**

Includes: Experiential Learning Activity

Environmental Engineering

This section presents the requirements for programs in:

- M.A.Sc. Environmental Engineering
- M.Eng. Environmental Engineering
- M.A.Sc. Environmental Engineering with Collaborative Specialization in Climate Change
- M.Eng. Environmental Engineering with Collaborative Specialization in Climate Change
- Ph.D. Environmental Engineering

Program Requirements**M.A.Sc. Environmental Engineering (5.0 credits)**

Study at the master's level can be pursued through a thesis leading to a M.A.Sc., a project option leading to a M.Eng., or a coursework option leading to a M. Eng. The requirements for coursework are specified in terms of credits. At Carleton University, 1.0 credit typically comprises three hours of lectures or seminars a week for two terms, or the equivalent. At the University of Ottawa, 1.0 course credit is one hour of instruction per week for one term. Thus 1.0 credit in Carleton University notation is

equivalent to 6 course credits in the University of Ottawa notation. The requirements are:

Requirements - Thesis option:

1. 2.5 credits in courses, with at least 0.5 credit from each of at least three of the areas of study listed below	2.5
2. Participation in the graduate seminar series:	0.0
ENVE 5800 [0.0] Master's Seminar (participation in the graduate seminar series)	
3. 2.5 credits in:	2.5
ENVE 5909 [2.5] Master's Thesis (including successful oral defence)	
Total Credits	5.0

M.Eng. Environmental Engineering (5.0 credits)

Requirements - Project option (5.0 credits)

1. 4.0 credits in courses	4.0
2. 1.0 credit in:	1.0
ENVE 5900 [1.0] Environmental Engineering Project	
3. Participation in the graduate student seminar series:	0.0
ENVE 5800 [0.0] Master's Seminar	
Total Credits	5.0

Requirements - Coursework option (5.0 credits)

1. Completion of a minimum of 5.0 credits by course	5.0
Total Credits	5.0

Breadth Requirement

In keeping with the objective of ensuring a breadth of knowledge for graduates of the program, students in the master's program are expected to take at least one graduate level course from each of at least three of the following areas of study:

- Air Pollution
- Water Resources Management, Groundwater Management and Contaminant Transport
- Management of Solid, Hazardous, and Radioactive Waste, and Pollution Prevention
- Water and Wastewater Treatment
- Environmental Impact Assessment, Sustainability and Climate Change

This requirement serves the objectives of educating graduate professionals who are not only specialized in one area but who are sufficiently familiar with problems and different approaches in the other areas to enable them to interact readily at a technical level with colleagues working in those areas. In addition to the courses associated with the individual areas, students will be encouraged to select courses from fundamental areas such as chemistry, numerical modelling, and applied statistics.

Master's candidates transferring from another university must take at least half their courses at the Institute.

M.A.Sc. Environmental Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	

2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits in courses, with at least 0.5 credit from two different areas of study listed below outside the area of EIA, Sustainability and Climate Change	1.5
4. 0.0 credit in:	
ENVE 5800 [0.0] Master's Seminar (participation in the graduate student seminar series)	
5. 2.5 credits in:	2.5
ENVE 5909 [2.5] Master's Thesis (in the specialization)	
Total Credits	5.0

M.Eng. Environmental Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Project pathway

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 0.5 credit from:	0.5
ENVE 5105 [0.5] Atmospheric Aerosols	
ENVE 5200 [0.5] Climate Change and Engineering	
ENVE 5201 [0.5] Geo-Environmental Engineering	
ENVE 5205 [0.5] Sludge Treatment and Disposal	
ENVJ 5908 [0.5] Anaerobic Digestion	
ENVJ 5212 [0.5] Climate Change Impacts on Water Resources	

or approved Special Topics in the area of climate change

4. 2.5 credits in courses, with at least 0.5 credit from two different areas of study listed below outside the area of EIA, Sustainability and Climate Change	2.5
5. 0.0 credit in:	
ENVE 5800 [0.0] Master's Seminar	
6. 1.0 credit in:	1.0
ENVE 5900 [1.0] Environmental Engineering Project (in the specialization)	

Total Credits 5.0

Requirements - Coursework pathway

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.5 credits from:	1.5
ENVE 5105 [0.5] Atmospheric Aerosols	
ENVE 5200 [0.5] Climate Change and Engineering	
ENVE 5201 [0.5] Geo-Environmental Engineering	
ENVE 5205 [0.5] Sludge Treatment and Disposal	
ENVJ 5908 [0.5] Anaerobic Digestion	
ENVJ 5212 [0.5] Climate Change Impacts on Water Resources	

or approved Special Topics in the area of climate change

4. **2.5 credits** in courses, with at least 0.5 credit from two different areas of study listed below outside the area of EIA, Sustainability and Climate Change 2.5

Total Credits 5.0

Ph.D. Environmental Engineering (2.0 credits)

Ph.D. Environmental Engineering (1.5 credits)

1. **1.5 credits** in courses 1.5

2. **0.5 credits** in: 0.5

ENVE 7800 [0.5] Ph.D. Seminar

3. Successful completion of the comprehensive examination, which consists of a presentation of a Ph.D. research proposal followed by an oral examination to assess any academic deficiencies in the student's background related to the proposed research project and to assess the originality and feasibility of the proposed research project. The comprehensive examination should be completed within the first 16 months (or the equivalent of four full-time terms) of the student's program

4. **0.0 credits** in: 0.0

ENVE 6909 [0.0] Ph.D. Thesis (Including successful oral defence)

Total Credits 2.0

Ph.D. candidates transferring from another university must take at least half their courses at the Institute.

Graduate Courses

Course selection is subject to the approval of the adviser or the Advisory committee. Students may choose courses offered at either university from among those listed below.

The courses listed below are grouped by area of study. Master's students must complete at least one course in three of the five areas. The program's Associate Chair (graduate affairs), in consultation with the Institute's Director or Associate Director, will decide when a course offered outside the Institute or offered under a Special Topics or Directed Studies heading can be considered to meet the requirements of a given area. Course descriptions may be found in the departmental sections of the calendars concerned. Course codes in parentheses are for University of Ottawa (EVG, CVG and CHG), and those that begin with the prefix "ENVE" or "CIVE" are offered at Carleton. Only a selection of courses is given in a particular academic year.

Full course descriptions for courses offered at Carleton can be found in the relevant courses section of this calendar.

Air Pollution

ENVE 5101 (EVG Air Pollution Control 7101)

ENVE 5102 (EVG Traffic-Related Air Pollution 7161)

ENVE 5103 (EVG Air Quality Modeling 7162)

ENVE 5104 (EVG Indoor Environmental Quality 7104)

ENVE 5105 (EVG Atmospheric Aerosols 7105)

ENVE 5106 (EVG Atmospheric Chemical Transport Modelling 7106)

ENVJ 5105 (CHG Adsorption Separation Process 8132)

Water Resources Management, Groundwater Management, and Contaminant Transport

CIVJ 5502 (CVG Computational Hydrodynamics 5112)

CIVJ 5503 (CVG Sediment Transport 5160)

CIVJ 5504 (CVG River Hydraulics 5162)

CIVJ 5601 (EVG Statistical Methods in Hydrology 5125)

CIVJ 5602 (CVG Stochastic Hydrology 5126)

CIVJ 5605 (CVG Coastal Engineering 5124)

ENVE 5301 (EVG Contaminant Hydrogeology 7301)

ENVE 5302 (EVG Case Studies in Hydrogeology 7163)

ENVE 5303 (EVG Multiphase Flow in Soils 7303)

ENVJ 5182 (EVG Water Resources Management 5182)

ENVJ 5183 (EVG Mixing and Transport in Water Bodies 5183)

ENVJ 5301 (EVG Soil and Water Conservation Engineering 5301)

ERTH 5403 (GEO Environmental Isotopes and Groundwater Geochemistry 5143)

ERTH 5407 (GEO Aqueous Inorganic Geochemistry and Modelling 5147)

ERTH 5503 (GEO Computer Techniques in the Earth Sciences 5153)

Management of Solid, Hazardous, and Radioactive Waste and Pollution Prevention

CIVJ 5109 (CVG Geotechnical Hazards 5109)

ENVE 5201 (EVG Geo-Environmental Engineering 7201)

ENVE 5203 (EVG Hazardous and Radioactive Wastes 7164)

ENVE 5204 (EVG Resource Industry Waste Management 7134)

ENVE 5205 (EVG Sludge Treatment and Disposal 7132)

ENVJ 5903 (EVG Sludge Utilization and Disposal 5331)

ENVJ 5906 (EVG Solid Waste Management 5133)

ENVJ 5908 (EVG Anaerobic Digestion 5179)

Water and Wastewater Treatment

ENVE 5001 (CVG Biofilm Processes 7160)

ENVE 5003 (EVG Advanced Ultraviolet Processes 7143)

ENVE 5004 (EVG Advanced Wastewater Treatment 7144)

ENVJ 5302 (EVG 5302)	Decentralized Wastewater Management
ENVJ 5502 (CHG 8192)	Membranes in Clean Processes
ENVJ 5900 (EVG 5130)	Wastewater Treatment Process Design
ENVJ 5901 (EVG 5132)	Unit Operations of Water Treatment
ENVJ 5902 (EVG 5138)	Advanced Water Treatment
ENVJ 5905 (EVG 5137)	Water and Wastewater Treatment Process Analysis
ENVJ 5907 (EVG 5134)	Chemistry for Environmental Engineering

Environmental Impact Assessment, Sustainability and Climate Change

ENVE 5200 (EVG 7200)	Climate Change and Engineering
ENVJ 5212	Climate Change Impacts on Water Resources
ENVJ 5700 (CVG 5139)	Environmental Assessment of Civil Engineering Projects

To fulfill the requirements beyond the 1.5 credits of area courses, students may choose from the following:

Other Institute Courses

CIVE 5601 (CVG 7140)	Engineering, Statistics, and Probabilities
ENVE 5402 (EVG 7402)	Finite Elements in Field Problems
ENVJ 5504 (CVG 8194)	Membrane Liquid Separation Processes and Materials
ENVJ 5505 (CHG 8195)	Advanced Numerical Methods in Chemical and Biological Engineering
ENVJ 5507 (CHG 8196)	Interfacial Phenomena in Engineering
GEOG 5804	Geographic Information Systems

Seminars, Directed Studies and Special Topics

ENVE 5701 (EVG 7001)	Topics in Environmental Engineering
ENVE 5702 (EVG 7002)	Topics in Environmental Engineering
ENVE 5704 (EVG 7004)	Topics in Environmental Engineering
ENVE 5703 (EVG 7003)	Topics in Environmental Engineering
ENVE 5705 (EVG 7005)	Topics in Environmental Engineering
ENVE 5800 (EVG 7305)	Master's Seminar
ENVE 5906 (EVG 6108)	Directed Studies 1
ENVE 6906 (EVG 6109)	Directed Studies 2
ENVE 7800 (EVG 6109)	Ph.D. Seminar
ENVJ 6300 (EVG 6300)	Special Topics in Environmental Engineering
ENVJ 6301 (EVG 6301)	Special Topics in Environmental Engineering

ENVJ 6302 (EVG 6302)	Special Topics in Environmental Engineering
ENVJ 6303 (EVG 6303)	Special Topics in Environmental Engineering
ENVJ 6304 (EVG 6304)	Special Topics in Environmental Engineering

Special Topics courses in Civil or Chemical Engineering will count as Institute courses only if approved by the program's Associate Chair (graduate affairs), in consultation with the Institute's Director or Associate Director.

Projects and Theses

ENVE 5900 (EVG 6001)	Environmental Engineering Project
ENVE 5909 (EVG 7999)	Master's Thesis
ENVE 6909 (EVG 9999)	Ph.D. Thesis
(EVG 9998)	Comprehensive Examination

Non-Institute Courses

Students may also, subject to approval, select courses from the graduate programs in Civil, Chemical and Mechanical Engineering, as well as in Biology, Chemistry, Earth Sciences, Computer Sciences, Geography and Public Policy and Administration at both universities. Courses taken outside the Institute will not count towards the degree requirements unless approved by the adviser or the advisory committee and the program's Associate Chair (graduate affairs). In all programs, at least one half of the course work must be taken from the Institute.

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.Eng. Environmental Engineering including all specializations/concentrations is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Admission

The requirement for admission to the master's program in Environmental Engineering is a four-year bachelor's degree in Environmental Engineering, other related engineering disciplines (Civil, Chemical, Mechanical, etc.), or Environmental Science disciplines.

All students entering the program are required to have courses in mathematics, probability and statistics equivalent to courses required in undergraduate engineering programs. Students admitted without full equivalency in these areas are expected to take appropriate undergraduate courses early in their studies. These courses will be additional to the normal degree requirements.

For applicants to the M.A.Sc. program without a bachelor's degree in environmental, civil or chemical engineering, up to 3 undergraduate courses may be required in addition to the graduate program requirements. These may include a course in fluid mechanics, a course in

environmental engineering fundamentals and a senior level undergraduate course in environmental engineering to be identified jointly by the supervisor, Associate Chair for Graduate Studies, and Director or Associate Director for OCIENE in the department.

For applicants to the MEng program without a bachelor's degree in environmental, civil or chemical engineering, up to 3 undergraduate courses may be specified in addition to the graduate program requirements at admission by the Director or Associate Director for OCIENE in the department. These will include a course in fluid mechanics, and course in chemical/biochemical kinetics and reactors if required.

Accelerated Pathway

The accelerated pathway in Environmental Engineering is a flexible and individualized plan of graduate study. Students in the final year of Bachelor of Engineering in Civil, Environmental, or Architectural Conservation and Sustainability Engineering with demonstrated excellent aptitude for graduate studies and research may qualify for this option.

Students with a CGPA of 10.0 or higher, going into their final year of undergraduate study, and intending to apply to a Master's degree in Environmental Engineering in the following academic year should consult with both the Undergraduate and Graduate Associate Chairs to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses.

Upon approval for the accelerated pathway, students will replace a maximum of 1.0 credit of their engineering electives with 5000 level ENVE courses. Students will receive advanced standing for the approved 5000 level courses in which they receive a grade of A- or higher.

Admission

The normal requirement for admission into the Ph.D. Program in Environmental Engineering is completion of either a Master's degree in Environmental Engineering, or a Master's degree in an engineering discipline with an environmental specialization.

- Students wishing to enter the program who do not have either of these backgrounds will be evaluated on a case-by-case basis. Additional course requirements may be specified in some cases.
- Students who have been admitted to a master's program may be admitted into the Ph.D. program, without completing their master's program, if they demonstrate: (1) outstanding academic performance by completing at least 2.5 credits of course work that fulfil the breadth requirements as specified in the Master's degree requirements with a CGPA of A- or higher, and (2) significant promise for advanced research and the ability to defend their Ph.D. proposal in the first year of their Ph.D. program.

Environmental Engineering - Joint (ENVJ) Courses

ENVJ 5001 [0.5 credit] (EVG 5001)
Biofilm Processes in Wastewater Treatment
Lecture

ENVJ 5105 [0.5 credit] (CHG 8132)
Adsorption Separation Process

ENVJ 5182 [0.5 credit] (EVG 5182)
Water Resources Management
Also listed as CIVJ 5182.

ENVJ 5183 [0.5 credit] (EVG 5183)
Mixing and Transport in Water Bodies

ENVJ 5212 [0.5 credit]
Climate Change Impacts on Water Resources

ENVJ 5301 [0.5 credit] (EVG 5301)
Soil and Water Conservation Engineering

ENVJ 5302 [0.5 credit] (EVG 5302)
Decentralized Wastewater Management

ENVJ 5304 [0.5 credit] (CHG 8158)
Porous Media

ENVJ 5502 [0.5 credit] (CHG 8192)
Membranes in Clean Processes

ENVJ 5503 [0.5 credit]
Reverse Osmosis

ENVJ 5504 [0.5 credit] (CHG 8194)
Membrane Liquid Separation Processes and Materials

ENVJ 5505 [0.5 credit] (CHG 8195)
Advanced Numerical Methods in Chemical and Biological Engineering
Includes: Experiential Learning Activity

ENVJ 5507 [0.5 credit] (CHG 8196)
Interfacial Phenomena in Engineering

ENVJ 5700 [0.5 credit] (EVG 5139)
Environmental Assessment of Civil Engineering Projects

ENVJ 5900 [0.5 credit] (EVG 5130)
Wastewater Treatment Process Design

ENVJ 5901 [0.5 credit] (EVG 5132)
Unit Operations of Water Treatment

ENVJ 5902 [0.5 credit] (EVG 5138)
Advanced Water Treatment

ENVJ 5903 [0.5 credit] (EVG 5331)
Sludge Utilization and Disposal

ENVJ 5905 [0.5 credit] (EVG 5137)
Water and Wastewater Treatment Process Analysis

ENVJ 5906 [0.5 credit] (EVG 5133)
Solid Waste Management

ENVJ 5907 [0.5 credit] (EVG 5134)
Chemistry for Environmental Engineering

ENVJ 5908 [0.5 credit] (EVG 5179)
Anaerobic Digestion

ENVJ 5909 [0.5 credit]
Biological Nutrient Removal

ENVJ 6002 [0.5 credit]
Sludge Processing, Utilization

ENVJ 6300 [0.5 credit] (EVG 6300)
Special Topics in Environmental Engineering

ENVJ 6301 [0.5 credit] (EVG 6301)
Special Topics in Environmental Engineering

ENVJ 6302 [0.5 credit] (EVG 6302)
Special Topics in Environmental Engineering

ENVJ 6303 [0.5 credit] (EVG 6303)
Special Topics in Environmental Engineering

ENVJ 6304 [0.5 credit] (EVG 6304)
Special Topics in Environmental Engineering

ENVJ 8191 [0.5 credit] (CHG 8191)
Selected Topics in Chemical Engineering

Environmental Engineering (ENVE) Courses

ENVE 5001 [0.5 credit] (CVG 7160)
Biofilm Processes

Physical, chemical properties, microbial ecology of biofilms. Biofilm processes, attachment, growth, sloughing. Transport and interfacial transfer phenomena; mass transfer models, mass transport in biofilms, deposition of solids. Modeling biofilm systems; species models, mass balance equations, boundary conditions, moving boundary problem, analytical and numerical solutions.

ENVE 5003 [0.5 credit] (EVG 7143)
Advanced Ultraviolet Processes

Fundamentals and applications of ultraviolet (UV) light-based processes for water and wastewater treatment; principles of photochemistry and photobiology, methods of UV dose determination, UV disinfection of microorganisms, advanced oxidation processes, and design of UV disinfection systems and reactors.

ENVE 5004 [0.5 credit] (EVG 7144)
Advanced Wastewater Treatment

Fundamentals, applications, and design of biological, physical, and chemical treatment processes employed for advanced treatment of domestic and industrial wastewater. Reuse applications and guidelines.

ENVE 5007 [0.5 credit]

Filtration and Membranes in Water Treatment

Filtration is a key process for removal of contaminants from water sources. This course discusses various filtration processes including slow sand filtration, conventional filtration, biological filtration, and low and high pressure membrane applications in a lecture and seminar format. Previous water related course knowledge expected.

ENVE 5101 [0.5 credit] (EVG 7101)

Air Pollution Control

Air quality and pollution; definitions, measurement and monitoring methods. Criteria pollutants, air toxics, particulate matter, secondary pollutants. Pollutant formation mechanisms. Major sources and control methods. Meteorology and principles of dispersion modeling. Principles of receptor modeling. Indoor air quality. Also offered at the undergraduate level, with different requirements, as ENVE 4003, for which additional credit is precluded.

ENVE 5102 [0.5 credit] (EVG 7161)

Traffic-Related Air Pollution

Pollutant formation, emission characterization, emission control technology and emission modeling from motor vehicles. Dispersion and receptor modeling for conservative pollutants in urban microenvironments. Personal exposure and health risk assessment.

ENVE 5103 [0.5 credit] (EVG 7162)

Air Quality Modeling

Dispersion modeling for simple and complex sources and complex terrain. Physical and chemical transformations for pollutants in the atmosphere. Urban and regional air pollution modeling for reactive pollutants. The urban air shed model. Regional air quality modeling case studies.

ENVE 5104 [0.5 credit] (EVG 7104)

Indoor Environmental Quality

Indoor environmental quality (air quality, thermal, visual, and acoustic comfort); physical and chemical parameters for characterization. Types and sources of indoor air pollution and discomfort; measurement techniques. Heating, ventilation, air conditioning, lighting practices and issues. Modeling of and design for indoor environmental quality.

ENVE 5105 [0.5 credit] (EVG 7105)

Atmospheric Aerosols

Atmospheric aerosol characterization and size distribution, theoretical fundamentals of physical and chemical processes that govern formation and transformation of aerosols in the atmosphere such as nucleation, coagulation, condensation/evaporation, and aerosol thermodynamics; interactions between aerosols and climate, aerosol sampling and measurement.

ENVE 5106 [0.5 credit] (EVG 7106)**Atmospheric Chemical Transport Modelling**

Fundamentals of Eulerian atmospheric modelling; overview of global and regional atmospheric models, basic principles of numerical methods used in air quality models; applications of air quality models; uncertainty and sensitivity analysis in air quality modelling.

ENVE 5200 [0.5 credit] (EVG 7200)**Climate Change and Engineering**

Survey of the physical science of climate change, impacts on the built environment, and climate adaptation in engineering. Greenhouse gases, global warming, paleoclimatology, and Earth system responses. Climate change impacts on structural, water, transportation, and energy systems. Climate vulnerability assessment, examples of design adaptation.

Also offered at the undergraduate level, with different requirements, as ENVE 4200, for which additional credit is precluded.

ENVE 5201 [0.5 credit] (EVG 7201)**Geo-Environmental Engineering**

Landfill design; hydrogeologic principles, water budget, landfill liners, geosynthetics, landfill covers, quality control and quality assurance, clay/leachate interaction, composite liner design and leachate collection systems. Landfill operation, maintenance and monitoring. Design of environmental control and containment systems; slurry walls, grout curtains, Case studies.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as ENVE 4002, for which additional credit is precluded.

ENVE 5203 [0.5 credit] (EVG 5203)**Hazardous and Radioactive Wastes**

Classification of hazardous, radioactive and mixed wastes, hazardous waste treatment processes, wastes generated in the nuclear fuel cycle, radioactive waste classification, radioactive waste treatment and management of residuals, engineered systems for long-term isolation and disposal, mixed waste management.

Also offered at the undergraduate level, with different requirements, as ENVE 4101, for which additional credit is precluded.

ENVE 5204 [0.5 credit] (EVG 7134)**Resource Industry Waste Management**

Application of geotechnique and hydraulics to management of resource extraction residuals such as tailings, waste rock, and sludge from hard rock mines and bitumen extraction operations. Geotechnique of conventional and high density tailings disposal. Pipeline transport of concentrated suspensions. Closure technologies for mine waste impoundments.

ENVE 5205 [0.5 credit] (EVG 7132)**Sludge Treatment and Disposal**

Aspects of sludge treatment, management, and disposal; sludge generation and characterization, thickening, preliminary treatment processes, aerobic and anaerobic digestion, lime stabilization, conditioning, dewatering, composting, land application and other disposal options, and thermal processes.

ENVE 5301 [0.5 credit] (EVG 7301)**Contaminant Hydrogeology**

Theory of flow through porous media; soil characterization, soil properties, anisotropy, heterogeneity. Contaminant transport. Well hydraulics and pump tests. Introduction to numerical modeling; finite difference, finite elements, conceptual model, boundary conditions. Site remediation and remediation technologies.

Also offered at the undergraduate level, with different requirements, as ENVE 4006, for which additional credit is precluded.

ENVE 5302 [0.5 credit] (EVG 7163)**Case Studies in Hydrogeology**

Development of a conceptual model; chemistry, geology and hydrology, site characterization, initial and boundary conditions. Application of industry-recognized computer codes to model flow and contaminant transport at a particular site. Evaluation of remedial alternatives at a site. Modeling of the more common remediation technologies. Includes: Experiential Learning Activity

ENVE 5303 [0.5 credit] (EVG 7303)**Multiphase Flow in Soils**

Theory of unsaturated flow and multiphase flow; capillary pressure-saturation relationships, relative permeability relationships, wettability, hysteresis, fluid entrapment, residual saturations, governing equations for flow and transport. Richard's Equation for unsaturated flow.

Modeling of multiphase flow.

ENVE 5402 [0.5 credit] (EVG 7402)**Finite Elements in Field Problems**

Use of Galerkin and Ritz finite element formulations to solve one and two dimensional field problems. Steady state and time-dependent phenomena involving heat transfer, fluid flow, diffusion, and dispersion with emphasis on practical applications. Basic knowledge of third year-level undergraduate engineering mathematics and physics required.

Also listed as CIVE 5107.

ENVE 5701 [0.5 credit] (EVG 7001)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5702 [0.5 credit] (EVG 7002)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5703 [0.5 credit] (EVG 7003)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5704 [0.5 credit] (EVG 7004)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5705 [0.5 credit] (EVG 7005)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5800 [0.0 credit] (EVG 7305)**Master's Seminar**

M.A.Sc. and M.Eng (project option) students in the Environmental Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

Registration in the course should be in the term that the presentation will take place.

ENVE 5900 [1.0 credit] (EVG 6001)**Environmental Engineering Project**

Students enrolled in the M.Eng. program by course work will conduct an engineering study, analysis, or design project under the general supervision of a member of the Department.

Includes: Experiential Learning Activity

ENVE 5906 [0.5 credit] (EVG 6108)**Directed Studies 1**

Precludes additional credit for CIVE 5906.

Prerequisite(s): open only to students in an Environmental Engineering Master's program.

ENVE 5909 [2.5 credits] (EVG 7999)**Master's Thesis**

Includes: Experiential Learning Activity

ENVE 6906 [0.5 credit] (EVG 6109)**Directed Studies 2**

Precludes additional credit for CIVE 6906.

Prerequisite(s): open only to students in the Environmental Engineering Ph.D. program.

ENVE 6909 [0.0 credit] (EVG 9999)**Ph.D. Thesis**

Includes: Experiential Learning Activity

ENVE 7800 [0.5 credit] (EVG 6109)**Ph.D. Seminar**

Ph.D. students in the Environmental Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

Registration in the course should be in the term that the presentation will take place.

Ethics and Public Affairs

This section presents the requirements for programs in:

- Ph.D. Ethics and Public Affairs
- Graduate Diploma in Ethics and Public Affairs

Program Requirements**Ph.D. Ethics and Public Affairs (5.0 credits)****Ph.D. Ethics and Public Affairs (10.0 credits)**

1. 3.0 credits in:	3.0
EPAF 5500 [0.5] Practicum	
EPAF 6000 [0.5] Ethical Concerns in Public Affairs	
EPAF 6100 [1.0] Public Reason I	
EPAF 6200 [1.0] Public Reason II	
2. Proficiency in a social science research methodology, as evidenced by successful completion of an approved graduate-level methods course (0.5 credit) either at Carleton University or another university. (May be satisfied on or after admission).	
3. 1.0 credit in:	1.0
EPAF 6600 [0.5] Theory Examination	
EPAF 6700 [0.5] Area Examination	
4. 1.0 credit in approved electives at the graduate level (which may include a methods course)	1.0
5. Public defence of a written dissertation proposal, preceded by its formal acceptance by the supervisory committee	
6. Submission and successful defence of a thesis proposal	
7. 0.0 credits in:	0.0
EPAF 6909 [0.0] Ph.D. Thesis	
8. Public defence of the dissertation	
9. Presentation of research findings to a professional audience	
Total Credits	5.0

Graduate Diploma in Ethics and Public Affairs (3.0 credits)**Requirements:**

1. 2.5 credits in:	2.5
EPAF 5000 [0.5] Topics in Ethics and Public Affairs	
EPAF 6100 [1.0] Public Reason I	
EPAF 6200 [1.0] Public Reason II	
2. 0.5 credit in electives from:	0.5
EPAF 5100 [0.5] Supervised Research Tutorial	
EPAF 5200 [0.5] Ethics in Organizations	
EPAF 5300 [0.5] Values-based Deliberation	
EPAF 5500 [0.5] Practicum	
- or another course approved by the Program Director.	
Total Credits	3.0

Regulations

See the General Regulations section of this Calendar.

Admission

The typical requirement for admission to the Graduate Diploma in Public Affairs is an average of A- or above in honours or graduate courses, with evidence of proficiency in both (a) analytical ethics or political philosophy, and (b)

social science or interdisciplinary studies including social science.

Admission

Admission to the Ph.D. Ethics and Public Affairs requires one of:

- A master's degree in a relevant field and an A average in relevant honours or graduate courses both in (a) analytical ethics or political philosophy and in (b) social science or interdisciplinary studies; or
- A master's degree in a relevant field, and successful performance in an EPAF graduate diploma program with an A average.

European, Russian and Eurasian Studies

This section presents the requirements for programs in:

- M.A. European, Russian and Eurasian Studies
- Graduate Diploma in European Integration Studies

M.A. European, Russian and Eurasian Studies (5.0 credits)

Requirements - Research Essay program:

1. 0.5 credit in:	0.5
EURR 5001 [0.5] Interdisciplinary Seminar in European, Russian and Eurasian Studies	
2. 0.5 credit in:	0.5
EURR 5010 [0.5] Research Design and Methodology in European, Russian and Eurasian Studies	
3. 1.0 credit in course work in the selected concentration (Russian and Eurasian Studies or European and European Union Studies)	1.0
4. 2.0 credits in course work chosen with the approval of the graduate supervisor from the electives course list below	2.0
5. 1.0 credit in:	1.0
EURR 5908 [1.0] Research Essay (related to the concentration, incorporating the approaches of at least two disciplines represented in the program; the research essay will be combined with an additional 1.0 credit coursework chosen with the approval of the graduate supervisor from the electives course list below)	

Total Credits **5.0**

Requirements - Thesis program:

1. 0.5 credit in:	0.5
EURR 5001 [0.5] Interdisciplinary Seminar in European, Russian and Eurasian Studies	
2. 0.5 credit in:	0.5
EURR 5010 [0.5] Research Design and Methodology in European, Russian and Eurasian Studies	
3. 1.0 credit in course work in the selected concentration (Russian and Eurasian Studies or European and European Union Studies)	1.0

4. 1.0 credit in course work chosen with the approval of the graduate supervisor from the electives course list below **1.0**

5. 2.0 credits in:	2.0
EURR 5909 [2.0] M.A. Thesis (on a topic related to the concentration, which must combine interdisciplinary approaches with a greater degree of originality and a greater use of primary sources than that required of the research essay. The thesis must be defended orally. The thesis option cannot be taken without the specific permission of the graduate supervisor)	

6. Language requirement (see Language Requirement, below)

Total Credits **5.0**

Notes:

1. No more than 1.0 credit may be taken at the 4000 level.
2. No more than 0.5 credit in a language discipline may be counted towards program requirements.

Language Requirement

Each student must demonstrate language proficiency by the end of their degree. Students entering the M.A. program with no or minimal knowledge of a regional language will require extra coursework and/or summer language training to meet the language requirement.

For the Russian and Eurasian Studies concentration the student may select German, Polish, Russian, Ukrainian or Serbian/Croatian. For the European and European Union Studies concentration the student may select French, German, Italian, Polish or Spanish. A student may request permission to use another major language to fulfil this requirement. However, the requested language:

- (a) must be utilized in undertaking research for the research essay or M.A. thesis; and,
- (b) its selection must be approved by the graduate supervisor.

Meeting the language requirement may be demonstrated by successful completion of the appropriate language from the following list with a minimum grade of B+:

RUSS 4115 [0.5] Russian for Social Studies	
or	
GERM 4110 [1.0] Intensive Fourth-Year German	
or	
SPAN 3010 [0.5] Third-Year Spanish I & SPAN 3020 [0.5] Third-Year Spanish II	
or	
SPAN 3110 [1.0] Intensive Third-Year Spanish	
or	
ITAL 3110 [1.0] Intensive Third-Year Italian	

Students may also complete a written translation examination administered by the Institute. Students who have completed an undergraduate degree in a relevant language may apply to the Institute for a waiver of the language requirement.

Guidelines for Completion of Master's Degree

Students in the 5.0-credit program with sufficient proficiency in Russian, German or another approved language are expected to complete the degree within three to four terms of study. Students participating in international exchanges or co-operative education programs will normally require longer to complete degree requirements.

Concentrations

While one of the program's goals is to provide students with an integrative approach to the entire region, the concentration assures that each student's individual program will retain a particular focus. Europe and Eurasia have become increasingly integrated in terms of theoretical and methodological approaches. However, the two sub-regions covered by the program have distinct histories and legacies along with differing intellectual traditions. Selection of a concentration assures that each student's program will have an adequate level of intellectual coherence. Students studying the post-communist countries of Central and Eastern Europe that are EU member states or candidates for membership may select either concentration, depending on the thematic focus of the student's work.

The Institute offers two concentrations that draw systematically from the program's range of courses and expertise. Students are required to pursue one of these concentrations:

- Russian and Eurasian Studies
- European and European Union (EU) Studies

Russian and Eurasian Studies

This concentration involves an interdisciplinary focus on the communist legacy and challenges facing countries in transition, with a geographic scope covering eastern and southeastern Europe, Russia, Ukraine, Belarus, the Caucasus and post-Soviet Central Asia.

Russian and Eurasian Studies Concentration Course Electives List

EURR 4002 [0.5]	Post-Soviet States and Societies
or EURR 5002 [0.5]	Post-Soviet States and Societies
EURR 4101 [0.5]	The Balkans in Transition – 1918 to 1989
EURR 4102 [0.5]	The Balkans since 1989
EURR 4103 [0.5]	The Great Russian Novel
EURR 4205 [0.5]	Politics of Identity in Europe and the Russian Area
EURR 4207 [0.5]	Politics of Central Eurasia
EURR 4208 [0.5]	Foreign Policies of Soviet Successor States
EURR 4209 [0.5]	Politics of the Caucasus and Caspian Basin
EURR 5008 [0.5]	Nationalism and Ethnic Conflict in Eastern and Central Europe
EURR 5100 [0.5]	Nation-Building in Central and Eastern Europe
EURR 5101 [0.5]	Russian Domestic Politics
EURR 5102 [0.5]	The International Political Economy of Transition

EURR 5107 [0.5]	Russia's Regional and Global Ambitions
EURR 5202 [0.5]	Special Topics in Russian and Eurasian Studies
EURR 5204 [0.5]	Central Europe, Past and Present
EURR 5305 [0.5]	Imperial Russia and the Russian Revolution
EURR 5306 [0.5]	The Soviet Union: Power and Culture
PSCI 4501 [0.5]	Politics of Identity in Europe and the Russian Area
PSCI 4503 [0.5]	Politics of Central Eurasia
PSCI 4505 [0.5]	Transitions to Democracy
PSCI 4601 [0.5]	Foreign Policies of Soviet Successor States
PSCI 5105 [0.5]	Post-Communist Politics in East Central Europe
PSCI 5106 [0.5]	The Politics of Post-Soviet Successor States
SOCI 5804 [0.5]	Modern Marxist Theory

European and European Union Studies

This concentration focuses on countries involved in the European Union and on European integration processes, consequences, and dynamics from an interdisciplinary perspective, including EU enlargement and relations of the EU with other states.

European and European Union Studies Concentration Course Electives List

EURR 4101 [0.5]	The Balkans in Transition – 1918 to 1989
EURR 4102 [0.5]	The Balkans since 1989
EURR 5003 [0.5]	Social and Political Perspectives in Europe
EURR 5008 [0.5]	Nationalism and Ethnic Conflict in Eastern and Central Europe
EURR 5100 [0.5]	Nation-Building in Central and Eastern Europe
EURR 5102 [0.5]	The International Political Economy of Transition
EURR 5104 [0.5]	European Integration and European Security
EURR 5105 [0.5]	European Economic Integration
EURR 5106 [0.5]	Selected Topics in European Integration Studies
EURR 5108 [0.5]	Canada-EU Relations: Summer Module
EURR 5109 [0.5]	The EU in International Affairs
EURR 5201 [0.5]	Special Topics in European Studies
EURR 5204 [0.5]	Central Europe, Past and Present
EURR 5205 [0.5]	The European Union and its Eastern Neighbours
EURR 5302 [0.5]	EU Summer Study Abroad
EURR 5303 [0.5]	Contemporary Europe: From Postwar to the European Union
EURR 5304 [0.5]	Europe and International Migration
HIST 5210 [0.5]	Power
HIST 5211 [0.5]	Consumption
HIST 5212 [0.5]	European History Special Topics
INAF 5804 [0.5]	International Relations in Europe

INAF 5805 [0.5]	The EU in International Affairs
PSCI 4501 [0.5]	Politics of Identity in Europe and the Russian Area
PSCI 4505 [0.5]	Transitions to Democracy
PSCI 5503 [0.5]	Topics in European Politics

Electives Course List

Art History

ARTH 4202 [0.5]	Topics in Medieval Architecture and Art
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Economics

ECON 5603 [0.5]	Topics in International Economics
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History

HIST 4600 [1.0]	Seminar in Russian History
HIST 5210 [0.5]	Power
HIST 5211 [0.5]	Consumption
HIST 5212 [0.5]	European History Special Topics

International Affairs

INAF 5202 [0.5]	Contemporary International Security
INAF 5206 [0.5]	Civil-Military Relations
INAF 5602 [0.5]	Development Assistance: Theory and Practice
INAF 5804 [0.5]	International Relations in Europe
INAF 5805 [0.5]	The EU in International Affairs

Political Science

PSCI 4501 [0.5]	Politics of Identity in Europe and the Russian Area
PSCI 4503 [0.5]	Politics of Central Eurasia
PSCI 4504 [0.5]	Politics of the Caucasus and Caspian Basin
PSCI 4505 [0.5]	Transitions to Democracy
PSCI 4601 [0.5]	Foreign Policies of Soviet Successor States
PSCI 5105 [0.5]	Post-Communist Politics in East Central Europe
PSCI 5106 [0.5]	The Politics of Post-Soviet Successor States
PSCI 5201 [0.5]	Politics in Plural Societies
PSCI 5503 [0.5]	Topics in European Politics
PSCI 5506 [0.5]	Gender and Politics
PSCI 5509 [0.5]	Governing in the Global Economy
PSCI 5803 [0.5]	Transatlantic Security Issues
PSCI 5806 [0.5]	Strategic Thought and Issues in International Security

Russian

RUSS 4115 [0.5]	Russian for Social Studies
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Sociology

SOCI 5804 [0.5]	Modern Marxist Theory
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European, Russian and Eurasian Studies

EURR 4101 [0.5]	The Balkans in Transition – 1918 to 1989
EURR 4102 [0.5]	The Balkans since 1989
EURR 4103 [0.5]	The Great Russian Novel
EURR 4205 [0.5]	Politics of Identity in Europe and the Russian Area
EURR 4207 [0.5]	Politics of Central Eurasia
EURR 4208 [0.5]	Foreign Policies of Soviet Successor States

EURR 4209 [0.5]	Politics of the Caucasus and Caspian Basin
EURR 5001 [0.5]	Interdisciplinary Seminar in European, Russian and Eurasian Studies
EURR 5002 [0.5]	Post-Soviet States and Societies
EURR 5003 [0.5]	Social and Political Perspectives in Europe
EURR 5008 [0.5]	Nationalism and Ethnic Conflict in Eastern and Central Europe
EURR 5100 [0.5]	Nation-Building in Central and Eastern Europe
EURR 5101 [0.5]	Russian Domestic Politics
EURR 5102 [0.5]	The International Political Economy of Transition
EURR 5103 [0.5]	Sustainability and Development in the Arctic: Transformations in the Circumpolar North
EURR 5104 [0.5]	European Integration and European Security
EURR 5105 [0.5]	European Economic Integration
EURR 5106 [0.5]	Selected Topics in European Integration Studies
EURR 5107 [0.5]	Russia's Regional and Global Ambitions
EURR 5108 [0.5]	Canada-EU Relations: Summer Module
EURR 5201 [0.5]	Special Topics in European Studies
EURR 5202 [0.5]	Special Topics in Russian and Eurasian Studies
EURR 5204 [0.5]	Central Europe, Past and Present
EURR 5205 [0.5]	The European Union and its Eastern Neighbours
EURR 5301 [0.5]	Internship and Applied Policy Skills
EURR 5304 [0.5]	Europe and International Migration
EURR 5305 [0.5]	Imperial Russia and the Russian Revolution
EURR 5306 [0.5]	The Soviet Union: Power and Culture
EURR 5900 [0.5]	Tutorial in Russian and Eurasian Studies
EURR 5901 [0.5]	Tutorial in Russian and Eurasian Studies
EURR 5902 [0.5]	Tutorial in European and European Union Studies
EURR 5903 [0.5]	Tutorial in European and European Union Studies

Other 4000- and 5000-level courses may be approved by the graduate supervisor as EURUS credits if they are deemed appropriate to a particular student's objectives.

Graduate Diploma in European Integration Studies (2.0 credits)

Requirements:

1. 1.5 credits from the Primary Option List	1.5
2. 0.5 credit from the Secondary Option List	0.5
Total Credits	2.0

Note: A maximum of 1.0 credit can be double-counted with the student's main degree program.

Primary Option List

PSCI 5503 [0.5]	Topics in European Politics
INAF 5804 [0.5]	International Relations in Europe
EURR 5003 [0.5]	Social and Political Perspectives in Europe
EURR 5104 [0.5]	European Integration and European Security
EURR 5105 [0.5]	European Economic Integration
EURR 5106 [0.5]	Selected Topics in European Integration Studies
EURR 5108 [0.5]	Canada-EU Relations: Summer Module
EURR 5109 [0.5]	The EU in International Affairs
EURR 5205 [0.5]	The European Union and its Eastern Neighbours
EURR 5302 [0.5]	EU Summer Study Abroad
EURR 5303 [0.5]	Contemporary Europe: From Postwar to the European Union
EURR 5304 [0.5]	Europe and International Migration

Secondary Option List

ECON 5401 [0.5]	Public Economics: Expenditures
ECON 5402 [0.5]	Public Economics: Taxation
ECON 5601 [0.5]	International Trade: Theory and Policy
ECON 5602 [0.5]	International Monetary Theory and Policy
EURR 5102 [0.5]	The International Political Economy of Transition
PSCI 5105 [0.5]	Post-Communist Politics in East Central Europe
PSCI 5106 [0.5]	The Politics of Post-Soviet Successor States
PSCI 5509 [0.5]	Governing in the Global Economy
PSCI 5807 [0.5]	Analysis of International Organizations
PSCI 5808 [0.5]	International Political Economy
INAF 5308 [0.5]	International Trade: Theory and Policy
INAF 5309 [0.5]	International Finance: Theory and Policy

Other 5000-level courses may be approved by the graduate supervisor as Diploma credits if they are deemed appropriate to the program.

In order to be awarded the Diploma, students must apply to graduate with the Diploma at the same time as they apply to graduate with their M.A. or Ph.D.

Regulations

See the General Regulations section of this Calendar.

Master's candidates must obtain a grade of B- or higher on each credit counted towards the degree.

Admission

For admission to the program, applicants should normally meet the following requirements:

- A four-year degree (or equivalent) in a humanities or social science discipline, with demonstrated coursework in the European/Russian/Eurasian

area, ideally covering multiple disciplines (not solely language courses); and

- A reading knowledge of an appropriate major European/Eurasian language other than English (normally equivalent to two academic years of instruction, or one year with an intensive summer program). Applicants may be admitted with no proficiency or inadequate proficiency in an appropriate language; in this case they must be prepared to undertake additional language training during the course of the MA program in addition to fulfilling the normal M.A. requirements.

Practical experience in the area of study will also be taken into consideration.

Applicants who do not have the required interdisciplinary background in the European/Russian/Eurasian area are encouraged to apply to the program, but additional coursework beyond the 5.0 credits may be required.

Accelerated Pathway

The accelerated pathway in the Institute for European, Russian and Eurasian Studies is a flexible and individualized plan of graduate study for students in their final year of a Carleton undergraduate degree.

Students in their third-year of study in a Carleton undergraduate degree should consult with both the Undergraduate Advisor in their program of study and the Graduate Advisor in EURUS to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated pathway requirements

1. At least 1.0 credit in EURUS courses (5000 level or higher).
2. Minimal overall CGPA of at least A-.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Qualifying Year

Applicants who have a general (three-year) bachelor's degree in one of the disciplines represented in the program, or who lack sufficient area studies or language training, may be admitted to a qualifying-year program designed to raise their status to that of honours graduates in European, Russian and Eurasian Studies. Students are expected to achieve a B+ average or better in the qualifying-year program in order to qualify for admission to the Master's year.

Co-operative Education Program in European, Russian and Eurasian Studies

The co-op education program provides students in European, Russian and Eurasian Studies the opportunity to combine work terms with academic study. The practical experiences obtained in the workplace will reflect and extend knowledge and skills learned in the classroom, and will help to develop career interests and marketable expertise. All students in the M.A. Program in European,

Russian and Eurasian Studies have the opportunity to enroll in the co-op education program.

Admission Requirements

Students interested in admission into the co-op education option must apply by the end of the first semester of academic study.

To be eligible for admission to the co-op option, students must:

1. be registered in the M.A. in European, Russian and Eurasian Studies;
2. have successfully completed, by the start-date of the first work term, the required first-year core classes
 - a. EURR 5001 Interdisciplinary Seminar in European, Russian and Eurasian Studies and
 - b. EURR 5010 Research Design and Methodology in European, Russian and Eurasian Studies
3. be registered full-time in each academic term prior to work term.
4. be eligible to work in Canada (for off-campus work terms).

In addition, students whose first language is not English who are admitted to Carleton based on CAEL, IELTS or TOEFL assessments must also meet the following requirement: either a score of 6.0 on the CAEL Spoken English Test for Co-op students, or a score of 22 on the TOEFL test for spoken English, or a score of 6.5 on the IELTS test for spoken English.

Meeting the preceding requirements only establishes eligibility for admission to the co-op option - the prevailing job market may limit enrollment in it. Students should also note that hiring priority is given to Canadian citizens for co-op positions under the auspices of the Public Service Commission. Work terms for European, Russian and Eurasian Studies co-op students exist in a variety of public and private sector fields. Every effort will be made to ensure that there are appropriate work opportunities available, but there are no assurances that a co-op position will be found. Students with a high CGPA, enthusiasm, and potential, however, will have a competitive edge in securing co-op employment. Students will be assisted by the Carleton University Co-op Office to find work term positions.

Registration

Students who are accepted into the Co-op Education Option in European, Russian and Eurasian Studies must be registered in EURR 5913 [0.0] Co-operative Work Term in each work term.

Note: This course does not carry academic course credit, but is noted on academic transcripts. Students are permitted to enroll in one 0.5 credit course during each work term.

Graduation

Students must successfully complete two work terms, in addition to the M.A. in European, Russian and Eurasian Studies requirements, to successfully graduate and

receive a co-op designation on their final transcript and diploma.

Appeals

The Co-op Office administers the regulations and procedures applicable to the co-op option, and will report any situation of a student failing to report to a placement or being required to withdraw from the co-op option for any reason to the Director of the Institute of European, Russian and Eurasian Studies for a final decision. Any decision may be appealed through the normal channels of the University.

European and Russian Studies (EURR) Courses

EURR 5001 [0.5 credit]

Interdisciplinary Seminar in European, Russian and Eurasian Studies

Current debates and methodological approaches within various academic disciplines relating to Europe, Russia, and Eurasia.

Prerequisite(s): permission of the Institute or enrolment in the EURUS program.

EURR 5002 [0.5 credit]

Post-Soviet States and Societies

The relationship between social forces and state structures at both the national and local levels in the USSR and the post-soviet states.

Also listed as PSCI 5110.

Also offered at the undergraduate level, with different requirements, as EURR 4002, PSCI 4502, for which additional credit is precluded.

EURR 5003 [0.5 credit]

Social and Political Perspectives in Europe

Social issues and policies in the European Union including European identity, democratic legitimacy, nationalist and extremist political movements, Euroscepticism, migration and immigration, social inclusion/exclusion and social models, gender and family policy, regional differentiation. Also offered at the undergraduate level, with different requirements, as EURR 4003, for which additional credit is precluded.

EURR 5008 [0.5 credit]

Nationalism and Ethnic Conflict in Eastern and Central Europe

Ethnic basis of nationalism in the region. Ethnic politics and trends.

Precludes additional credit for EURR 4008.

EURR 5010 [0.5 credit]

Research Design and Methodology in European, Russian and Eurasian Studies

Examination of various issues in research design and methodology, with examples from the academic literature. Discussion of student research proposals.

Includes: Experiential Learning Activity

Precludes additional credit for EURR 5200 (no longer offered) and EURR 5300 (no longer offered).

EURR 5100 [0.5 credit]**Nation-Building in Central and Eastern Europe**

Processes of nation-building in the region examined in terms of a particular country, or set of countries. Country focus may vary.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4100, for which additional credit is precluded.

EURR 5101 [0.5 credit]**Russian Domestic Politics**

Examination of the evolution of Russian domestic politics and society since the collapse of the Soviet Union.

Themes discussed include the transformation of Russia's political system, changes in the behavior of political elites, the evolution of Russia's social structure, and federal-regional relations.

Also listed as PSCI 5112.

EURR 5102 [0.5 credit]**The International Political Economy of Transition**

Problems of reintegration into the world economy and dilemmas of transition from command to market economies. Topics may include new trade and investment patterns, role in regional and international economic organizations, search for appropriate exchange rate policies, impact of Western assistance.

Also listed as INAF 5802.

EURR 5103 [0.5 credit]**Sustainability and Development in the Arctic: Transformations in the Circumpolar North**

The Circumpolar Arctic Region is undergoing rapid political, economic, social and technological development, which impacts sustainability. Climate, contaminants and biological diversity focus international attention.

Nunavut, the Russian North, major developments, and international circumpolar regime formation, with emphasis on environment and development.

EURR 5104 [0.5 credit]**European Integration and European Security**

A seminar focusing on security issues related to the formation of supra-national decision-making structures in Europe.

Includes: Experiential Learning Activity

Also listed as PSCI 5608.

Also offered at the undergraduate level, with different requirements, as EURR 4104, for which additional credit is precluded.

EURR 5105 [0.5 credit]**European Economic Integration**

Economic issues and policies related to the process of European integration and the development of the post-World War II European Union.

Also listed as INAF 5803.

Prerequisite(s): ECON 1000.

EURR 5106 [0.5 credit]**Selected Topics in European Integration Studies**

Selected topics related to post-World War II European integration.

Also listed as PSCI 5609.

EURR 5107 [0.5 credit]**Russia's Regional and Global Ambitions**

This course examines domestic conditions in Russia from 2000 to the present and the framing of Russia's foreign policy and strategic objectives towards the former Soviet republics and other key global actors, including the United States, the European Union, NATO and China.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4107, for which additional credit is precluded.

EURR 5108 [0.5 credit]**Canada-EU Relations: Summer Module**

Relations between Canada and Europe in the context of European integration, with attention to policy issues affecting the relationship and/or areas of common policy challenges.

Also listed as PSCI 5103.

Precludes additional credit for EURR 5106 and PSCI 5609 if taken in the summer of 2003-2004 or 2004-05.

Prerequisite(s): previous course in European integration or permission of the instructor.

EURR 5109 [0.5 credit]**The EU in International Affairs**

The impact of the EU on international affairs; the internal development of the EU, the evolution of integration theory, and the growth of the EU's external relations capabilities.

Includes: Experiential Learning Activity

Also listed as INAF 5805.

EURR 5113 [0.5 credit]**Democracy in the European Union**

Survey of empirical research and normative theorizing about democracy in the EU. Topics include: European Parliament and other channels for democratic input, patterns of citizen participation, impact of European integration on democracy in EU member states, Euroscepticism, theories of EU democracy.

Also listed as PSCI 5113.

EURR 5201 [0.5 credit]**Special Topics in European Studies**

Selected topics related to Europe and/or the European Union.

EURR 5202 [0.5 credit]**Special Topics in Russian and Eurasian Studies**

Selected topics related to the communist and post-communist states and processes of transition they are undergoing.

Also offered at the undergraduate level, with different requirements, as EURR 4202, for which additional credit is precluded.

EURR 5204 [0.5 credit]**Central Europe, Past and Present**

Evolution and current status of Central Europe from periods of foreign control in the late nineteenth and twentieth centuries to independent statehood. Emphasis on national accommodations and conflicts.

Also listed as HIST 5604.

Also offered at the undergraduate level, with different requirements, as EURR 4204, for which additional credit is precluded.

EURR 5205 [0.5 credit]**The European Union and its Eastern Neighbours**

The EU's European Neighbourhood Policy and Eastern partnership policy, the Russia-EU "strategic partnership". Policies and reactions of non-EU East European countries toward the EU. The interaction of Member state policies and EU policies. May include attention to historical legacies, cultural factors, public opinion, energy security.

Includes: Experiential Learning Activity

Also listed as INAF 5807, PSCI 5111.

EURR 5301 [0.5 credit]**Internship and Applied Policy Skills**

A seminar accompanying an unpaid internship placement to develop workplace and applied policy skills. Relating applied experience to academic literature. Writing skills for an applied policy setting. Internship placement: 12 days over 12 weeks.

Includes: Experiential Learning Activity

Prerequisite(s): Open only to EURUS MA students with a minimum B+ average and placement in an internship position in the same semester or in the previous semester (based on a competitive application process).

Also offered at the undergraduate level, with different requirements, as EURR 4206, for which additional credit is precluded.

EURR 5302 [0.5 credit]**EU Summer Study Abroad**

This course is open only to students in approved summer study options in Europe, particularly the EU Study Tour.

Includes: Experiential Learning Activity

Prerequisite(s): approval of the Institute.

Also offered at the undergraduate level, with different requirements, as EURR 4302, for which additional credit is precluded.

EURR 5303 [0.5 credit]**Contemporary Europe: From Postwar to the European Union**

History of contemporary Europe from 1945 to present covering both eastern and western halves of the continent and including social, cultural, political, and economic dimensions.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4303, HIST 4606, for which additional credit is precluded.

EURR 5304 [0.5 credit]**Europe and International Migration**

Europe's role in international migration. Topics to be discussed may include migration and mobility as both assets and challenges for sending, transit, and destination countries, changing geographies of migration, inclusion and exclusion, political mobilization, and responses of European states and other actors.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4304, for which additional credit is precluded.

EURR 5305 [0.5 credit]**Imperial Russia and the Russian Revolution**

Examination of the expansion and downfall of tsarist Russia from the eighteenth century to the revolutionary era and the establishment of Bolshevik rule. Topics include the relationship between the monarchy and subject peoples, social and economic change, and daily life.

Includes: Experiential Learning Activity

Also listed as HIST 5607.

Precludes additional credit for EURR 4203 (no longer offered), EURR 5203 (no longer offered), HIST 4603 (no longer offered), HIST 5603 (no longer offered).

Also offered at the undergraduate level, with different requirements, as EURR 4305, for which additional credit is precluded.

EURR 5306 [0.5 credit]**The Soviet Union: Power and Culture**

Examination of the rise of the Soviet Union to a global power and subsequent tensions that promoted its collapse. The course will analyze Stalinism, the Second World War, the Thaw, and Brezhnev and Gorbachev eras through the lens of the USSR's citizens.

Includes: Experiential Learning Activity

Also listed as HIST 5608.

Precludes additional credit for EURR 4203 (no longer offered), EURR 5203 (no longer offered), HIST 4603 (no longer offered), HIST 5603 (no longer offered).

Also offered at the undergraduate level, with different requirements, as EURR 4306, for which additional credit is precluded.

EURR 5307 [0.5 credit]**Topics in Migration and Diaspora: Europe, Russia and Eurasia**

Topics in European, Russian and Eurasian Studies with a focus on migration and diaspora in Europe, Russia and Eurasia.

Also listed as MGDS 5202.

EURR 5900 [0.5 credit]**Tutorial in Russian and Eurasian Studies**

Directed readings on selected aspects of Russian and Eurasian issues.

Prerequisite(s): permission of the Institute.

EURR 5901 [0.5 credit]**Tutorial in Russian and Eurasian Studies**

Directed readings on selected aspects of Russian and Eurasian issues.

Prerequisite(s): permission of the Institute.

EURR 5902 [0.5 credit]**Tutorial in European and European Union Studies**

Directed readings on selected aspects of European and European Union issues.

Prerequisite(s): permission of the Institute.

EURR 5903 [0.5 credit]**Tutorial in European and European Union Studies**

Directed readings on selected aspects of European and European Union issues.

Prerequisite(s): permission of the Institute.

EURR 5908 [1.0 credit]**Research Essay**

A research essay on a topic relating to European, Russian or Eurasian Studies.

Includes: Experiential Learning Activity

EURR 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Institute.

EURR 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Co-operative Education Program option in the M.A. program in European, Russian, and Eurasian Studies.

Film Studies

This section presents the requirements for programs in:

- M.A. Film Studies
- M.A. Film Studies with Specialization in African Studies
- M.A. Film Studies with Specialization in Digital Humanities

Program Requirements

Students admitted to the Film Studies M.A. will initially be enrolled in the Coursework Stream. By November 1 of their first term, students may apply to be transferred to either the Research Essay Stream or the Thesis Stream.

M.A. Film Studies (4.0 credits)**Requirements - Thesis Stream (4.0 credits)**

1. 1.0 credit in:	1.0
FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II	
2. 1.5 credits in Film Studies graduate course work, excluding FILM 5801	1.5
3. 1.5 credits in:	1.5

FILM 5909 [1.5] M.A. Thesis

Total Credits **4.0**

Note: for **Item 2** above, students may take 0.5 credit of coursework outside the Film Studies program subject to the approval of the Graduate Supervisor. This 0.5 credit may be a 4000-level Film Studies course.

Requirements - Research Essay Stream (4.0 credits)

1. 1.0 credit in:	1.0
FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II	
2. 2.0 credits in Film Studies graduate course work, 0.5 credit of which can include:	2.0
FILM 5801 [0.5] Graduate Internship (see Note, below)	
3. 1.0 credit in:	1.0
FILM 5908 [1.0] Research Essay	

Total Credits **4.0**

Note: for **Item 2** above, students may take 0.5 credit of coursework outside the Film Studies M.A. program subject to the approval of the Graduate Supervisor. This 0.5 credit may be a 4000-level Film Studies course.

Requirements - Coursework Stream (4.0 credits)

1. 1.0 credit in:	1.0
FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II	
2. 3.0 credits in Film Studies graduate course work, 0.5 credit of which can include:	3.0
FILM 5801 [0.5] Graduate Internship	

Total Credits **4.0**

Note: for **Item 2** above, students may take up to 1.0 credit of graduate coursework outside the Film Studies M.A. program subject to the approval of the Graduate Supervisor. Students may request departmental approval for 0.5 of this 1.0 credit to be a 4000-level Film Studies course.

M.A. Film Studies with Specialization in African Studies (4.0 credits)**Requirements - Thesis Stream (4.0 credits)**

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 1.0 credit in:	1.0
FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I	
FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II	
4. 1.0 credit in Film Studies graduate course work, excluding FILM 5801	1.0

5. 1.5 credits in:	1.5
FILM 5909 [1.5] M.A. Thesis	

Total Credits 4.0

Requirements - Research Essay Stream (4.0 credits)

1. 0.5 credit in:	0.5
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AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

2. 0.0 credit in:	
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AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. 1.0 credit in:	1.0
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FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I

FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II

4. 1.5 credits in Film Studies graduate course work, 0.5 credit of which can include:	1.5
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FILM 5801 [0.5] Graduate Internship

5. 1.0 credit in:	1.0
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FILM 5908 [1.0] Research Essay

Total Credits 4.0

Requirements - Coursework Stream (4.0 credits)

1. 0.5 credit in:	0.5
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AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives

2. 0.0 credit in:	0.0
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AFRI 5800 [0.0] Scholarly Preparation in African Studies

3. 1.0 credit in:	1.0
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FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I

FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II

4. 1.5 credits in Film Studies graduate course work, 0.5 credit of which can include:	1.5
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FILM 5801 [0.5] Graduate Internship

5. 1.0 credit from:	1.0
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AFRI 5050 [0.5] Selected Topics in African Studies

AFRI 5100 [0.5] African Studies Abroad

AFRI 5700 [0.5] Directed Readings in African Studies

Students may also take courses designated as having sufficient African Studies content, as approved by both the Graduate Supervisor in Film Studies and the Graduate Coordinator of the Institute of African Studies.

Total Credits 4.0

Note: for Item 4 above, students may take a 0.5 credit Film Studies course at the 4000-level subject to the approval of the Graduate Supervisor

M.A. Film Studies with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis Stream (5.0 credits)

1. 1.0 credit in:	1.0
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FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I

FILM 5020 [0.5]	Film Theory, History, and Critical Methodologies II	
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2. 1.5 credits in Film Studies graduate course work, excluding FILM 5801	1.5
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3. 1.5 credits in:	1.5
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FILM 5909 [1.5] M.A. Thesis

4. 0.5 credit in:	0.5
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DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually-listed DIGH course)	0.5
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6. 0.0 credit in DIGH 5800	0.0
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Total Credits 5.0

Requirements - Research Essay Stream (5.0 credits)

1. 1.0 credit in:	1.0
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FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I

FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II

2. 2.0 credits in Film Studies graduate course work, 0.5 credit of which can include:	2.0
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FILM 5801 [0.5] Graduate Internship

3. 1.0 credit in:	1.0
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FILM 5908 [1.0] Research Essay

4. 0.5 credit in:	0.5
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DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
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6. 0.0 credit in:	0.0
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DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits 5.0

Note: for Item 2 above, students may take 0.5 credit of coursework outside the Film Studies program subject to the approval of the Graduate Supervisor. This credit may be a 4000-level Film Studies course.

Requirements - Coursework Stream (5.0 credits)

1. 1.0 credit in:	1.0
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FILM 5010 [0.5] Film Theory, History, and Critical Methodologies I

FILM 5020 [0.5] Film Theory, History, and Critical Methodologies II

2. 2.5 credits in Film Studies graduate course work, 0.5 credit of which can include:	2.5
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FILM 5801 [0.5] Graduate Internship

3. 0.5 credit in:	0.5
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DIGH 5000 [0.5] Issues in the Digital Humanities

4. 1.0 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	1.0
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5. 0.0 credit in:	0.0
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DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits 5.0

Note: for Item 2 above, students may take a 0.5 credit Film Studies course at the 4000-level subject to the approval of the Graduate Supervisor.

Guidelines for Completion of M.A. Film Studies

- Full-time students in the thesis stream are expected to finish all requirements for the degree, with the exception of FILM 5909, during their first two terms of study, and part-time students by the end of the fifth term. The thesis requirement is designed to take two or three additional terms.
- Full-time students in the research essay stream are expected to finish all requirements for the degree, with the exception of FILM 5908 during their first two terms of study, and part-time students by the end of the fifth term. Full-time students are expected to complete the research essay by the end of the third term and part time students during the sixth term.

Thesis/Research Essay Proposal

- Students who wish to be admitted into the thesis stream will submit a thesis proposal to the Film Studies Graduate committee no later than November 1 of the first year of registration for students enrolled full time, and no later than the middle of the third term of registration for students enrolled part time.
- Students who wish to be admitted into the research essay stream will submit a research proposal to the Film Studies Graduate committee no later than November 1 of the first year of registration for students enrolled full time, and no later than the middle of the third term of registration for students enrolled part time. The topic should concern research undertaken after admission into the program.

Language Requirements

A reading knowledge of French (or another language approved by the Film Studies Graduate Supervisor) is required.

Regulations

See the General Regulations section of this Calendar.

A standing of B- or better must be obtained in each course counted towards the master's degree.

Admission

The minimum requirement for admission to the master's program is a B.A. Honours or the equivalent in film studies or a related discipline with, normally, B+ in the honours subject and B- or higher overall. Related disciplines might include mass communication, art history, literature, Canadian studies, women's studies, and history. Successful applicants will be admitted to the Coursework stream, with the option of applying to be transferred to either the Research Essay stream or the Thesis stream at the beginning of the second term. Applicants without a background in film studies may be required to take a maximum of two full credits from designated courses in the undergraduate Film Studies program in addition to their normal M.A. program requirements.

Applicants who lack an honours degree, but who have a three-year degree in film studies or a related discipline with a minimum standing of B+, may be admitted to a Post-Baccalaureate in Film Studies. Students who complete the Post-Baccalaureate in Film Studies

requirements with a CGPA of 10.4 or higher will be considered for admission to the master's program. The regulations governing the Post-Baccalaureate are outlined in the General Regulations section of this calendar.

Film Studies (FILM) Courses

FILM 5001 [0.5 credit]

Directed Readings and Research

Tutorials designed to permit students to pursue research on topics in film studies which have been chosen in consultation with members of faculty.

Includes: Experiential Learning Activity

FILM 5002 [0.5 credit]

Special Topics

Selected topics in film studies not available in the regular course program.

FILM 5010 [0.5 credit]

Film Theory, History, and Critical Methodologies I

Recent developments in film theory and history, with emphasis on the themes and concepts informing the development of the discipline of film studies, and training in methodologies for critical, theoretical and historical research in film studies.

Precludes additional credit for FILM 5000 (no longer offered).

FILM 5020 [0.5 credit]

Film Theory, History, and Critical Methodologies II

Building on the skills and knowledge developed in FILM 5010, the course examines recent developments in film theory and history. Emphasis on themes and concepts informing the discipline of film studies, and methodologies for critical, theoretical and historical research in film studies.

Precludes additional credit for FILM 5000 (no longer offered).

Prerequisite(s): FILM 5010 or permission of the instructor.

FILM 5106 [0.5 credit]

Cinema and Technology

Selected aspects of the technological development of cinema, with emphasis on the impact of technological advances on film historiography and critical analysis.

FILM 5107 [0.5 credit]

Topics in Film History

Aspects of the history of cinema, with emphasis on periods, film movements, styles, genres and comparative approaches to national, regional and/or world-wide trends.

FILM 5109 [0.5 credit]

Topics in Film and Philosophy

Selected topics in philosophical approaches to the study of film, and an examination of the relations between film theory and philosophical aesthetics.

Also offered at the undergraduate level, with different requirements, as FILM 4301, for which additional credit is precluded.

FILM 5203 [0.5 credit]**Issues in World Cinema**

Study of the theoretical and methodological issues raised by the concept of world cinema. Topics may include nationalism, transnationalism, translation, cosmopolitanism, local and regional vernaculars, co-productions, film festivals, multinational corporations and other phenomena associated to globalization.

FILM 5205 [0.5 credit]**Topics in Hollywood Cinema**

Examination of Hollywood cinema relative to recent research into Hollywood's impact on film aesthetics, technology, economics and culture.

FILM 5209 [0.5 credit]**Critical Perspectives on Canadian Cinema**

Current critical and historical approaches to Canadian film, with emphasis on institutions, aesthetic traditions and cultural practices.

FILM 5401 [0.5 credit]**Studies in Authorship**

Examination of the work of one or two filmmakers, with a concern for recent ideas about the concept of authorship and the formation of artistic and critical reputations.

FILM 5500 [0.5 credit]**Advanced Film Analysis**

Issues and approaches to the detailed analysis of particular film texts. Work in narratology, hermeneutics, discourse analysis, psychoanalysis, deconstruction and semiotics will provide the methodological background to the study of individual films.

FILM 5506 [0.5 credit]**Topics in Culture, Identity and Representation**

Current critical approaches to the study of identity in cinema. Topics will vary from year to year, and may include race, ethnicity and sexuality, and the geopolitical implications of colonialism and post-colonialism.

FILM 5601 [0.5 credit]**Studies in Genre**

The theory and practice of film genres will be the object of study in this course.

FILM 5701 [0.5 credit]**Topics in Animation**

Institutional histories, the work of individual animators, modes of production, and the social function of animation represent topics to be covered by this course.

FILM 5801 [0.5 credit]**Graduate Internship**

This course provides students with the opportunity to gain practical experience by working on film-related projects under the supervision of staff at a museum, gallery, archive, exhibition venue or government agency. Graded SAT/UNS.

Includes: Experiential Learning Activity

FILM 5908 [1.0 credit]**Research Essay**

Individual project on a topic of the student's choice involving research undertaken after admission into the program and supervised by a faculty member.

Includes: Experiential Learning Activity

FILM 5909 [1.5 credit]**M.A. Thesis**

Includes: Experiential Learning Activity

French and Francophone Studies

This section presents the requirements for programs in:

- M.A. French and Francophone Studies
- M.A. French and Francophone Studies with Specialization in African Studies
- M.A. French and Francophone Studies with Specialization in Digital Humanities

Program Requirements**M.A. French and Francophone Studies (4.0 credits)**

Note: FREN 5300 and FREN 5350 are mandatory for all students. Candidates select from one of two program options, chosen in consultation with an adviser from the Department, normally the Supervisor of Graduate Studies.

Requirements - Research Essay option (4.0 credits)

1. 1.0 credit in:	1.0
FREN 5908 [1.0] Mémoire de recherche	
2. 0.5 credit in:	0.5
FREN 5300 [0.5] Méthodologie de la recherche	
3. 0.0 credit in:	0.0
FREN 5350 [0.0] Proposition de recherche	
4. 2.5 credits at the 5000-level	2.5
Total Credits	4.0

Requirements - Thesis option (4.0 credits)

1. 2.0 credits in:	2.0
FREN 5909 [2.0] M.A. Thesis	
2. 0.5 credit in:	0.5
FREN 5300 [0.5] Méthodologie de la recherche	
3. 0.0 credit in:	0.0
FREN 5350 [0.0] Proposition de recherche	
4. 1.5 credits at the 5000-level	1.5
Total Credits	4.0

With the approval of the Supervisor of Graduate Studies, M.A. students in French may select the equivalent of 1.0 credit at the graduate or 4000 level in French and at the 4000 or 5000 level in another department.

Students are restricted to a maximum of 1.0 credit in directed readings FREN 5800.

M.A. French and Francophone Studies with Specialization in African Studies (4.0 credits)

Note: FREN 5300 and FREN 5350 are mandatory for all students. Candidates select from one of two program

options, chosen in consultation with an adviser from the Department, normally the Supervisor of Graduate Studies.

Requirements - Research Essay option (4.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 1.0 credit in:	1.0
FREN 5908 [1.0]	Mémoire de recherche
4. 0.5 credit in:	0.5
FREN 5300 [0.5]	Méthodologie de la recherche
5. 0.0 credit in:	0.0
FREN 5350 [0.0]	Proposition de recherche
6. 2.0 credits at the 5000 level	2.0
Total Credits	4.0

Requirements - Thesis option (4.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 2.0 credits in:	2.0
FREN 5909 [2.0]	M.A. Thesis
4. 0.5 credit in:	0.5
FREN 5300 [0.5]	Méthodologie de la recherche
5. 0.0 credit in:	0.0
FREN 5350 [0.0]	Proposition de recherche
6. 1.0 credit at the 5000 level	1.0
Total Credits	4.0

M.A. French and Francophone Studies with Specialization in Digital Humanities (4.0 credits)

Note: FREN 5300 and FREN 5350 are mandatory for all students. Candidates select from one of two program options, chosen in consultation with an adviser from the Department, normally the Supervisor of Graduate Studies.

Requirements - Research Essay option (4.0 credits)

1. 1.0 credit in:	1.0
FREN 5908 [1.0]	Mémoire de recherche
2. 0.5 credit in:	0.5
FREN 5300 [0.5]	Méthodologie de la recherche
3. 0.0 credit in:	
FREN 5350 [0.0]	Proposition de recherche
4. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development
7. 1.5 credit at the 5000 level	1.5
Total Credits	4.0

Requirements - Thesis option (4.0 credits)

1. 2.0 credits in:	2.0
FREN 5909 [2.0]	M.A. Thesis
2. 0.5 credit in:	0.5
FREN 5300 [0.5]	Méthodologie de la recherche
3. 0.0 credit in:	0.0
FREN 5350 [0.0]	Proposition de recherche
4. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development
7. 0.5 credit at the 5000 level	0.5
Total Credits	4.0

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or higher must be obtained in each course counted towards the master's degree.

Guidelines for Completion of Master's Degree

Full-time students in the research essay option should be able to complete their program within three terms. Full-time students in the thesis option should be able to complete their program within five terms.

Students are required to submit a detailed proposal of their thesis or research essay. Full-time master's candidates are required to submit this proposal by the end of the ninth month of full-time registration.

Admission

The normal requirement for admission into the master's program is a B.A.(Honours) in French with at least high honours standing (normally B+ or higher in Honours subject; B- or higher overall).

Qualifying Year

Applicants who hold a general (three year) bachelor's degree with at least B standing or higher, with a major in French, are required to register in the qualifying-year program (normally 5.0 credits in French chosen from those numbered at the 4000 level), and maintain at least B+ standing overall, before proceeding to the M.A. program.

Qualifying-year students should consult the Undergraduate Calendar and the departmental website for a listing of 4000-level courses.

French (FREN) Courses

FREN 5004 [0.5 credit]

Linguistique du français canadien

Regard sur la diversité du français parlé au Canada d'un point de vue diachronique, synchronique ou les deux. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5100 [0.5 credit]**Le monde francophone: linguistique et littérature**

Étude trans- et inter-disciplinaire de la langue et de la littérature d'une région du monde francophone. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5212 [0.5 credit]**Littératures francophones**

Analyse de problématiques liées à la francophonie littéraire. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4212, for which additional credit is precluded.

FREN 5213 [0.5 credit]**Littérature québécoise et canadienne d'expression française**

Étude approfondie portant sur un ou plusieurs aspects des littératures d'expression française au Canada. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4213, for which additional credit is precluded.

FREN 5214 [0.5 credit]**Genre et mouvement**

Étude approfondie d'un thème, d'un mouvement, d'un genre dans le champ littéraire. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4214, for which additional credit is precluded.

FREN 5215 [0.5 credit]**Problématiques contemporaines**

Étude de questions contemporaines dans le domaine littéraire. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4215, for which additional credit is precluded.

FREN 5300 [0.5 credit]**Méthodologie de la recherche**

Initiation au monde de la recherche, aux techniques de documentation, à l'exploitation des ressources bibliographiques, à l'élaboration d'un problème de recherche, à l'organisation d'un programme de recherche, aux enjeux épistémologiques de la recherche universitaire.

FREN 5350 [0.0 credit]**Proposition de recherche**

Élaboration de la proposition de thèse ou de mémoire (selon l'option choisie) sous la direction du membre du département qui supervisera la thèse ou le mémoire.

Prerequisite(s): FREN 5300.

FREN 5400 [0.5 credit]**Théories littéraires**

Étude de théories ciblées dans le champ des études littéraires. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5403 [0.5 credit]**Littérature et idéologie**

Études des rapports entre la production littéraire et les discours idéologiques. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5404 [0.5 credit]**Auteurs I**

Étude approfondie de l'œuvre d'un auteur francophone. Le contenu précis de ce cours varie selon les années.

La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5408 [0.5 credit]**Littérature française I**

Étude approfondie d'un aspect particulier de la littérature française. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5409 [0.5 credit]**Littérature française II**

Étude approfondie d'un aspect particulier de la littérature française. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5412 [0.5 credit]**Diversité du français**

Études des variétés du français, dans ses dimensions spatiales. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5412.

Also offered at the undergraduate level, with different requirements, as FREN 4412 and LING 4412, for which additional credit is precluded.

FREN 5413 [0.5 credit]**Diachronie du français**

Étude du français, dans ses dimensions historiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5413.

Also offered at the undergraduate level, with different requirements, as FREN 4413 and LING 4413, for which additional credit is precluded.

FREN 5414 [0.5 credit]**Analyse du français**

Étude du français, dans ses dimensions morphologiques, syntaxiques ou phonologiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5414.

Also offered at the undergraduate level, with different requirements, as FREN 4414 and LING 4414, for which additional credit is precluded.

FREN 5415 [0.5 credit]**Variation du français**

Étude des variations internes de la langue, dans ses dimensions orales et écrites. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5415.

Also offered at the undergraduate level, with different requirements, as FREN 4415 and LING 4415, for which additional credit is precluded.

FREN 5501 [0.5 credit]**Experiential Learning in French and Francophone studies**

Topics in French language, literature or linguistics. Application of language skills in a francophone context. Topic and location may vary; consult Departmental website.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as FREN 4300, for which additional credit is precluded.

FREN 5603 [0.5 credit]**Littérature et les autres arts**

Étude des rapports entre l'art littéraire et d'autres formes d'expression artistique. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5800 [0.5 credit]**Cours de lectures dirigées**

Sujet établi sur proposition de l'étudiant en consultation avec son conseiller.

FREN 5908 [1.0 credit]**Mémoire de recherche**

Includes: Experiential Learning Activity

FREN 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Geography

This section presents the requirements for programs in:

- M.A. Geography
- M.A. Geography with Specialization in African Studies
- M.A. Geography with Specialization in Data Science
- M.A. Geography with Specialization in Latin American and Caribbean Studies
- M.Sc. Geography
- M.Sc. Geography with Specialization in Data Science
- Ph.D. Geography
- Ph.D. Geography with Specialization in Political Economy

Program Requirements

M.A. Geography (5.0 credits)**Requirements:**

1. 0.5 credit in:		0.5
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
2. 2.5 credits in:		2.5
GEOG 5909 [2.5]	M.A. Thesis (which must be defended at an oral examination)	
3. 0.5 credit in:		0.5
GEOG 5905 [0.5]	Masters Research Workshop	
4. 1.0 credit from:		1.0
GEOG 5002 [0.5]	Quantitative Analysis for Geographical Research	
GEOG 5003 [0.5]	Critical Approaches to Qualitative Inquiry	
GEOG 5005 [0.5]	Global Environmental Change: Human Implications	
GEOG 5006 [0.5]	Special Topics in Geography of the Environment	
GEOG 5201 [0.5]	Special Topics in the Geography of Development	
GEOG 5400 [0.5]	Territory and Territoriality	
GEOG 5406 [0.5]	Special Topics in Cultural Geography	
GEOG 5500 [0.5]	Special Topics in the Study of Cities and Urbanization	
GEOG 5502 [0.5]	Special Topics in Geography of Globalization	
GEOG 5600 [0.5]	Empire and Colonialism	
GEOG 5803 [0.5]	Seminar in Geomatics	
GEOG 5804 [0.5]	Geographic Information Systems	
GEOG 5900 [0.5]	Graduate Tutorial	
ENST 4006 [0.5]	Environmental Policy Analysis	
GEOG 4004 [0.5]	Environmental Impact Assessment	
GEOG 4021 [0.5]	Seminar in Culture, Identity and Place	
GEOG 4022 [0.5]	Seminar in People, Resources and Environmental Change	
GEOG 4023 [0.5]	Seminar in Special Topics on the City	

GEOG 4024 [0.5]	Seminar in Globalization	
GEOG 4040 [0.5]	Geographic Thought	
GEOG 4050 [0.5]	Environmental and Geographic Education	
GEOG 4304 [0.5]	Transportation Engineering and Planning	
GEOG 4323 [0.5]	Urban and Regional Planning	
GEOG 4008 [0.5]	Advanced Topics in Geographic Information Systems	
Or from courses offered by departments in the Faculties of Arts and Social Sciences or Public Affairs and Management		
5. 0.5 credit in free elective		0.5
6. In addition to the formal requirements, M.A. students are required to attend the Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

M.A. Geography with Specialization in African Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
GEOG 5905 [0.5]	Masters Research Workshop	
4. 2.5 credits in:		2.5
GEOG 5909 [2.5]	M.A. Thesis (in the specialization and including oral examination of the thesis)	
5. 1.0 credit in approved graduate-level electives		1.0
6. In addition to the formal requirements, MA students are required to attend the Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

M.A. Geography with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
3. 2.5 credits in:		2.5
GEOG 5909 [2.5]	M.A. Thesis (in the specialization and including oral examination of the thesis)	
4. 0.5 credit in:		0.5
GEOG 5905 [0.5]	Masters Research Workshop	
5. 1.0 credit in approved graduate-level electives		1.0

6. In addition to the formal requirements, M.A. students are required to attend the Departmental Seminar series, and the Graduate Field Camp.

Total Credits **5.0**

M.A. Geography with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
GEOG 5905 [0.5]	Masters Research Workshop	
4. 2.5 credits in:		2.5
GEOG 5909 [2.5]	M.A. Thesis (in the specialization and including oral examination of the thesis)	
5. 1.0 credit in approved graduate-level electives		1.0
6. In addition to the formal requirements, MA students are required to attend the Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

M.Sc. Geography (5.0 credits)

Requirements:

1. 0.5 credit in:		0.5
GEOG 5001 [0.5]	Modeling Environmental Systems	
2. 0.5 credit in:		0.5
GEOG 5905 [0.5]	Masters Research Workshop	
3. 3.0 credits in:		3.0
GEOG 5906 [3.0]	M.Sc. Thesis (must be defended at an oral examination)	
4. 0.5 credit in Physical Geography selected from:		0.5
GEOG 5002 [0.5]	Quantitative Analysis for Geographical Research	
GEOG 5103 [0.5]	Hydrologic Principles and Methods	
GEOG 5104 [0.5]	Advanced Biogeography	
GEOG 5107 [0.5]	Field Study and Methodological Research	
GEOG 5303 [0.5]	Geocryology	
GEOG 5307 [0.5]	Soil Resources	
GEOG 5803 [0.5]	Seminar in Geomatics	
GEOG 5804 [0.5]	Geographic Information Systems	
GEOG 5900 [0.5]	Graduate Tutorial	
GEOG 4004 [0.5]	Environmental Impact Assessment	
GEOG 4013 [0.5]	Cold Region Hydrology	
GEOG 4017 [0.5]	Global Biogeochemical Cycles	
GEOG 4101 [0.5]	Two Million Years of Environmental Change	
GEOG 4103 [0.5]	Water Resources Engineering	
GEOG 4104 [0.5]	Microclimatology	
GEOG 4108 [0.5]	Permafrost	

GEOM 4003 [0.5]	Remote Sensing of the Environment	
GEOM 4008 [0.5]	Advanced Topics in Geographic Information Systems	
Or from courses offered by departments in the Faculty of Science		
5. 0.5 credit in	free elective	0.5
6. In addition to the formal requirements, M.Sc. students are required to attend the Departmental Seminar Series, and the Graduate Field Camp.		
Total Credits		5.0

Notes

1. Only 0.5 credit towards the program may be obtained in GEOG 5900 Graduate Tutorial
2. Only 0.5 credit may be obtained at 4000 level.

M.Sc. Geography with Specialization in Data Science (5.0 credits)

Requirements

1. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
2. 0.5 credit in:		0.5
GEOG 5001 [0.5]	Modeling Environmental Systems	
3. 0.5 credit in:		0.5
GEOG 5905 [0.5]	Masters Research Workshop	
4. 0.5 credit in	Physical Geography selected from:	0.5
GEOG 5002 [0.5]	Quantitative Analysis for Geographical Research	
GEOG 5103 [0.5]	Hydrologic Principles and Methods	
GEOG 5104 [0.5]	Advanced Biogeography	
GEOG 5107 [0.5]	Field Study and Methodological Research	
GEOG 5303 [0.5]	Geocryology	
GEOG 5307 [0.5]	Soil Resources	
GEOG 5803 [0.5]	Seminar in Geomatics	
GEOG 5804 [0.5]	Geographic Information Systems	
GEOG 5900 [0.5]	Graduate Tutorial	
up to 0.5 credit in GEOG or GEOM at the 4000 level, with departmental approval		
5. 3.0 credits in:		3.0
GEOG 5906 [3.0]	M.Sc. Thesis (in the specialization and including oral examination of the thesis)	
6. In addition to the formal requirements, M.Sc. students are required to attend the DGES Departmental Seminar series, and the Graduate Field Camp.		
Total Credits		5.0

Ph.D. Geography (2.0 credits)

Requirements:

1. 1.0 credit in:		1.0
GEOG 6000 [0.5]	Doctoral Core Seminar: Geography, Society and the Environment	
& GEOG 6001 [0.5]	Doctoral Core Seminar: Geography, Society and the Environment	
2. 1.0 credit from:		1.0

GEOG 6003 [0.5]	Field Seminar: Geography of Societal Change	
& GEOG 6004 [0.5]	Field Seminar: Geography of Societal Change	
GEOG 6006 [0.5]	Field Seminar: Geography of - Environmental Change	
& GEOG 6007 [0.5]	Field Seminar: Geography of - Environmental Change	
3. Presentation and oral defence of the thesis proposal as outlined below		
4. 0.0 credit from:		
GEOG 6906 [0.0]	Comprehensive Examination: The - Geography of Societal Change	
GEOG 6907 [0.0]	Comprehensive Examination: The Geography of Environmental Change	
5. 0.0 credits in	Thesis which must be defended at an oral examination	0.0
GEOG 6909 [0.0]	Ph.D. Thesis	
6. In addition to the formal requirements, Ph.D. students are required to attend the Departmental Seminar series and the Graduate Field Camp.		
Total Credits		2.0

Ph.D. Geography with Specialization in Political Economy (2.0 credits)

Requirements:

1. 1.0 credit in:		1.0
GEOG 6000 [0.5]	Doctoral Core Seminar: Geography, Society and the Environment	
GEOG 6001 [0.5]	Doctoral Core Seminar: Geography, Society and the Environment	
2. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
3. 0.5 credit from:		0.5
GEOG 6003 [0.5]	Field Seminar: Geography of Societal Change	
GEOG 6004 [0.5]	Field Seminar: Geography of Societal Change	
4. 0.0 credit in:		0.0
GEOG 6906 [0.0]	Comprehensive Examination: The - Geography of Societal Change	
5. Presentation and oral defence of the thesis proposal as outlined below		
6. 0.0 credits in	Thesis which must be defended at an oral examination	0.0
GEOG 6909 [0.0]	Ph.D. Thesis	
7. In addition to the formal requirements, Ph.D. students are required to attend the Departmental Seminar series and the Graduate Field Camp.		
Total Credits		2.0

Comprehensive Examination

Each doctoral candidate is required to write one comprehensive examination: GEOG 6906 or GEOG 6907, according to the chosen field of specialization

The comprehensive examination must be completed after course requirements for the Ph.D. have been completed.

The examination will occur no later than the fourth term of registration in the Ph.D. program. Failure to complete the examination successfully will result in denial of permission to continue in the program.

Thesis Proposal

Candidates normally register in the thesis on entry to the program and work actively to define their research topic during the first term of registration. The thesis proposal is normally presented after comprehensive requirements have been fulfilled. Candidates submit and defend the thesis proposal at an oral examination no later than the end of the 5th term of registration in the Ph.D. program. Continuous registration is required after initial registration in the thesis.

Residence Requirements

All Ph.D. candidates must be registered full time in a minimum of six terms to satisfy the residence requirement.

Regulations

See the General Regulations section of this Calendar.

Admission Requirements

The requirement for admission into the master's program is a B.A.(Honours) or B.Sc. (Honours) in Geography or a related discipline, with at least B+ standing.

In exceptional cases, pertinent work experience may be considered in support of an application to the Department. Students entering the program from other disciplines or with academic deficiencies may be required to take additional courses.

Accelerated Pathway

The accelerated pathway in the M.A. Geography program is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.A. or BSc. Honours degree in Geography, Geomatics, Environmental Studies or related discipline with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third-year of study should consult with both their Undergraduate Program Coordinator and the Department of Geography & Environmental Studies Graduate Program Supervisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. At least 0.5 credit in GEOG courses (5000 level) with a grade of B+ or higher excluding GEOG 5000, 5001 and 5905.
2. Minimum overall CGPA of A-.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission Requirements

The normal requirement for admission into the M.Sc. program in Geography is a B.Sc. (Honours) or B.A.

(Honours) in Physical Geography or a related discipline, with at least B+ standing.

Students entering the program from other disciplines or with academic deficiencies may be required to take additional courses.

The intended research area must be eligible for NSERC support.

Applicants for admission must provide an outline of their proposed project, which must be suitable for the M.Sc. program.

Accelerated Pathway

The accelerated pathway in the M.Sc. Geography program is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.A. or BSc. Honours degree in Geography, Geomatics, Environmental Studies or related discipline with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third-year of study should consult with both their Undergraduate Program Coordinator and the Department of Geography & Environmental Studies Graduate Program Supervisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. At least 0.5 credit in GEOG courses (5000 level) with a grade of B+ or higher excluding GEOG 5000, GEOG 5001 and GEOG 5905.
2. Minimal overall CGPA of A-.

Students may receive advanced standing with transfer of credit of up to 1.0 credit, which can reduce their time to completion.

Admission

The normal requirement for admission to the Ph.D. program is a master's degree (or the equivalent) in geography, with at least an A- average.

A student already registered in the M.A. or M.Sc. program who shows outstanding academic performance and research promise may be permitted to transfer to the Ph.D. program with a recommendation by the Departmental graduate committee.

Applicants whose academic preparation has deficiencies in certain areas may be admitted to the Ph.D. program with the requirement that they complete additional course work.

Admission to the Ph.D. program is granted on a full-time basis in September for the fall term.

Geography (GEOG) Courses

GEOG 5000 [0.5 credit]

Approaches to Geographical Inquiry

A review of the major philosophical perspectives shaping research and explanation by geographers. Particular attention is paid to interpretations of social structure and human action, the nature of the biophysical universe, and the interaction between human beings and their environments.

Includes: Experiential Learning Activity

GEOG 5001 [0.5 credit]

Modeling Environmental Systems

Methods and problems of research on the physical environment, with illustrative material taken from the atmospheric and surface earth sciences. Topics include: the identification and behaviour of environmental systems, temporal and spatial scale, experimental method under field conditions, and simulation and model development.

Includes: Experiential Learning Activity

GEOG 5002 [0.5 credit]

Quantitative Analysis for Geographical Research

Quantitative techniques and methods for research on the natural and cultural environment. Topics include sampling, experimental design, replication, variance, correlation, time series analysis, statistical uncertainty, simulation, calibration, validation.

Includes: Experiential Learning Activity

GEOG 5003 [0.5 credit]

Critical Approaches to Qualitative Inquiry

Development of critical skills in qualitative research by considering the relationship between theory and method. Engaged scholarship and participatory, community-based, action research. Practical experience with select methods including: interviews, personal narratives, focus groups, participant observation, archival research, discourse analysis, and visual methodologies.

Includes: Experiential Learning Activity

GEOG 5005 [0.5 credit]

Global Environmental Change: Human Implications

Global environmental change: its significance for societies, economies and international relations. Value systems underlying environmental discourse; political economy of the environment; sustainability and security. Environmental diplomacy and grassroots environmentalism. Regionalized impacts of pressures on natural environments; challenges of adaptation.

Includes: Experiential Learning Activity

Also listed as INAF 5701.

GEOG 5006 [0.5 credit]

Special Topics in Geography of the Environment

Research seminar on a selected theme within geographical approaches to environmental analysis. Topics will vary from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5103 [0.5 credit]

Hydrologic Principles and Methods

Advanced physical hydrology with emphasis on atmospheric moisture, precipitation, evaporation, infiltration, soil water physics, snow hydrology and runoff generation. Analytical approaches and methods to solve practical hydrological problems.

Includes: Experiential Learning Activity

GEOG 5104 [0.5 credit]

Advanced Biogeography

Current methods and theories in paleoecology are examined: dendrochronology, paleolimnology and other techniques for examining past climates and environmental condition. Numerical approaches to climate change studies.

Includes: Experiential Learning Activity

GEOG 5107 [0.5 credit]

Field Study and Methodological Research

Field acquisition and analysis of geographic material; supervised field observations and methodology. (Individual or group basis, by special arrangement.).

Includes: Experiential Learning Activity

GEOG 5201 [0.5 credit]

Special Topics in the Geography of Development

Research seminar within geographical approaches to development focusing on a selected theme or region. Topics vary from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5303 [0.5 credit]

Geocryology

Development of ground ice in permafrost regions of Canada; ice segregation and pore-water expulsion during ground freezing; analytical and numerical approaches to modeling permafrost conditions.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 4108 or permission of the Department.

GEOG 5307 [0.5 credit]

Soil Resources

Physical, mineralogical, chemical, and other properties of soils will be studied in agricultural, environmental, geomorphological and/or geotechnical contexts, as relevant to the students enrolled.

Includes: Experiential Learning Activity

GEOG 5400 [0.5 credit]

Territory and Territoriality

Contemporary geographical and international relations theorizing is challenging notions of boundaries and territories in the political organization of modernity. Using contemporary writings on geopolitics, security, sovereignty, self-determination and identity politics this course investigates territoriality as a political and intellectual strategy.

Includes: Experiential Learning Activity

Also listed as INAF 5402.

GEOG 5406 [0.5 credit]**Special Topics in Cultural Geography**

Research seminar on a selected theme within cultural (including historical) geography. Topic varies from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5500 [0.5 credit]**Special Topics in the Study of Cities and Urbanization**

Research seminar on a selected theme within geographical approaches to the study of cities and urbanization. Topics will vary from year to year. Consult departmental website for current details.

Includes: Experiential Learning Activity

GEOG 5502 [0.5 credit]**Special Topics in Geography of Globalization**

Research seminar on a selected theme within geographical aspects of globalization. Topic varies from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5600 [0.5 credit]**Empire and Colonialism**

Theoretical approaches to empire and colonialism: postcolonial, feminist, Indigenous, anti-racist, queer, decolonizing, and political-economic approaches. Consideration of a range of sites of imperial and colonial formation, including land, territory, nature, the body, sexuality, gender, and race, as well as forms of resistance, resurgence, and decolonization.

Includes: Experiential Learning Activity

GEOG 5701 [0.5 credit]**Topics in Northern Human Geography**

Political, social, economic, cultural, and environmental geographies of the Canadian North and/or circumpolar North. Topics may include climate change, resource development, politics and governance, knowledge and expertise, geopolitics, sovereignty, colonialism, Indigenous knowledge, Indigenous self-determination, conservation and wildlife, environmental politics.

Includes: Experiential Learning Activity

GEOG 5803 [0.5 credit]**Seminar in Geomatics**

Current research issues in geomatics, including remote sensing, geographic information systems, geographic positioning, and cartography. Topics will focus on combined interests of enrolled students and departmental faculty.

Includes: Experiential Learning Activity

Prerequisite(s): prior experience with GIS, GPS, remote sensing or cartography and permission of the department.

GEOG 5804 [0.5 credit]**Geographic Information Systems**

GIS for students with no previous experience. Includes data formats and structures, input/output and analysis capabilities, and GIS applications.

Includes: Experiential Learning Activity

GEOG 5900 [0.5 credit]**Graduate Tutorial**

Tutorial, directed reading or research, offered on an individual basis, to meet specific program needs; may be taken in one of the areas of specialization of the Department.

Includes: Experiential Learning Activity

GEOG 5905 [0.5 credit]**Masters Research Workshop**

A workshop which focuses on the challenges of research design in the various sub-fields of geography. The workshop will culminate with the development and defence of a thesis research proposal.

Includes: Experiential Learning Activity

GEOG 5906 [3.0 credits]**M.Sc. Thesis**

Thesis supervision will be given in Physical Geography, as listed in the introductory section of this department's program description.

Includes: Experiential Learning Activity

GEOG 5909 [2.5 credits]**M.A. Thesis**

Thesis supervision will be given in all areas of specialization of the Department, as listed in the introductory section of this department's program description.

Includes: Experiential Learning Activity

GEOG 6000 [0.5 credit]**Doctoral Core Seminar: Geography, Society and the Environment**

Geographical perspectives on the development of society/environment interrelations in Western thought and critiques thereof. The course is designed to represent and address integrative issues in the two fields of the program, the geography of social change and the geography of environmental change.

Includes: Experiential Learning Activity

GEOG 6001 [0.5 credit]**Doctoral Core Seminar: Geography, Society and the Environment**

Geographical perspectives on the development of society/environment interrelations in Western thought and critiques thereof. The course is designed to represent and address integrative issues in the two fields of the program, the geography of social change and the geography of environmental change.

Includes: Experiential Learning Activity

GEOG 6003 [0.5 credit]**Field Seminar: Geography of Societal Change**

Analysis of current geographical and related research into the three themes of global political economy: restructuring and the environment; geographies of socio-cultural evaluation; and feminist geographies.

Includes: Experiential Learning Activity

GEOG 6004 [0.5 credit]**Field Seminar: Geography of Societal Change**

Analysis of current geographical and related research into the three themes of global political economy: restructuring and the environment; geographies of socio-cultural evaluation; and feminist geographies.

Includes: Experiential Learning Activity

GEOG 6006 [0.5 credit]**Field Seminar: Geography of Environmental Change**

Analysis of geographical and related research into the appraisal and societal management of environmental resources, and environmental processes and anthropogenic impacts.

Includes: Experiential Learning Activity

GEOG 6007 [0.5 credit]**Field Seminar: Geography of Environmental Change**

Analysis of geographical and related research into the appraisal and societal management of environmental resources, and environmental processes and anthropogenic impacts.

Includes: Experiential Learning Activity

GEOG 6906 [0.0 credit]**Comprehensive Examination: The Geography of Societal Change**

This examination focuses on research challenges in theory and methodology in the themes of global political economy: restructuring and the environment; geographies of socio-cultural evaluation; feminist geographies. A specific theme will be identified for each candidate.

Includes: Experiential Learning Activity

GEOG 6907 [0.0 credit]**Comprehensive Examination: The Geography of Environmental Change**

This examination focuses on research challenges in theory and methodology associated with the appraisal and societal management of environmental resources, and environmental processes and anthropogenic impacts. A specific theme will be identified for each candidate.

Includes: Experiential Learning Activity

GEOG 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Health Sciences

This section presents the requirements for programs in:

- M.Sc. Health Sciences
- M.Sc. Health: Science, Technology and Policy
- M.Sc. Health Sciences with Specialization in Data Science
- Graduate Diploma in Health: Science, Technology and Policy
- Ph.D. Health Sciences

Program Requirements

M.Sc. Health Sciences (5.0 credits)

Requirements:		
1. 1.0 credit in:		1.0
HLTH 5901 [0.5]	Advanced Topics in Interdisciplinary Health Sciences	
HLTH 5902 [0.5]	Seminars in Interdisciplinary Health Sciences for MSc	
2. Completion of:		0.0
HLTH 5905 [0.0]	Final Research Seminar Presentation for MSc	
3. 4.0 credits in:		4.0
HLTH 5909 [4.0]	MSc Thesis	
4. Twice-yearly meetings with the thesis Graduate Advisory Committee, with students meeting a level of progress as determined by the Committee.		
Total Credits		5.0

Note: the final research seminar presentation must be completed within one month of the thesis defence.

M.Sc. Health: Science, Technology and Policy (6.0 credits)

Requirements:		
1. 3.5 credits in:		3.5
HLTH 5100 [0.5]	Fundamentals of Research Methods	
HLTH 5150 [0.5]	Statistics for Health Sciences	
HLTH 5201 [0.5]	Fundamentals of Policy I: Policy Analysis	
HLTH 5300 [0.5]	Knowledge Translation	
HLTH 5350 [0.5]	New Health Technologies	
HLTH 5401 [0.5]	Interdisciplinary Problems in Health	
HLTH 5402 [0.5]	Biological and Social Fundamentals of Health	
2. 1.0 credit from:		1.0
HLTH 5504 [1.0]	Interdisciplinary Health Research Project - Group	
HLTH 5505 [1.0]	Interdisciplinary Health Research Project – Individual	
3. 1.5 credits from:		1.5
a. HLTH selected topic elective courses focusing on areas of specific relevance to the health sector		
HLTH 5151 [0.5]	Principles of Epidemiology	
HLTH 5202 [0.5]	Fundamentals of Policy II: The Health Sector	
HLTH 5600 [0.25]	Special Topics in Biostatistics and Epidemiology	
HLTH 5601 [0.25]	Special Topics in Health Policy and Administration	
HLTH 5602 [0.25]	Special Topics: Social and Behavioural	
HLTH 5603 [0.25]	Special Topics in Environmental Health	
HLTH 5604 [0.25]	Special Topics in the Science of Disease	
HLTH 5605 [0.25]	Special Topics: Engineering, Design and Computer Science	
HLTH 5701 [0.5]	Special Topics in Health Policy and Administration	

HLTH 5702 [0.5]	Special Topics: Social and Behavioural
HLTH 5703 [0.5]	Special Topics in Environmental Health
HLTH 5704 [0.5]	Special Topics in the Science of Disease
HLTH 5705 [0.5]	Special Topics: Engineering, Design and Computer Science
HLTH 5800 [0.5]	Directed Studies in Health: Science, Technology and Policy
HLTH 5801 [0.5]	Health: Science, Technology and Policy Practicum

b. Courses offered by other graduate programs, selected with the guidance and permission of the supervisor of graduate studies and with the permission of the specific program and requiring the prior completion of prerequisites. Examples include:

BIOL 5407 [0.5]	Biostatistics I
BIOL 5515 [0.5]	Bioinformatics
BIOL 5516 [0.5]	Applied Bioinformatics
BIOL 6406 [0.5]	Genetic Toxicology
BIOM 5100 [0.5]	Biomedical Instrumentation
CHEM 5708 [0.5]	Principles of Toxicology
CHEM 5709 [0.5]	Chemical Toxicology
COMS 5206 [0.5]	Communication, Culture, Regulation
COMP 5308 [0.5]	Topics in Medical Computing
INAF 5705 [0.5]	Global Social Policy
INAF 5706 [0.5]	Global Health Policy
NEUR 5201 [0.5]	Statistics for Neuroscience I
NEUR 5202 [0.5]	Statistics for Neuroscience II
PADM 5221 [0.5]	Health Policy in Canada
PADM 5222 [0.5]	Economics and Health Policy
PADM 5229 [0.5]	The Health of Populations
PADM 5817 [0.5]	Health Policy in Developing Countries
PHIL 5000 [0.5]	Special Topic in Philosophy
PHYS 5204 [0.5]	Physics of Medical Imaging
PSYC 5209 [0.5]	Topics in Health Psychology
SOCI 5209 [0.5]	Sociology of Science and Technology
SOWK 5302 [0.5]	Mental Health
STAT 5600 [0.5]	Mathematical Statistics I
STAT 5501 [0.5]	Mathematical Statistics II
STAT 5602 [0.5]	Analysis of Categorical Data

Total Credits **6.0**

M.Sc. Health Sciences with Specialization in Data Science (5.5 credits)

Requirements (5.5 credits)

1. 1.0 credits in:	1.0
HLTH 5901 [0.5]	Advanced Topics in Interdisciplinary Health Sciences
HLTH 5902 [0.5]	Seminars in Interdisciplinary Health Sciences for MSc
2. 0.5 credits in:	0.5
DATA 5000 [0.5]	Data Science Seminar
3. Completion of:	

HLTH 5905 [0.0]	Final Research Seminar Presentation for MSc	
4. 4.0 credits in:		4.0
HLTH 5909 [4.0]	MSc Thesis	

5. Twice-yearly meetings with the thesis Graduate Advisory Committee, with students meeting a level of progress as determined by the Committee.

Total Credits **5.5**

Note: The final research seminar presentation must be completed within one month of the thesis defence.

Graduate Diploma in Health: Science, Technology and Policy (2.0 credits)

The Diplomas are designed to be completed in one year. However, as it is understood that most students in the Diploma programs will either be working or full-time students in another graduate program, students may take the program on either a part-time or full-time basis.

Type 2 Diploma

For graduate students currently enrolled in other Carleton graduate programs.

Requirements:

1. 1.5 credits in:		1.5
HLTH 5100 [0.5]	Fundamentals of Research Methods	
HLTH 5201 [0.5]	Fundamentals of Policy I: Policy Analysis	
HLTH 5300 [0.5]	Knowledge Translation	
2. 0.5 credit in	electives from either a or b:	0.5
a. HLTH selected topic elective courses focusing on areas of specific relevance to the health sector:		
HLTH 5150 [0.5]	Statistics for Health Sciences	
HLTH 5151 [0.5]	Principles of Epidemiology	
HLTH 5202 [0.5]	Fundamentals of Policy II: The Health Sector	
HLTH 5350 [0.5]	New Health Technologies	
HLTH 5401 [0.5]	Interdisciplinary Problems in Health	
HLTH 5402 [0.5]	Biological and Social Fundamentals of Health	
HLTH 5600 [0.25]	Special Topics in Biostatistics and Epidemiology	
HLTH 5601 [0.25]	Special Topics in Health Policy and Administration	
HLTH 5602 [0.25]	Special Topics: Social and Behavioural	
HLTH 5603 [0.25]	Special Topics in Environmental Health	
HLTH 5604 [0.25]	Special Topics in the Science of Disease	
HLTH 5605 [0.25]	Special Topics: Engineering, Design and Computer Science	
HLTH 5700 [0.5]	Special Topics in Biostatistics and Epidemiology	
HLTH 5701 [0.5]	Special Topics in Health Policy and Administration	
HLTH 5702 [0.5]	Special Topics: Social and Behavioural	
HLTH 5703 [0.5]	Special Topics in Environmental Health	

HLTH 5704 [0.5]	Special Topics in the Science of Disease	
HLTH 5705 [0.5]	Special Topics: Engineering, Design and Computer Science	
b. Courses offered by other graduate programs, selected with the guidance and permission of the supervisor of graduate studies and with the permission of the specific program and requiring the prior completion of prerequisites.		
Total Credits		2.0

Type 3 Diploma

For individuals currently employed, or with the goal of employment in the health sector, who are not currently registered in another Carleton graduate program.

Requirements:

1. 0.5 credit in: 0.5

HLTH 5300 [0.5] Knowledge Translation

2. 1.5 credits in electives from either a, b or c: 1.5

a. HLTH 5201 (recommended for students who do not have a strong policy background)

b. HLTH selected topic elective courses focusing on areas of specific relevance to the health sector:

HLTH 5100 [0.5] Fundamentals of Research Methods

HLTH 5150 [0.5] Statistics for Health Sciences

HLTH 5151 [0.5] Principles of Epidemiology

HLTH 5202 [0.5] Fundamentals of Policy II: The Health Sector

HLTH 5350 [0.5] New Health Technologies

HLTH 5401 [0.5] Interdisciplinary Problems in Health

HLTH 5402 [0.5] Biological and Social Fundamentals of Health

HLTH 5600 [0.25] Special Topics in Biostatistics and Epidemiology

HLTH 5601 [0.25] Special Topics in Health Policy and Administration

HLTH 5602 [0.25] Special Topics: Social and Behavioural

HLTH 5603 [0.25] Special Topics in Environmental Health

HLTH 5604 [0.25] Special Topics in the Science of Disease

HLTH 5605 [0.25] Special Topics: Engineering, Design and Computer Science

HLTH 5700 [0.5] Special Topics in Biostatistics and Epidemiology

HLTH 5701 [0.5] Special Topics in Health Policy and Administration

HLTH 5702 [0.5] Special Topics: Social and Behavioural

HLTH 5703 [0.5] Special Topics in Environmental Health

HLTH 5704 [0.5] Special Topics in the Science of Disease

HLTH 5705 [0.5] Special Topics: Engineering, Design and Computer Science

c. Courses offered by other graduate programs, selected with the guidance and permission of the supervisor of graduate studies and with the permission of the specific program and requiring the prior completion of prerequisites. No more than 0.5 credit can be taken outside of the department.

Total Credits 2.0

Ph.D. Health Sciences (1.5 credits)

Requirements:

1. 1.5 credits in: 1.5

HLTH 5901 [0.5] Advanced Topics in Interdisciplinary Health Sciences

HLTH 6902 [0.5] Seminars in Interdisciplinary Health Sciences

HLTH 6903 [0.5] Grant Proposals and Ethics

2. Completion of: 0.0

HLTH 6904 [0.0] Mid-Program Defence

HLTH 6905 [0.0] Final Research Seminar Presentation

3. 0.0 credits in: 0.0

HLTH 6909 [0.0] PhD Thesis

4. Twice-yearly meetings with thesis Graduate Advisory Committee, with students reaching a level of satisfaction as determined by the Committee

Total Credits 1.5

Note: If the student fails to satisfy the requirements of HLTH 6904, he/she will be withdrawn from the program. The final research seminar presentation must be completed within one month of the thesis defence.

Regulations

See the General Regulations section of this Calendar.

All candidates are required to obtain a grade of B or higher in each course in the program.

M.Sc. Health: Science, Technology and Policy

Full-time candidates in the master's program are expected to complete their degree requirements within five terms (20 months) of first registration for full-time study.

Regulations

See the General Regulations section of this Calendar.

All candidates are required to obtain a grade of B or higher in each course in the program.

Regulations

See the General Regulations section of this Calendar.

All candidates are required to obtain a grade of B- or higher in each course in the program.

Admission

Applicants for the master's program will normally hold an Honours undergraduate degree or equivalent professional degree. Normally, an average of B+ or higher is required for admission. At least one university-level course in statistics is also required for admission. Applicants judged to be generally acceptable but deficient in some aspect of preparation may be asked to complete course-work in addition to the program requirements. In addition to transcripts and letters of reference, application packages

will include a statement of interest explaining how the applicant's career goals are aligned with the program and a statement of expertise, including previous research and/or work experience. The admissions committee will also consider the requirement for an appropriate balance of academic backgrounds to provide the disciplinary expertise required for the group projects, which are designed to represent a mixed-discipline workplace in the health sector.

Students whose first language is not English, or who have not completed a previous degree at an English speaking university, must demonstrate an adequate command of English. Please refer to section 3.6 of the general regulations in the Graduate Calendar.

Students may receive advanced standing with transfer of credit for up to 1.5 credits. Advanced standing will be considered only for core courses. It will be determined on an individual basis in consultation with the M.Sc Supervisor and the Faculty of Graduate and Postdoctoral Affairs and pursuant to Section 6.1 of the General Regulations section of this Calendar. In general, a grade of B+ or higher is necessary in the equivalent courses in order to receive advanced standing.

Note: students in the Diploma programs are not eligible to receive university funding.

Admission

The normal requirement for admission into the Ph.D. program is an M.Sc. degree in a relevant field. Students who are in the Health Sciences M.Sc. program may be admitted to the Ph.D. program if they show outstanding academic performance and demonstrate significant promise for advanced research, upon recommendation of the student's Graduate Advisory Committee and approval by the Graduate Advisor.

Admission

Applicants must have a bachelor's degree (or equivalent). Normally, an average of B+ or higher is required for admission. A university level course in statistics is also required for admission.

Students whose first language is not English, or who have not completed a previous degree at an English speaking university, must demonstrate an adequate command of English. Please refer to section 3.6 of the general regulations in the Graduate Calendar.

Note: students in the Diploma programs are not eligible to receive university funding through the program.

Health Sciences (HLTH) Courses

HLTH 5100 [0.5 credit]

Fundamentals of Research Methods

Experimental design, statistical analysis and interpretation of results in health science research, principles and methods of epidemiology, fundamentals of research ethics.

Includes: Experiential Learning Activity

Prerequisite(s): university-level statistics.

HLTH 5101 [0.0 credit]

Statistical Software and its Application to Health Sciences Primer

Introduction to statistical softwares used to analyze health research data. Data management topics include data entry, manipulation, and elementary statistical analyses using SAS, SPSS, Stata and R. Other topics include privacy/maintaining security of health datasets. For students without strong backgrounds in biostatistics/data handling.

Includes: Experiential Learning Activity

HLTH 5150 [0.5 credit]

Statistics for Health Sciences

Statistical methods commonly used in analyses of health data. This applied course covers topics related to descriptive and graphical methods, tests of hypotheses in both paired and independent samples, linear regression, survival analysis, and logistic regression.

Includes: Experiential Learning Activity

Lecture three hours a week, lab/workshop three hours a week.

HLTH 5151 [0.5 credit]

Principles of Epidemiology

Introduction to epidemiologic concepts and methods.

Different types of epidemiological study designs.

Fundamental concepts of: definitions and measures of disease frequency and effects, causality, bias, sample size, confounding and interaction.

Includes: Experiential Learning Activity

HLTH 5201 [0.5 credit]

Fundamentals of Policy I: Policy Analysis

Policy analysis and policy processes with an emphasis on the stages of the policy process, as well as the influences of institutions, ideas and interests.

HLTH 5202 [0.5 credit]

Fundamentals of Policy II: The Health Sector

Canadian health policies and programs with emphasis on the economics, politics and public administration of the healthcare sector.

HLTH 5300 [0.5 credit]

Knowledge Translation

The application of knowledge translation in the formulation of policy and the development of skills required to maximize the impact of scientific findings through real world programs and policies and communication skills for diverse audiences.

Precludes additional credit for NEUR 5801.

Also offered at the undergraduate level, with different requirements, as HLTH 4701, for which additional credit is precluded.

HLTH 5350 [0.5 credit]**New Health Technologies**

Overview of new and emerging health technologies, including medical and assistive devices, diagnostics and screening, genetics, reproduction, tissue regeneration, imaging, and health informatics. Health technology assessment methods and issues. Regulatory, ethical and social implications; considerations in the developing world.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as HLTH 4102, for which additional credit is precluded.

HLTH 5401 [0.5 credit]**Interdisciplinary Problems in Health**

Development of an understanding of the scope and interdisciplinary nature of issues that impact the health of Canadians is the focus of this course.

HLTH 5402 [0.5 credit]**Biological and Social Fundamentals of Health**

What comprises a healthy body and mind? This course addresses the psycho-social and biological mechanisms that may interact to determine health outcomes. The course examines complex relationships between social, environmental, and biological factors underlying some of the most important and emerging health concerns today.

HLTH 5403 [0.5 credit]**Host-Pathogen Interactions**

Advanced cellular and molecular mechanisms governing host-pathogen interactions and their contribution to disease. Exploration of immune signaling and recognition, virulence factors, antimicrobial resistance and research techniques used in this field.

Prerequisite(s): Permission of the department.

Also offered at the undergraduate level, with different requirements, as HLTH 4304, for which additional credit is precluded.

HLTH 5501 [2.0 credits]**Collaborative Group Research Project**

Student teams, supervised by a cross-disciplinary team of faculty, will collaborate on a project that addresses a real-world health concern.

Includes: Experiential Learning Activity

Prerequisite(s): HLTH 5400.

HLTH 5504 [1.0 credit]**Interdisciplinary Health Research Project - Group**

Student teams will collaborate on a research project that addresses a real-world health concern, supervised by a cross-disciplinary team of faculty. Students must be continually registered in this course throughout their degree program (five terms.).

Includes: Experiential Learning Activity

Precludes additional credit for HLTH 5502 (no longer offered), HLTH 5503(no longer offered), HLTH 5505.

HLTH 5505 [1.0 credit]**Interdisciplinary Health Research Project – Individual**

An independent research project that addresses a real-world health concern, supervised by a faculty member and advised by a cross-disciplinary team of experts. Students must be continually registered in this course throughout their degree program (five terms).

Includes: Experiential Learning Activity

Precludes additional credit for HLTH 5502(no longer offered), HLTH 5503(longer offered), HLTH 5504.

Prerequisite(s): permission of the Faculty supervisor and the Department of Health Sciences.

HLTH 5600 [0.25 credit]**Special Topics in Biostatistics and Epidemiology**

Selected topics in biostatistics and epidemiology, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

Includes: Experiential Learning Activity

HLTH 5601 [0.25 credit]**Special Topics in Health Policy and Administration**

Selected topics in health policy and administration, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5602 [0.25 credit]**Special Topics: Social and Behavioural**

Selected topics in the social and behavioural sciences, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5603 [0.25 credit]**Special Topics in Environmental Health**

Selected topics in environmental health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5604 [0.25 credit]**Special Topics in the Science of Disease**

Selected topics in the science of disease, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5605 [0.25 credit]**Special Topics: Engineering, Design and Computer Science**

Selected topics in applications of engineering, design or computer science in health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5700 [0.5 credit]**Special Topics in Biostatistics and Epidemiology**

Selected topics in biostatistics and epidemiology, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

Includes: Experiential Learning Activity

HLTH 5701 [0.5 credit]**Special Topics in Health Policy and Administration**

Selected topics in health policy and administration, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5702 [0.5 credit]**Special Topics: Social and Behavioural**

Selected topics in the social and behavioural sciences, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5703 [0.5 credit]**Special Topics in Environmental Health**

Selected topics in environmental health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5704 [0.5 credit]**Special Topics in the Science of Disease**

Selected topics in the science of disease, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5705 [0.5 credit]**Special Topics: Engineering, Design and Computer Science**

Selected topics in applications of engineering, design or computer science in health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5800 [0.5 credit]**Directed Studies in Health: Science, Technology and Policy**

One-to-one instruction in selected aspects of specialized Health: Science and Technology subjects not covered by other graduate courses. Students may not take this course from their project supervisor(s), and are limited to one directed studies course per program.

Prerequisite(s): permission of the director of Health: Science, Technology and Policy.

HLTH 5801 [0.5 credit]**Health: Science, Technology and Policy Practicum**

This practicum supports students in gaining relevant and practical experience through applying course learning at approved organizations. Students are responsible for arranging the placement with an external partner where the practicum will be held, preparing a learning contract, and completing a field-based project deliverable.

Includes: Experiential Learning Activity

Prerequisite(s): Completion of two semesters of the MSc in HSTP program, permission of the department and at the discretion of the practicum supervisor. Students may not be supervised by their MSc research supervisor(s) and are limited to one practicum per program.

HLTH 5901 [0.5 credit]**Advanced Topics in Interdisciplinary Health Sciences**

Discussion of current health problems and exploration of innovative interdisciplinary solutions. Development of skills required to perform critical analyses of health research to evaluate the quality, interpret the findings, and assess the impact of health sciences literature across disciplines.

HLTH 5902 [0.5 credit]**Seminars in Interdisciplinary Health Sciences for MSc**

Development of scientific communication skills through attendance at interdisciplinary seminars and by the student presenting a seminar on their own thesis research. Topics have specific or broad relevance to health sciences. Graded SAT/UNS.

HLTH 5905 [0.0 credit]**Final Research Seminar Presentation for MSc**

Final seminar of MSc thesis research. Seminar presentation should occur within one month of the final oral thesis defence.

Includes: Experiential Learning Activity

HLTH 5909 [4.0 credits]**MSc Thesis**

Includes: Experiential Learning Activity

HLTH 6902 [0.5 credit]**Seminars in Interdisciplinary Health Sciences**

Development of scientific communication skills through attendance at interdisciplinary seminars and by the student presenting a seminar on their own thesis research. Topics have specific or broad relevance to health sciences. Graded SAT/UNS.

HLTH 6903 [0.5 credit]**Grant Proposals and Ethics**

Advanced course in writing successful grant proposals in Tri-Council (CIHR, NSERC, SSHRC) formats. Ethics associated with conducting health sciences research, including the preparation of ethics proposals for human and animal studies in health sciences research. Includes: Experiential Learning Activity

HLTH 6904 [0.0 credit]**Mid-Program Defence**

Departmental seminar and Graduate Advisory Committee meeting on PhD research including results to date and future research aims and directions, and on field-specific knowledge. Includes: Experiential Learning Activity

HLTH 6905 [0.0 credit]**Final Research Seminar Presentation**

Final seminar of PhD thesis research. Seminar presentation should occur within one month of the final oral thesis defence. Includes: Experiential Learning Activity

HLTH 6909 [0.0 credit]**PhD Thesis**

Includes: Experiential Learning Activity

History

This section presents the requirements for programs in:

- M.A. History
- M.A. History with Specialization in African Studies
- M.A. History with Specialization in Data Science
- M.A. History with Specialization in Digital Humanities
- M.A. History with Specialization in Latin American and Caribbean Studies
- M.A. Public History
- M.A. Public History with Specialization in Digital Humanities
- Ph.D. History
- Ph.D. History with Concentration in Public History
- Ph.D. History with Specialization in Political Economy

Program Requirements**M.A. History (4.0 credits)****Requirements - Thesis pathway:**

1. 0.5 credit in:	0.5
HIST 5003 [0.5] Historical Theory and Method	
2. 1.5 credits in HIST at the graduate level at Carleton; up to 1.0 credit may be taken in designated public history courses; with departmental permission, up to 0.5 credit of courses with historical content may be taken from another unit at Carleton University, at the University of Ottawa, or at another accredited institution.	1.5
3. 2.0 credits in:	2.0
HIST 5909 [2.0] M.A. Thesis	
Total Credits	4.0

Requirements - Research Essay pathway:

1. 0.5 credit in:	0.5
HIST 5003 [0.5] Historical Theory and Method	
2. 2.0 credits in HIST at the graduate level at Carleton; up to 1.0 credit may be taken in designated public history courses; with departmental permission, up to 0.5 credit of courses with historical content may be taken from another unit at Carleton University, at the University of Ottawa, or at another accredited institution.	2.0
3. 0.5 credit in:	0.5
HIST 5900 [0.5] Directed Research	
4. 1.0 credit in:	1.0
HIST 5908 [1.0] M.A. Research Essay	
Total Credits	4.0

M.A. History**with Specialization in African Studies (4.5 credits)****Requirements - Research Essay pathway (4.5 credits)**

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 0.5 credit in:	0.5
HIST 5003 [0.5] Historical Theory and Method	
4. 1.0 credit in HIST at the graduate level at Carleton	1.0
5. 1.0 credit in graduate seminars with sufficient African Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with African Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.	1.0
6. 0.5 credit in:	0.5
HIST 5900 [0.5] Directed Research	
7. 1.0 credit in:	1.0
HIST 5908 [1.0] M.A. Research Essay	
Total Credits	4.5

Requirements - Thesis pathway (4.5 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 0.5 credit in:	0.5
HIST 5003 [0.5] Historical Theory and Method	
4. 0.5 credit in HIST at the graduate level at Carleton	0.5
5. 1.0 credit in graduate seminars with sufficient African Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with African Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.	1.0
6. 2.0 credits in:	2.0
HIST 5909 [2.0] M.A. Thesis	
Total Credits	4.5

M.A. History with Specialization in Data Science (4.5 credits)

Requirements:

1. 0.5 credit in:	0.5
HIST 5003 [0.5]	Historical Theory and Method
2. 1.5 credits in HIST at the graduate level of which only 0.5 credit may be taken in a designated public history course; with departmental permission, up to 0.5 credit of courses with historical content may be taken from another unit at Carleton University, at the University of Ottawa, or at another accredited institution.	1.5
3. 0.5 credit in:	0.5
HIST 5706 [0.5]	Digital History
4. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
5. 0.5 credit in:	0.5
HIST 5900 [0.5]	Directed Research
6. 1.0 credit in:	1.0
HIST 5908 [1.0]	M.A. Research Essay (in the specialization)
Total Credits	4.5

M.A. History with Specialization in Digital Humanities (4.5 credits)

Requirements:

1. 0.5 credit in:	0.5
HIST 5003 [0.5]	Historical Theory and Method
2. 1.0 credit in HIST at the graduate level at Carleton; up to 0.5 credit may be taken in a designated public history course; with departmental permission, up to 0.5 credit of courses with historical content may be taken from another unit at Carleton University, at the University of Ottawa, or at another accredited institution.	1.0
3. 2.0 credits in:	2.0
HIST 5909 [2.0]	M.A. Thesis
4. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development
Total Credits	4.5

M.A. History with Specialization in Latin American and Caribbean Studies (4.5 credits)

Requirements - Research Essay pathway (4.5 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 0.5 credit in:	0.5
HIST 5003 [0.5]	Historical Theory and Method
4. 1.0 credit in HIST at the graduate level at Carleton	1.0

5. 1.0 credit in a graduate seminar with sufficient Latin American and Caribbean Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with Latin American and Caribbean Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.

6. 0.5 credit in:	0.5
HIST 5900 [0.5]	Directed Research
7. 1.0 credit in:	1.0
HIST 5908 [1.0]	M.A. Research Essay (in the specialization)

Total Credits 4.5

Requirements - Thesis pathway (4.5 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies

3. 0.5 credit in: 0.5
HIST 5003 [0.5] Historical Theory and Method

4. 0.5 credit in HIST at the graduate level at Carleton 0.5

5. 1.0 credit in graduate seminars with sufficient Latin American and Caribbean Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with Latin American and Caribbean Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.

6. 2.0 credits in: 2.0
HIST 5909 [2.0] M.A. Thesis (in the specialization)

Total Credits 4.5

M.A. Public History (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
HIST 5003 [0.5]	Historical Theory and Method
2. 0.5 credit in:	0.5
HIST 5700 [0.5]	Introduction to Public History
3. 1.5 credits in designated public history courses. With departmental permission, up to 0.5 credit may be taken in appropriate graduate-level courses from other units at Carleton University.	1.5
4. 0.5 credit in a graduate-level history course outside of public history.	0.5
5. 0.5 credit in any graduate-level history course. With departmental permission, students may take a graduate-level course in another unit at Carleton University, at the University of Ottawa, or at another accredited institution.	0.5
6. 0.5 credit in:	0.5
HIST 5703 [0.5]	Public History Internship
7. 1.0 credit in:	1.0
HIST 5908 [1.0]	M.A. Research Essay

Total Credits 5.0

M.A. Public History with Specialization in Digital Humanities (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
HIST 5003 [0.5]	Historical Theory and Method
2. 0.5 credit in:	0.5
HIST 5700 [0.5]	Introduction to Public History
3. 1.0 credit in	1.0
designated public history courses.	
4. 0.5 credit in	0.5
a graduate-level history course outside of public history.	
5. 0.5 credit in:	0.5
HIST 5703 [0.5]	Public History Internship
6. 1.0 credit in:	1.0
HIST 5908 [1.0]	M.A. Research Essay
7. 0.5 credit in:	0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities
8. 0.5 credit in	0.5
DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	
9. 0.0 credit in:	0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development
Total Credits	5.0

Guidelines for Completion of Master's Degree

Full-time students in the thesis pathway are expected to finish all requirements for the degree except HIST 5909 during their first two terms of study. The thesis requirement is designed to take an additional two or three terms.

Full-time students in the research essay pathway are expected to finish all requirements for the degree except HIST 5908 during their first two terms of study. The research essay requirement is designed to take an additional term.

Full-time students in the M.A. in Public History normally complete HIST 5003, HIST 5700, and 1.5 credits of courses in the first two terms; HIST 5703 Public History Internship during the summer term; and 1.0 credit of courses and HIST 5908 during the fall and winter terms of the second year. Courses that are designated as fulfilling the public history requirement include: HIST 5701, HIST 5702, HIST 5705, HIST 5706, HIST 5707, and HIST 5709.

Part-time students should complete all degree requirements except the thesis within twelve terms of study.

M.A. students are required to submit thesis or research essay proposals to the graduate advisor during their second term of full-time enrollment. Part-time students should discuss the timing of this requirement with the Department.

Language Requirements

All candidates are required to demonstrate a reading knowledge of a language other than English, the choice to depend upon the field of the candidate's thesis or research. For seminars dealing with sources not in English, a reading knowledge of the appropriate language will be required before acceptance into the program.

Details may be obtained from the supervisor of graduate studies.

Ph.D. History (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
HIST 6808 [1.0]	Doctoral Seminar in Historical Theory and Method
2. 1.5 credits in:	1.5
HIST 6906 [0.5]	Ph.D. Tutorials (in the candidate's field; taken three times)
3. 0.5 credit in:	0.5
HIST 6907 [0.5]	Ph.D. Comprehensive Examination
4. 1.0 credit in	1.0
approved courses in a Cognate Area	
5. 1.0 credit in	1.0
Professional Development courses:	
HIST 6805 [0.5]	Professional Development Project I
HIST 6806 [0.5]	Professional Development Project II
Or another approved course.	
6. 0.0 credit in:	0.0
HIST 6909 [0.0]	Ph.D. Thesis
Total Credits	5.0

Ph.D. History with Concentration in Public History (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
HIST 6808 [1.0]	Doctoral Seminar in Historical Theory and Method
2. 1.5 credits in:	1.5
HIST 6906 [0.5]	Ph.D. Tutorials (in Public History, taken three times)
3. 0.5 credit in:	0.5
HIST 6908 [0.5]	Ph.D. Comprehensive Examination in Public History
4. 1.0 credit in	1.0
approved courses in a Cognate Area	
5. 1.0 credit in:	1.0
HIST 6809 [0.5]	Internship in Applied History Preparation Course
HIST 6810 [0.5]	Internship in Applied History
6. 0.0 credits in:	0.0
HIST 6909 [0.0]	Ph.D. Thesis
Total Credits	5.0

Ph.D. History with Specialization in Political Economy (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
PECO 6000 [0.5]	Political Economy: Core Concepts
2. 0.5 credit in:	0.5
HIST 6701 [0.5]	History and Political Economy
Or 0.5 credit in a relevant political economy course from the approved list.	
3. 1.0 credit in:	1.0
HIST 6808 [1.0]	Doctoral Seminar in Historical Theory and Method
4. 1.5 credits in:	1.5

HIST 6906 [0.5]	Ph.D. Tutorials (in the candidate's field; taken three times)	
5. 0.5 credits in:		0.5
HIST 6907 [0.5]	Ph.D. Comprehensive Examination	
6. 1.0 credit in	Professional Development courses:	1.0
HIST 6805 [0.5]	Professional Development Project I	
HIST 6806 [0.5]	Professional Development Project II	
Or another approved course.		
7. 0.0 credits in:		
HIST 6909 [0.0]	Ph.D. Thesis	
Total Credits		5.0

Ph.D. Tutorials and Comprehensive Examination

All students complete 1.5 credits of tutorials (HIST 6906) in their major field in their first year. After completing three terms of tutorials, students will undertake a comprehensive examination in the major field. The exam will have both written and oral components.

Cognate Area

All students complete 1.0 credit in a cognate area that complements their major field of study. The requirement is met through completion of 1.0 credit in HIST courses at the 5000- or 6000-level or, with permission of the Graduate Supervisor, in graduate level courses from another unit at Carleton or the University of Ottawa.

Professional Development Project

All students undertake a professional development project (1.0 credit) that enhances and complements their program of study and career goals. The nature of the professional development project is flexible and is to be determined jointly by the student, their dissertation advisor, and the Graduate Supervisor.

Language Requirement

All students must demonstrate proficiency in a language other than English allied to their program of study. The appropriate language requirement will be determined in conjunction with their dissertation advisor and the Graduate Supervisor. Proficiency is normally demonstrated through completion of the departmental language exam or course credits approved by the department. Language requirements must be met by the end of the student's second year of study.

Regulations

See the General Regulations section of this Calendar.

Regulations

See the General Regulations section of this Calendar.

Admission

The minimum requirement for admission to the master's program is an Honours bachelor's degree (or the equivalent) with at least high honours standing.

The Department offers no qualifying-year program; applicants with a general (three-year) degree may be considered for admission into the fourth year of Carleton's B.A. (Honours) program.

Admission

Applicants with an M.A. degree will be expected to have at least high honours standing.

Applicants for the history of Women, Gender and Sexuality program will be expected to have at least one of their earlier degrees in history.

History (HIST) Courses

HIST 5003 [0.5 credit]

Historical Theory and Method

An exploration of some of the theories, concepts and methodologies used in historical practice.

Includes: Experiential Learning Activity

HIST 5210 [0.5 credit]

Power

A seminar on power and its deployment in Europe, whether by states and other political entities or in relation to gender, race, the body, private and public identities, and the family. Theories and philosophies of power and its exercise will be examined.

Includes: Experiential Learning Activity

HIST 5211 [0.5 credit]

Consumption

A seminar exploring the development of European cultures of consumption and exchange of commodities and services. Examined in relation to gender, ideology, imperialism, social distinction, and everyday life, topics may include markets, food, clothing, material goods, leisure, and work.

Includes: Experiential Learning Activity

HIST 5212 [0.5 credit]

European History Special Topics

A seminar on a thematic, transnational or regional topic related to European history. Topics will vary from year to year.

HIST 5314 [0.5 credit]

Colonialism and Postcolonialism in Canada

A seminar on selected topics related to the histories and historiography of colonialism and postcolonialism in Canada.

Includes: Experiential Learning Activity

HIST 5315 [0.5 credit]

State and Society in Canadian History

A seminar on selected topics related to the histories and historiography of political culture, state formation, and social relations in Canada.

Includes: Experiential Learning Activity

HIST 5316 [0.5 credit]

Canadian History Special Topics

A seminar on a thematic or regional topic related to Canadian history. Topics will vary from year to year.

HIST 5410 [0.5 credit]**United States History Special Topics**

A seminar on a thematic topic related to the history of the United States of America. Topics will vary from year to year.

HIST 5510 [0.5 credit]**Gender History Special Topics**

A seminar on a topic related to gender and/or women's history. Topics will vary from year to year.

HIST 5511 [0.5 credit]**History of Sexuality Special Topics**

A seminar on a topic related to the history of sexuality. Topics will vary from year to year.

HIST 5604 [0.5 credit]**Central Europe, Past and Present**

Evolution and current status of Central Europe, from periods of foreign control in the late nineteenth and twentieth centuries to independent statehood. Emphasis on national accommodations and conflicts.

Also listed as EURR 5204.

Also offered at the undergraduate level, with different requirements, as HIST 4604, for which additional credit is precluded.

HIST 5607 [0.5 credit]**Imperial Russia and the Russian Revolution**

Examination of the expansion and downfall of tsarist Russia from the eighteenth century to the revolutionary era and the establishment of Bolshevik rule. Topics include the relationship between the monarchy and subject peoples, social and economic change, and daily life.

Includes: Experiential Learning Activity

Also listed as EURR 5305.

Also offered at the undergraduate level, with different requirements, as HIST 4607, for which additional credit is precluded.

HIST 5608 [0.5 credit]**The Soviet Union: Power and Culture**

Examination of the rise of the Soviet Union to a global power and subsequent tensions that promoted its collapse. The course will analyze Stalinism, the Second World War, the Thaw, and Brezhnev and Gorbachev eras through the lens of the USSR's citizens.

Includes: Experiential Learning Activity

Also listed as EURR 5306.

Also offered at the undergraduate level, with different requirements, as HIST 4608, for which additional credit is precluded.

HIST 5700 [0.5 credit]**Introduction to Public History**

Introduction to the professional and academic dimensions of public history with a focus on theory, method, ethics, modes of storytelling, and the politics of the past. The course also serves as a foundation for the M.A. in Public History programs.

Includes: Experiential Learning Activity

Prerequisite(s): Open only to students enrolled in the M.A. Public History programs, or with permission of the Department.

HIST 5701 [0.5 credit]**Archival Theory and Practice**

Theories, methodologies and problems relating to archives and records management including principles and concepts guiding the work of archivists; records appraisal, collection, arrangement, description; special attention to archival communities including Library and Archives Canada.

Includes: Experiential Learning Activity

HIST 5702 [0.5 credit]**Public History Special Topics**

Theoretical and practical instruction in topical areas such as digitizing history, oral history, local history, photography, material history, performance, etc.

Includes: Experiential Learning Activity

HIST 5703 [0.5 credit]**Public History Internship**

Placement for a term, normally over the summer following the first year of study, to put into practice the precepts learned in course work. Students will be jointly supervised by their employers and a faculty member. Graded Sat/Uns.

Includes: Experiential Learning Activity

HIST 5705 [0.5 credit]**Museums, National Identity and Public Memory**

Explores how national museums and similar institutions construct narratives and represent histories through processes of collection, preservation and exhibition.

Topics include memory and identity; theory of museums; contestation; inclusivity and authority; cultural politics and heritage.

Includes: Experiential Learning Activity

HIST 5706 [0.5 credit]**Digital History**

Methods and theories of public history through the lens of computation, digital technologies and allied fields.

Includes: Experiential Learning Activity

HIST 5707 [0.5 credit]**Narrativity and Performance in Public History**

Theory and practice of storytelling and performance in public history through a variety of forms, media, and contexts.

Includes: Experiential Learning Activity

HIST 5709 [0.5 credit]**Photography and Public History**

The social history of photographic practices with an emphasis on the photograph as a material object. Traces the reproduction, circulation, and exhibition of photographs in a variety of contexts.

HIST 5710 [0.5 credit]**Race and Empire**

A seminar examining how discourses on race have been used to construct visions of empire. Students will be introduced to relevant historiographical, theoretical, discursive, and methodological approaches to race and empire.

HIST 5711 [0.5 credit]**Migration and Diaspora History Special Topics**

A seminar on the cultural, economic, political and social implications of the movement of people in historical and contemporary contexts. It takes a multidisciplinary and multiscale approach to topics such as citizenship, forced migration, diasporic communities, exile, immigration, global identities and transnationalism. Also listed as MGDS 5201.

HIST 5712 [0.5 credit]**African History Special Topics**

A seminar on a thematic or regional topic related to African history. Topics will vary from year to year.

HIST 5713 [0.5 credit]**Latin America and Caribbean History Special Topics**

A seminar on a thematic or regional topic related to Latin America or Caribbean history. Topics will vary from year to year.

HIST 5803 [0.5 credit]**History of Women, Gender and Sexuality: Foundations**

Selected problems in the historiography of women, gender and sexuality.

Includes: Experiential Learning Activity

Precludes additional credit for HIST 5807 (no longer offered).

HIST 5900 [0.5 credit]**Directed Research**

A course designed for students and supervisors to confer regularly in preparation for the research essay. Graded satisfactory/unsatisfactory upon a written report from the supervisor.

Prerequisite(s): open only to students enrolled in the Research Essay option of the regular M.A.

HIST 5902 [1.0 credit]**Directed Studies**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

HIST 5904 [0.5 credit]**Directed Studies**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

HIST 5906 [0.5 credit]**Selected Topics**

A seminar in an area not covered by an existing graduate course.

HIST 5908 [1.0 credit]**M.A. Research Essay**

An examination of an approved topic in an area of departmental specialization or in an appropriate area of Public History.

Includes: Experiential Learning Activity

HIST 5909 [2.0 credits]**M.A. Thesis**

A substantial historical investigation. The subject will be determined in consultation with the Department, and a supervisor will be assigned. The candidate will be examined orally after presenting his/her thesis.

Includes: Experiential Learning Activity

HIST 6110 [0.5 credit]**History of Modern Europe**

Directed readings in modern European history.

HIST 6111 [0.5 credit]**History of France**

Directed readings in French history.

HIST 6112 [0.5 credit]**History of Russia**

Directed readings in Russian history.

HIST 6113 [0.5 credit]**History of Germany**

Directed readings in German history.

HIST 6210 [0.5 credit]**History of Early Modern Europe**

Directed readings in early modern European history.

HIST 6211 [0.5 credit]**History of Medieval Europe**

Directed readings in medieval European history.

HIST 6212 [0.5 credit]**History of Ancient Rome**

Directed readings in ancient Roman history.

HIST 6310 [0.5 credit]**History of Africa**

Directed readings in African history.

HIST 6311 [0.5 credit]**History of the African Diaspora**

Directed readings in the history of the African Diaspora.

HIST 6312 [0.5 credit]**History of Latin America**

Directed readings in Latin American history.

HIST 6313 [0.5 credit]**History of the Caribbean**

Directed readings in Caribbean history.

HIST 6410 [0.5 credit]**History of the United States**

Directed readings in U.S. history.

HIST 6510 [0.5 credit]**British History**

Directed readings in British history.

HIST 6601 [0.5 credit]**Transnational or Thematic History**

Directed readings in a transnational or thematic topic.

HIST 6604 [0.5 credit]**Directed Studies**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

HIST 6605 [0.5 credit]**Selected Topics**

A seminar in an area not covered by an existing graduate course.

HIST 6609 [1.0 credit]**Digital History and Digital Humanities**

A program of supervised reading in Digital History and Digital Humanities, leading to a digitally-mediated piece.

HIST 6612 [0.5 credit]**Public History**

Directed readings in Public History.

HIST 6613 [0.5 credit]**History of South Asia**

Directed readings in South Asian history.

HIST 6701 [0.5 credit]**History and Political Economy**

A program of supervised readings in political economy and history. When taken in conjunction with PECO 6000, will be considered a breadth-requirement course.

HIST 6805 [0.5 credit]**Professional Development Project I**

A project related to the student's doctoral program such as the preparation of an article-length essay, the design of an undergraduate course, internship, or curatorial initiative. Graded Sat./Uns.

Includes: Experiential Learning Activity

HIST 6806 [0.5 credit]**Professional Development Project II**

A 0.5 credit project related to the student's doctoral program such as the preparation of an article-length essay, the design of an undergraduate course, internship, or curatorial initiative. Graded Sat./Uns.

Includes: Experiential Learning Activity

HIST 6808 [1.0 credit]**Doctoral Seminar in Historical Theory and Method**

A critical examination of theories, concepts and methodological approaches in the discipline of history.

Includes: Experiential Learning Activity

HIST 6809 [0.5 credit]**Internship in Applied History Preparation Course**

A course of study to equip students with specialized skills and knowledge for the internship placement in applied history.

Includes: Experiential Learning Activity

HIST 6810 [0.5 credit]**Internship in Applied History**

An internship, normally of four months duration, in any field of applied history.

Includes: Experiential Learning Activity

HIST 6906 [0.5 credit]**Ph.D. Tutorials**

A program of directed readings in the student's major research field. Students normally complete three terms (fall, winter, summer) of tutorials before sitting the comprehensive examination.

HIST 6907 [0.5 credit]**Ph.D. Comprehensive Examination**

An examination of defined topics in the student's major research field. A written examination followed by an oral examination.

HIST 6908 [0.5 credit]**Ph.D. Comprehensive Examination in Public History**

An examination of defined topics in the field of Public History. A written examination followed by an oral examination.

HIST 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

HIST 6911 [0.5 credit]**Canadian History**

Directed readings in Canadian history.

HIST 6913 [0.5 credit]**History of Women, Gender, and Sexuality**

Directed readings in the history of women, gender and sexuality.

Human-Computer Interaction

This section presents the requirements for programs in:

- M.A. Human-Computer Interaction
- M.A.Sc. Human-Computer Interaction
- M.C.S. Human-Computer Interaction

Program Requirements

The HCI program comprises 5.0 credits of which 2.5 credits are devoted to course work, and 2.5 credits to a thesis.

Every student must enrol in one of three streams, Master of Arts, Master of Applied Science, or Master of Computer Science, depending on their native discipline.

M.A. Human-Computer Interaction (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
HCIN 5100 [0.5] Fundamentals of HCI Design and Evaluation	
2. 0.5 credit in:	0.5
HCIN 5200 [0.5] Software and User Interface Development	
3. 0.5 credit in:	0.5
HCIN 5300 [0.5] Emerging Interaction Techniques	
Students in the M.A. stream must also complete one of the following:	0.5
HCIN 5400/CGSC 5100 Experimental Methods and Statistics	
HCIN 5403 [0.5] Research methods in HCI	
4. 0.5 credit from a wide range of available electives with the guidance and permission of the supervisor of graduate studies	0.5
5. 2.5 credits in:	2.5
HCIN 5909 [2.5] Thesis in Human-Computer Interaction	
Total Credits	5.0

M.A.Sc. Human-Computer Interaction (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
HCIN 5100 [0.5] Fundamentals of HCI Design and Evaluation	
2. 0.5 credit in:	0.5
HCIN 5200 [0.5] Software and User Interface Development	
3. 0.5 credit in:	0.5
HCIN 5300 [0.5] Emerging Interaction Techniques	
4. 0.5 credit from:	0.5
HCIN 5403 [0.5] Research methods in HCI	
HCIN 5404/IDES 51 Design Research Methods	
5. 0.5 credit from a wide range of available electives with the guidance and permission of the supervisor of graduate studies.	0.5
6. 2.5 credits in:	2.5
HCIN 5909 [2.5] Thesis in Human-Computer Interaction	
Total Credits	5.0

M.C.S. Human-Computer Interaction (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
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HCIN 5100 [0.5] Fundamentals of HCI Design and Evaluation	
2. 0.5 credit in:	0.5
HCIN 5200 [0.5] Software and User Interface Development	
3. 0.5 credit in:	0.5
HCIN 5300 [0.5] Emerging Interaction Techniques	
4. 0.5 credit from the following, to be selected with the approval of the supervisor	0.5
HCIN 5400 [0.5] Experimental Methods and Statistics	
HCIN 5403 [0.5] Research methods in HCI	
HCIN 5404 [0.5] Design Research Methods	
5. 0.5 credit from a wide range of available electives with the guidance and permission of the supervisor of graduate studies	0.5
6. 2.5 credits in:	2.5
HCIN 5909 [2.5] Thesis in Human-Computer Interaction	
Total Credits	5.0

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.A., M.A.Sc., and M.C.S. in Human-Computer Interaction is considered a regularly scheduled break approved by Carleton University. Students should resume full-time studies in September.

Admission

Applicants for the M.A. program will normally hold an Honours degree or equivalent professional degree in Arts, Social Sciences, Business, or related areas with Highest Honours.

Applicants for the M.A.Sc. program will normally hold an Honours degree in Engineering, Architecture, Design, or related areas with Highest Honours.

Applicants for the M.C.S. degree will normally hold an Honours degree in Computer Science. Applicants with a background in Cognitive Science will be considered for whichever of the three programs is appropriate to their particular academic background.

Applicants judged to be generally acceptable but deficient in some preparation may be asked to complete course-work in addition to the program requirements.

In addition to transcripts and letters of reference, application packages will include a statement of interest outlining the applicant's proposed area of research.

Human-Computer Interaction (HCIN) Courses

HCIN 5100 [0.5 credit]

Fundamentals of HCI Design and Evaluation

Strategies and practices in HCI design and evaluation. Students will learn to perform studies in user interface analysis and design, read research literature critically, distill important points from readings, summarize, write papers, design user interfaces and present their work. Precludes additional credit for PSYC 5105 (no longer offered).

HCIN 5200 [0.5 credit]

Software and User Interface Development

Design and development of user interfaces for software systems based on principles for supporting user interaction, with emphasis on frameworks, tools, and processes for user interface development.

HCIN 5300 [0.5 credit]

Emerging Interaction Techniques

Advanced interaction styles and their associated technologies. Topics may include hand held and gestural interactions, ubiquitous computing, deformable user interfaces, physiological computing and tangible user interfaces.

Also listed as ITEC 5204.

HCIN 5400 [0.5 credit]

Experimental Methods and Statistics

An introduction to the design of experiments and the statistics needed to interpret data.

Also listed as CGSC 5101.

HCIN 5403 [0.5 credit]

Research methods in HCI

An introduction to quantitative and qualitative research methods in HCI. Students will acquire skills in collecting and analyzing HCI data, presenting the findings and specifying practical implications.

Precludes additional credit for PSYC 5106 (no longer offered).

HCIN 5404 [0.5 credit]

Design Research Methods

Critical review of qualitative and quantitative research methods to support interdisciplinary design. Methods used by collaborators from the sciences and humanities as well as methods designers bring to interdisciplinary collaborations are introduced. Research for design, research through design and theoretical frameworks are discussed.

Includes: Experiential Learning Activity

Also listed as IDES 5102.

HCIN 5405 [0.5 credit]

Methodologies for Discrete-Event Modelling and Simulation

Methodological aspects of simulation. Modelling discrete events systems. Modeling formalisms: FSA, FSM, Petri Nets, DEVS, others. Verification and Verification. Cellular models: Cellular Automata, Cell-DEVS. Continuous and hybrid models. Parallel and Distributed simulation (PADS) techniques. PADS middleware: HLA, Parallel-DEVS, Time-Warp.

Also listed as SYSC 5104.

HCIN 5406 [0.5 credit]

Object-Oriented Software Development

Issues in modeling and verifying quality and variability in object-oriented systems. Testable models in model-driven and test-driven approaches. System family engineering. Functional conformance: scenario modeling and verification, design by contract. Conformance to non functional requirements: goals, forces and tradeoffs, metrics.

Also listed as COMP 5104.

HCIN 5501 [0.5 credit]

Virtual and Augmented Reality Technology

Research in and design of virtual/augmented reality systems. Applications, history, human factors, display and input hardware, and interaction techniques for navigation, selection and manipulation. Students develop and evaluate a VR/AR system using modern game engines and 3D hardware devices such as head-mounted displays.

Includes: Experiential Learning Activity

Also listed as ITEC 5208.

HCIN 5900 [0.5 credit]

Directed Studies

Independent study under supervision of a member of the Human/Computer Interaction faculty. Students are required to obtain their supervisor's written approval prior to registration and are limited to one such course in their program.

Prerequisite(s): Enrolment in the HCI program and permission of the program Director.

HCIN 5901 [0.5 credit]

Advanced Topics

Topics not ordinarily treated in the regular course program due to their contemporary subject matter. The choice of topics varies from year to year. Details will be available at the time of registration.

HCIN 5909 [2.5 credits]

Thesis in Human-Computer Interaction

Indigenous Policy and Administration

This section presents the requirements for programs in:

- Master of Public Policy and Administration with Concentration in Indigenous Policy and Administration
- Graduate Diploma in Indigenous Policy and Administration

Master of Public Policy and Administration with Concentration in Indigenous Policy and Administration (7.0 credits)

To complete the M.P.P.A. program with a concentration in Indigenous Policy and Administration, students should notify the M.P.P.A. Supervisor when registering for their first year.

Requirements (7.0 credits):

1. 5.0 credits in core courses:	5.0
PADM 5120 [0.5]	Modern Challenges to Governance
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change
PADM 5122 [0.5]	Public Management: Principles and Approaches
PADM 5123 [0.5]	Public Management in Practice
PADM 5124 [0.5]	Law and Ethics
PADM 5126 [0.5]	Quantitative Methods for Public Policy
PADM 5127 [0.5]	Microeconomics for Policy Analysis
PADM 5128 [0.5]	Macroeconomics for Policy Analysis
PADM 5129 [0.5]	Capstone Course
PADM 5224 [0.5]	Indigenous Policy
2. 0.5 credits from:	0.5
PADM 5125 [0.5]	Qualitative Methods for Public Policy
PADM 5715 [0.5]	Policy Research and Evaluation for Indigenous Policy and Administration
3. 1.5 credits from:	1.5
PADM 5712 [0.5]	Issues in Contemporary Governance: First Nations, Métis and Inuit
PADM 5713 [0.5]	Leadership and Management in Indigenous Organizations and Governments
PADM 5714 [0.5]	Financial Management in First Nations, Métis and Inuit Governments and Organizations
PADM 5716 [0.5]	Economic and Community Development in Indigenous Territories
PADM 5717 [0.5]	Indigenous Peoples and Canadian Law
PADM 5718 [0.5]	Indigenous Peoples and Urban Policy and Administration
PADM 5719 [0.5]	Indigenous Health and Social Policy
PADM 5772 [0.5]	Policy Seminar (Indigenous Policy and Administration)
PADM 5703 [0.5]	Directed Studies (Indigenous Public Administration)
PADM 5908 [1.0]	Research Essay

Note: Students are required to complete PADM 5224 before registering in any of the other electives for the IPA concentration in Item 3.

Total Credits **7.0**

Master of Public Policy and Administration with Concentration in Indigenous Policy and Administration (Advanced Completion, 5.0 credits)

Requirements: (See Notes below):

1. 3.5 credits in core courses:	3.5
PADM 5120 [0.5]	Modern Challenges to Governance
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change
PADM 5122 [0.5]	Public Management: Principles and Approaches
PADM 5123 [0.5]	Public Management in Practice
PADM 5124 [0.5]	Law and Ethics
PADM 5125 [0.5]	Qualitative Methods for Public Policy
PADM 5126 [0.5]	Quantitative Methods for Public Policy
PADM 5127 [0.5]	Microeconomics for Policy Analysis
PADM 5128 [0.5]	Macroeconomics for Policy Analysis
PADM 5129 [0.5]	Capstone Course
PADM 5224 [0.5]	Indigenous Policy
PADM 5715 [0.5]	Policy Research and Evaluation for Indigenous Policy and Administration
2. 1.5 credits from:	1.5
PADM 5711 [0.5]	Indigenous-Canada Relations: Governance and Policy History
PADM 5712 [0.5]	Issues in Contemporary Governance: First Nations, Métis and Inuit
PADM 5713 [0.5]	Leadership and Management in Indigenous Organizations and Governments
PADM 5714 [0.5]	Financial Management in First Nations, Métis and Inuit Governments and Organizations
PADM 5716 [0.5]	Economic and Community Development in Indigenous Territories
PADM 5717 [0.5]	Indigenous Peoples and Canadian Law
PADM 5718 [0.5]	Indigenous Peoples and Urban Policy and Administration
PADM 5719 [0.5]	Indigenous Health and Social Policy
PADM 5772 [0.5]	Policy Seminar (Indigenous Policy and Administration)
PADM 5703 [0.5]	Directed Studies (Indigenous Public Administration)
PADM 5908 [1.0]	Research Essay

Note: additional credits may be required, as specified on offer of admission.

Note: Students are required to complete PADM 5224 before registering in any of the other electives for the IPA concentration in Item 2.

Total Credits **5.0**

Graduate Diploma in Indigenous Policy and Administration (3.0 credits)

Requirements:

Students must complete:

1. 2.5 credits in:	2.5
PADM 5711 [0.5]	Indigenous-Canada Relations: Governance and Policy History
PADM 5712 [0.5]	Issues in Contemporary Governance: First Nations, Métis and Inuit
PADM 5713 [0.5]	Leadership and Management in Indigenous Organizations and Governments
PADM 5714 [0.5]	Financial Management in First Nations, Métis and Inuit Governments and Organizations
PADM 5715 [0.5]	Policy Research and Evaluation for Indigenous Policy and Administration
2. 0.5 credit in elective, selected from other PADM courses or those offered by another unit, as approved by the I.P.A. Supervisor.	0.5
Total Credits	3.0

Public Administration (PADM) Courses

PADM 5120 [0.5 credit]

Modern Challenges to Governance

Modern challenges to states, citizens, and policy-making, explored with the help of contemporary and historical thinkers. Topics may include: inequality; national security and intelligence gathering; identity; globalization and global finance; trade agreements and property rights; climate change and environmental challenges. Precludes additional credit for PADM 5115 (no longer offered).

PADM 5121 [0.5 credit]

Policy Analysis: The Practical Art of Change

Contemporary techniques of policy analysis. Topics may include: risk assessment, policy design, options analysis, and scenario-writing. Precludes additional credit for PADM 5116 (no longer offered).

PADM 5122 [0.5 credit]

Public Management: Principles and Approaches

Principles and processes of public-sector management as they function through cabinet-parliamentary government, federalism, the public service and the judiciary. Institutional reforms and changes in the philosophy of public sector management. Precludes additional credit for PADM 5117 (no longer offered).

PADM 5123 [0.5 credit]

Public Management in Practice

Contemporary public management practices. Topics may include: financial management, leadership, performance management, organizational design, human resource management, implementation.

PADM 5124 [0.5 credit]

Law and Ethics

The legal and normative environment of Canadian public administration, law, institutions and processes. The relationship between ethics, accountability and good governance. Canadian legal history, adjudicative procedures, delegation of powers to public authorities, procedural justice in decision making. Precludes additional credit for PADM 5412 and PADM 5413.

PADM 5125 [0.5 credit]

Qualitative Methods for Public Policy

Qualitative methods and dimensions of policy research. Topics may include the formulation of research problems, research design and techniques for collecting and managing evidence, and the role of qualitative research in the analysis of public policies and programs. Precludes additional credit for PADM 5715, PADM 5113 (no longer offered).

PADM 5126 [0.5 credit]

Quantitative Methods for Public Policy

Descriptive statistics, probability theory and sampling distributions, hypothesis testing of quantitative and qualitative population parameters, and regression analysis. Precludes additional credit for PADM 5114 (no longer offered).

PADM 5127 [0.5 credit]

Microeconomics for Policy Analysis

Key concepts in microeconomic theory and their application to public policy. Topics may include incentives, rational choice theory, market structure, welfare economics, and strategic behaviour. Precludes additional credit for PADM 5111 (no longer offered). Prerequisite(s): ECON 1001 or equivalent.

PADM 5128 [0.5 credit]

Macroeconomics for Policy Analysis

Theoretical foundations and current policy issues that relate to the level and growth of expenditure and production are analyzed in the Canadian and international context. Precludes additional credit for PADM 5112 (no longer offered). Prerequisite(s): ECON 1002 or equivalent.

PADM 5129 [0.5 credit]

Capstone Course

An integrative workshop-based course in which teams of students develop and present strategies to address a policy problem. Includes: Experiential Learning Activity

PADM 5211 [0.5 credit]**Intergovernmental Relations**

Major cost-sharing and fiscal transfer agreements. The intergovernmental mechanisms for policy and administrative coordination in selected policy fields. Precludes additional credit for PADM 5003 (no longer offered).

PADM 5212 [0.5 credit]**Civil Society and Public Policy**

The influence of various interests, social movements, voluntary organizations and citizens in the policy process in a Canadian and comparative context.

PADM 5213 [0.5 credit]**Gender and Public Policy**

The impact of public policy on gender relations and how gender relations shape policy. Topics covered may include gender inequalities in earnings and employment, macroeconomic policy, gender and development, and gender-based analysis.

Precludes additional credit for PADM 4701 and PADM 5701 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4213, for which additional credit is precluded.

PADM 5214 [0.5 credit]**Budgetary Policy in the Public Sector**

Selected aspects of the expenditure and revenue budget and budgetary process at all levels of government. Critical review of actual budgets and budgetary processes.

Precludes additional credit for PADM 5103 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4214, for which additional credit is precluded.

PADM 5215 [0.5 credit]**Benefit-Cost Analysis**

Benefit-cost analysis and its application to public-sector investment, pricing policy, discount rates, marginal cost and shadow pricing, and the handling of risk and uncertainty.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5216 [0.5 credit]**Economic Models of Politics and Public Policy**

Microfoundations of collective action, majority rule, political institutions and bureaucracy. Applications to various issues in Canadian and international public policy.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5217 [0.5 credit]**Applied Microeconomic Policy Analysis**

Microeconomic theory applied to public policy problems and issues.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5218 [0.5 credit]**Analysis of Socio-economic Data**

Correlation and regression analyses to test hypotheses about the relationships between socio-economic variables. Prerequisite(s): PADM 5126 or equivalent.

PADM 5219 [0.5 credit]**Advanced Statistical Policy Analysis**

Econometric research on selected policy issues using selected econometric techniques.

Prerequisite(s): PADM 5218 or equivalent.

PADM 5220 [0.5 credit]**Regulation and Public Policy**

Political, economic, legal, and organizational theories of regulation in the Canadian and comparative context. Processes and consequences of regulatory practice in selected Canadian public policy fields.

Also offered at the undergraduate level, with different requirements, as PADM 4220, for which additional credit is precluded.

PADM 5221 [0.5 credit]**Health Policy in Canada**

Canadian health policies and programs set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4221, for which additional credit is precluded.

PADM 5222 [0.5 credit]**Economics and Health Policy**

This course applies microeconomic theory to a discussion of health policy. Focus on issues of particular interest to a student of Canadian health care policy.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5223 [0.5 credit]**Canadian Economic Policy**

Overview of Canadian economic development and how it has been affected by governments. Topics may be drawn from monetary, fiscal, industrial, trade, labour market or competition policies, viewed in contemporary and historical contexts.

Prerequisite(s): PADM 5128 or equivalent.

PADM 5224 [0.5 credit]**Indigenous Policy**

Canadian policies and programs on Indigenous peoples and Indigenous peoples' own policies as nations set in a comparative political-economic and institutional context. Precludes additional credit for PADM 5711, PADM 4806 (no longer offered) and PADM 5806 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4224, for which additional credit is precluded.

PADM 5225 [0.5 credit]**Trade Policy**

Canadian multilateral and regional trade policies and programs set in a comparative political-economic and institutional context.

Prerequisite(s): PADM 5127 or equivalent.

Also offered at the undergraduate level, with different requirements, as PADM 4225, for which additional credit is precluded.

PADM 5226 [0.5 credit]**Tax Policy**

Canadian tax policies set in a comparative political-economic and institutional context.

Prerequisite(s): PADM 5127 or equivalent.

Also offered at the undergraduate level, with different requirements, as PADM 4226, for which additional credit is precluded.

PADM 5227 [0.5 credit]**Education Policy**

Canadian policies and programs on education set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4227, for which additional credit is precluded.

PADM 5228 [0.5 credit]**Social Policy**

The nature and historical development of social programs in capitalist countries, with particular focus on Canada.

The course will concentrate on developing a critical understanding of the social forces shaping these programs.

Also offered at the undergraduate level, with different requirements, as PADM 4228, for which additional credit is precluded.

PADM 5229 [0.5 credit]**The Health of Populations**

Assessment of the medical model, and perspectives on the social and economic determinants of health, population health, and community health. The health of particular groups in Canada (e.g., women, Aboriginal peoples). International comparisons will be made.

PADM 5230 [0.5 credit]**Ethics for Public Policy**

The development and application of ethical theories to examine not simply what governments could do, but what they should do on the basis of consequences, principles, or motivations. Applications could include policies affecting climate change, income inequality, end of life, privacy, use of force.

Also offered at the undergraduate level, with different requirements, as PADM 4230, for which additional credit is precluded.

PADM 5291 [0.5 credit]**Directed Studies**

A tutorial or directed reading course on selected subjects related to policy analysis.

PADM 5372 [0.5 credit]**Policy Seminar (Data Science Specialization)**

One or more selected policy areas and topics related to policy and administration in the data science context. Topics will change each year.

PADM 5391 [0.5 credit]**Directed Studies (Data Science Specialization)**

A tutorial of directed reading on selected subjects related to data science.

PADM 5411 [0.5 credit]**Organization Theory**

Focusing on major theoretical approaches to organizations, the course develops practical insights into issues such as organizational design, leadership, technology, culture and diversity, motivation and power. It applies these insights to organizations in both the public and private sectors in a variety of national contexts.

PADM 5414 [0.5 credit]**Law of Public Authorities II**

Characteristics and selected problems of control of administrative action. Topics may include: varieties of constitutional, legal and judicial control, impact of the Charter, reforms to administrative law control systems in Canada, and comparisons with developments outside Canada.

Prerequisite(s): PADM 5124 or equivalent.

PADM 5415 [0.5 credit]**Strategic Management in the Public Sector**

Key concepts, principles and tools of strategic management, and their use in planning and policy implementation in the public sector. Reviews critical perspectives and cases in order to identify some of the limitations of strategic management.

Includes: Experiential Learning Activity

PADM 5416 [0.5 credit]**Budgetary Management for the Public Sector**

Theory and practice of budgeting in the public sector. From a management perspective, the course focuses on the objectives, methods and systems for the control and reporting of expenditures.

PADM 5417 [0.5 credit]**Principles of Finance**

The use of financial assets to obtain funds, evaluative criteria to compare alternative uses of funds, and derivative contracts to manage risk. Public sector applications of these practices are emphasized.

PADM 5418 [0.5 credit]**Human Resources Management**

The field of human resources management including the roles of human resource departments, employee motivation, staffing, compensation, benefits, training and development and employee relations.

PADM 5419 [0.5 credit]**Industrial Relations and Public Sector Collective Bargaining**

The basic concepts of industrial relations, with respect to both public and private sector employees and organizations.

PADM 5420 [0.5 credit]**Policy and Program Evaluation**

Selected concepts, issues, and processes in applied governmental planning and evaluation, utilizing both Canadian and comparative experiences.

PADM 5421 [0.5 credit]**Globalizing Public Management**

Public sector reform has swept the developed and developing world in the last two decades. The dynamics of this global movement, the models exported and adopted, and the success and failure of these exports.

PADM 5422 [0.5 credit]**Urban and Local Government**

The role of municipal government in the context of Canadian federalism. Current economic, political and social trends affecting Canada's major urban centres including growth, amalgamation, fiscal reform, immigration, housing, community engagement, and sustainable development.

PADM 5423 [0.5 credit]**Third Sector Governance and Management**

Governance and management of voluntary/nonprofit organizations and their role in democracy, public policy, and service delivery.

PADM 5424 [0.5 credit]**Evaluation Cases and Applications**

Selected case studies and emerging theories and issues in the development, design, management and implementation of policy and program evaluation.

Includes: Experiential Learning Activity

Prerequisite(s): PADM 5420.

PADM 5441 [0.5 credit]**Introduction to Policy and Program Evaluation**

Survey of evaluation in Canada and internationally. Topics include: Canadian context for public sector evaluation practice; approaches to research in evaluation; essentials of effective evaluation design, including logic modeling, theories of change/action, and contribution/attribution constructs.

PADM 5442 [0.5 credit]**Quantitative Research Methods in Evaluation**

Descriptive and inferential statistics, probability theory and sampling distributions, hypothesis testing of quantitative and qualitative population parameters, and regression analysis as these apply to the field of program evaluation.

PADM 5443 [0.5 credit]**Qualitative Research Methods in Evaluation**

Methods used in qualitative evaluation research. Topics include: formulating evaluation research questions; deriving research designs from questions; qualitative data gathering techniques and approaches; managing evidence, ethics reviews, and analysis of qualitative data.

PADM 5444 [0.5 credit]**Benefit-Cost Analysis for Program Evaluation**

Approaches to benefit-cost analysis in the Canadian evaluation context. Topics include: the role of benefit-cost analysis within program evaluation; its application to public sector investments, pricing and other forms of policy valuation; discount rates, marginal cost, and shadow pricing; risk and uncertainty.

PADM 5445 [0.5 credit]**Program Evaluation Planning and Designs**

Application of specific evaluation research designs to actual projects. Topics include: designs for formative, summative and developmental programs; designs for policy evaluation; attribution and contribution analysis; applied logic modeling; and managing evaluation projects at the planning stages.

Includes: Experiential Learning Activity

Prerequisite(s): PADM 5441, PADM 5442, PADM 5443, PADM 5444.

PADM 5446 [0.5 credit]**Program Evaluation Conduct, Analysis and Reporting**

Application of evaluation conduct to actual projects. Topics include: selecting data analysis methods specific to a project; forming evaluation findings and recommendations; data visualization; reporting techniques; and management of evaluation projects at the conduct stages.

Includes: Experiential Learning Activity

PADM 5510 [0.5 credit]**Energy Economics**

Micro- and macroeconomic concepts and techniques applied to such topics as international energy markets, energy production, and energy consumption.

PADM 5511 [0.5 credit]**Energy Management**

The fundamentals of energy management, focusing on current practices in both private and public sector organizations.

PADM 5512 [0.5 credit]**International Politics of Sustainable Energy**

Recent historical and contemporary developments in the role of energy in inter- and intranational relations, involving such topics as Canada/US relations, the international political economy of oil, energy security, and climate change.

PADM 5515 [0.5 credit]
Sustainable Energy Policy

The institutions involved in energy policy, the processes through which policy is made, and the substantive energy-related issues currently preoccupying policy makers. Precludes additional credit for PADM 5615.

PADM 5572 [0.5 credit]
Policy Seminar (Sustainable Energy)

One or more selected topics or specialized aspects of sustainable energy policy. The topic will change each year.

PADM 5611 [0.5 credit]
Science and Technology Policies

Theory and practice regarding governmental policies for science and technology, and the use of scientific knowledge in the policy and regulatory processes of government. Concerns regarding the ethical issues and the transparency of science in government. Also offered at the undergraduate level, with different requirements, as PADM 4611, for which additional credit is precluded.

PADM 5612 [0.5 credit]
Industrial Policy, Innovation and Sustainable Production

Sustainable production theory and key drivers, barriers and opportunities influencing innovation in industrial systems and processes. The relationship of public policies and industry practices are explored in a number of sectors. Also offered at the undergraduate level, with different requirements, as PADM 4612, for which additional credit is precluded.

PADM 5613 [0.5 credit]
Science, Risk and Evaluation

Risk-benefit theories and practices and related issues in the evaluation of science and technology; how they are handled in applied regulatory and policy institutions in selected sectors (e.g. pesticides; health protection; biotechnology).

PADM 5614 [0.5 credit]
Natural Resource Management

Governance and management of natural resources from a Canadian and international perspective. The use of various management instruments, regulatory approaches and community-based and co-management institutions are evaluated with evidence from several case studies from around the world.

PADM 5615 [0.5 credit]
Politics and Policy of Energy in Canada

Dilemmas associated with energy policy in Canada. Economic, social and environmental dimensions of energy decision making; Canadian issues within the context of a changing international scene and long term energy transitions.

Precludes additional credit for PADM 5515. Also offered at the undergraduate level, with different requirements, as PADM 4615, for which additional credit is precluded.

PADM 5616 [0.5 credit]
Environmental Policy

Canadian environmental policies and programs set in a comparative political-economic and institutional context. Also offered at the undergraduate level, with different requirements, as PADM 4616, for which additional credit is precluded.

PADM 5617 [0.5 credit]
Implementing Sustainable Development in Industrialized Countries

Genesis and evolution of the idea of sustainable development and the ways in which it is influencing public policy and public sector structures and processes. Canada's performance in implementing sustainable development will be assessed in comparison with other industrialized countries.

PADM 5618 [0.5 credit]
Environmental and Ecological Economics

Environmental and ecological economics with applications to public policy and environmental management issues. Concepts of sustainability, non-market valuation and ecological stability, the determination of environmental targets, and the use of policy instruments, incentives and emissions markets. Prerequisite(s): PADM 5127 or equivalent.

PADM 5619 [0.5 credit]
Urban Sustainability

Impact of economic growth and social change on cities and their attempts to forge sustainable growth. Incorporating political and fiscal issues, the focus is on 'smart growth' policies and initiatives in areas such as environmental control, transport, land use, housing and infrastructure.

PADM 5620 [0.5 credit]
The Science, Politics and Economics of Global Climate Change

Scientific issues at the core of climate change and the domestic and international policy responses. Various environmental, economic, and political implications for both the developed and developing worlds and for the various regions of Canada.

PADM 5702 [0.5 credit]
Policy Seminars

PADM 5703 [0.5 credit]
Directed Studies (Indigenous Public Administration)
A tutorial or directed reading course on selected subjects.

PADM 5711 [0.5 credit]**Indigenous-Canada Relations: Governance and Policy History**

Introduction to pre-contact history of select Indigenous nations and peoples, overview of contact period: the treaty relationship, evolving jurisprudence, changing power dynamics, federal and provincial administrative practices, contemporary and traditional forms of First Nations, Métis and Inuit governance. Contrasting approaches to understanding foundational events.

Includes: Experiential Learning Activity

Precludes additional credit for PADM 5224.

PADM 5712 [0.5 credit]**Issues in Contemporary Governance: First Nations, Métis and Inuit**

Diverse approaches to understanding and responding to the main governance issues facing contemporary and traditional First Nations, Inuit and Métis governments and organizations in Ontario and in the rest of Canada.

PADM 5713 [0.5 credit]**Leadership and Management in Indigenous Organizations and Governments**

Leadership, organizational development and innovation in various cultural contexts relevant to Indigenous peoples, organizational design, recruitment and human resources management, decision-making, project planning and implementation, media and communications. Practicum included.

Includes: Experiential Learning Activity

PADM 5714 [0.5 credit]**Financial Management in First Nations, Métis and Inuit Governments and Organizations**

Legislation, regulations, and financial management practices that apply in First Nations, Métis, Inuit organizations and governments. Sources and measures to mitigate and eliminate historical disparity, including asset management, strategic investment, and capital aggregation.

PADM 5715 [0.5 credit]**Policy Research and Evaluation for Indigenous Policy and Administration**

Policy research and program evaluation; applied research ethics, cultural and community protocols, legal frameworks, formulation of research problems, research design, and techniques for collecting and managing community-based and other data; research methodologies of specific Indigenous nations and peoples, and scholarly debates about epistemology and practice.

Precludes additional credit for PADM 5125.

PADM 5716 [0.5 credit]**Economic and Community Development in Indigenous Territories**

Community economic development theories; the ethics, benefits and costs of traditional, current and new approaches pertinent to building stable economies in rural and urban Aboriginal settings.

Includes: Experiential Learning Activity

PADM 5717 [0.5 credit]**Indigenous Peoples and Canadian Law**

Canadian law relating to Indigenous peoples from colonial times to the present. Jurisprudence on Indigenous and treaty rights: the duty to consult, fiduciary duties, the honour of the Crown, nation-to-nation relations; introduction to First Nations, Métis and Inuit legal traditions, and international law.

PADM 5718 [0.5 credit]**Indigenous Peoples and Urban Policy and Administration**

Policies and programs of and for Indigenous peoples living in Canadian cities, with a focus on institutional and intergovernmental challenges and opportunities for change.

PADM 5719 [0.5 credit]**Indigenous Health and Social Policy**

Development and delivery of health and social policies pertinent to Indigenous peoples living in diverse circumstances in Canada; theories and practices.

PADM 5772 [0.5 credit]**Policy Seminar (Indigenous Policy and Administration)**

One or more selected policy areas or specialized aspects of Indigenous Policy and Administration. The policy field or topic will change each year.

PADM 5811 [0.5 credit]**The International Policy Framework**

The evolution of the main international rules and institutions governing the economic relationships among nation states, with emphasis on the changing roles of the Bretton Woods institutions (IMF, World Bank, GATT/WTO).

PADM 5812 [0.5 credit]**Governance in Developing Countries**

The roles of the state and civil society in the governance of developing countries in the context of public sector reform and globalization.

PADM 5813 [0.5 credit]**The Evolution of World Bank/IMF Policy Conditionality**

The changing nature of World Bank/IMF policy conditionality with emphasis on the period since the onset of the 1982 debt crisis.

PADM 5814 [0.5 credit]**Program and Project Management**

The context, critical issues and methods relating to the planning and implementation of development programs and projects.

PADM 5815 [0.5 credit]**Civil Society Organizations and Development**

The context, roles, structures and strategies of nongovernmental organizations in the development process at the global, national and local levels. The role of development aid and NGOs is considered. Also listed as IDMG 5615.

PADM 5816 [0.5 credit]**Program Evaluation in Developing Countries**

The context, critical issues and methods relating to the evaluation of development interventions. Also listed as IDMG 5616. Prerequisite(s): PADM 5126 or equivalent.

PADM 5817 [0.5 credit]**Health Policy in Developing Countries**

Debates regarding health policy in the developing world, in the context of the global health sector reform movement, trade and intellectual property regimes, and strategies of corporate and NGO actors. Issues of gender, class and the determinants of health. Also listed as IDMG 5617. Also offered at the undergraduate level, with different requirements, as PADM 4817, for which additional credit is precluded.

PADM 5818 [0.5 credit]**Theories of Development**

A survey of the theories and evidence to explain processes of growth and development, and their unevenness, in low-income countries and transition economies. Precludes additional credit for INAF 5007.

PADM 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

PADM 5909 [2.0 credits]**M.P.P.A. Thesis**

Includes: Experiential Learning Activity

PADM 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity
Prerequisite(s): registration in the Co-operative Education Option of the M.A. program and permission of the Co-op Supervisor.

PADM 6010 [0.5 credit]**Current Issues in Public Policy**

Current issues in Canadian public policy, their historical contexts, and interdisciplinary approaches to analyzing them. Issues may include inequality, gender, environment, Indigenous governance, US/Canada relations, populism. Approaches to analysis may include contemporary and classic thinkers. Precludes additional credit for PADM 6114 (no longer offered).

PADM 6011 [0.5 credit]**Theoretical Foundations of Public Policy**

Normative and explanatory theories fundamental to public policy, drawing on multiple social science disciplines and incorporating ethical, economic, and political/administrative perspectives. Topics may include utilitarianism, rights-based traditions, contractualism, market failure, life-course dynamics. Precludes additional credit for PADM 6111 (no longer offered).

PADM 6012 [0.5 credit]**Policy Process and Institutions**

Various theoretical approaches to policy-making. Topics may include policy formation, agenda-setting, institutionalism, theories of the bureau, theories of policy change, policy design and implementation, policy evaluation, advocacy and coalitions, private policy-making. Precludes additional credit for PADM 6112 (no longer offered).

PADM 6013 [0.5 credit]**Research Design for Public Policy**

Introduction to the analytical challenges to the study of public policy, and ways of addressing them. Exploration of why particular explanatory, interpretive and normative research questions are asked; and why particular theories, units of analysis, concepts, methods and data are used. Precludes additional credit for PADM 6113 (no longer offered).

PADM 6200 [0.5 credit]**Doctoral Research Seminar**

Issues in developing research proposals and conducting public policy research; includes research presentations by senior doctoral students and faculty. Required for second-year doctoral students who present their thesis proposals. Issues surrounding quantitative or qualitative methods in public policy analysis may be discussed. Graded Pass/Fail.

PADM 6201 [0.5 credit]**Doctoral Research Seminar**

Presentations on research skills and strategies such as ethics approval, bibliographic software, work-flow management, subsequent publication. Supervised independent research projects preliminary to Ph.D. Thesis, drawing upon interdisciplinary approaches to study of public policy. Precludes additional credit for PADM 6200. Prerequisite(s): PADM 6900.

PADM 6900 [0.5 credit]**Ph.D. Comprehensive Examination**

Ph.D. preparation for the comprehensive examination. The grade to be awarded will be that obtained on the comprehensive examination.

PADM 6901 [0.5 credit]**Ph.D. Specialization Tutorial**

A Ph.D. tutorial covering advanced theory and research in an area of specialization generally related to public policy. Specific topics will be selected in consultation with, and must be approved by, the academic supervisor and Ph.D. co-ordinator.

PADM 6902 [0.5 credit]**Ph.D. Specialization Tutorial**

A Ph.D. tutorial covering advanced theory and research in an area of specialization generally related to public policy. Specific topics will be selected in consultation with, and must be approved by, the academic supervisor and Ph.D. co-ordinator.

PADM 6909 [0.0 credit]**Ph.D. Thesis**

A thorough investigation of a public policy issue that integrates multiple disciplines into the analysis.

Includes: Experiential Learning Activity

Prerequisite(s): successful public defence of written thesis proposal.

Information Technology

This section presents the requirements for programs in:

- Master of Information Technology: Digital Media
- Master of Information Technology: Digital Media with Specialization in Data Science
- Master of Information Technology: Network Technology
- Ph.D. Information Technology

Program Requirements
**Master of Information Technology:
Digital Media (5.0 credits)**
Requirements:

1. For students admitted to 5.0-credit program only, 0.5 0.5 credit in:

ITEC 5002 [0.5]	Fundamentals of Information Technology Research
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2. 0.0 credit in:

ITEC 5001 [0.0]	Information Technology Seminars
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3. 1.5 credits from core courses (For students admitted to 4.0-credit program, 1.0 credit): **1.5**

ITEC 5200 [0.5]	Entertainment Technologies
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ITEC 5201 [0.5]	Computer Animation Technologies
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ITEC 5202 [0.5]	Visual Effects Technologies
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ITEC 5203 [0.5]	Game Design and Development Technologies
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ITEC 5204 [0.5]	Emerging Interaction Techniques
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ITEC 5920 [0.5]	Selected Topics in Digital Media
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4. 0.5 credit in electives, which may include up to 0.5 credit from a fourth-year course with the approval of the supervisor or the associate director of graduate studies. **0.5**

5. 2.5 credits in: **2.5**

ITEC 5909 [2.5]	Master's Thesis
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Total Credits **5.0**

**Master of Information Technology: Digital Media
with Specialization in Data Science (5.0 credits)**
Requirements:

1. 0.5 credit in: **0.5**

DATA 5000 [0.5]	Data Science Seminar
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2. 0.5 credit in: **0.5**

ITEC 5002 [0.5]	Fundamentals of Information Technology Research
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3. 1.0 credit from core courses: **1.0**

ITEC 5200 [0.5]	Entertainment Technologies
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ITEC 5201 [0.5]	Computer Animation Technologies
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ITEC 5202 [0.5]	Visual Effects Technologies
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ITEC 5203 [0.5]	Game Design and Development Technologies
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ITEC 5204 [0.5]	Emerging Interaction Techniques
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ITEC 5920 [0.5]	Selected Topics in Digital Media
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4. 0.5 credit in electives, which may include ITEC courses or any other 5000- or 4000-level courses from other departments or programs selected in consultation with the supervisor. **0.5**

5. 2.5 credits in: **2.5**

ITEC 5909 [2.5]	Master's Thesis (in the specialization)
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Total Credits **5.0**

Note: No additional IT seminar requirements for this stream.

**Master of Information Technology:
Network Technology (5.0 credits)**
Requirements - Project pathway:

1. 0.5 credit in: **0.5**

ITEC 5002 [0.5]	Fundamentals of Information Technology Research
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2. 0.0 credit in:

ITEC 5001 [0.0]	Information Technology Seminars
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3. 2.0 credits from core courses: **2.0**

ITEC 5100 [0.5]	Planning and Design of Computer Networks
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ITEC 5101 [0.5]	Cross Layer Design for Wireless Multimedia Networks
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ITEC 5102 [0.5]	Designing Secure Networking and Computer Systems
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ITEC 5103 [0.5]	Cloud and Datacentre Networking
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ITEC 5910 [0.5]	Selected Topics in Network Technologies
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4. 1.0 credit in: **1.0**

ITEC 5905 [1.0]	Network Technology Project
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5. 1.5 credit in electives, which may include up to 0.5 credit from a fourth-year course with the approval of the supervisor or associate director of graduate studies. **1.5**

Total Credits **5.0**

Requirements - Thesis pathway:

1. For students admitted to the 5.0-credit program only, 0.5 0.5 credit in:

ITEC 5002 [0.5]	Fundamentals of Information Technology Research
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2. 0.0 credit in:

ITEC 5001 [0.0]	Information Technology Seminars
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3. 1.5 credits from core courses (For students admitted to 4.0-credit program, 1.0 credit):	1.5
ITEC 5100 [0.5]	Planning and Design of Computer Networks
ITEC 5101 [0.5]	Cross Layer Design for Wireless Multimedia Networks
ITEC 5102 [0.5]	Designing Secure Networking and Computer Systems
ITEC 5103 [0.5]	Cloud and Datacentre Networking
ITEC 5910 [0.5]	Selected Topics in Network Technologies
4. 0.5 credit in electives, which may include ITEC 5900 or up to 0.5 credit at the fourth year, with the approval of the supervisor or associate director of graduate studies.	0.5
5. 2.5 credits in:	2.5
ITEC 5909 [2.5]	Master's Thesis
Total Credits	5.0

Ph.D. Information Technology (1.5 credits)

Requirements:

1. 0.5 credit in:	0.5
ITEC 6200 [0.5]	Introduction to Interdisciplinary Research in Information Technology
2. 1.0 credit in two courses, at least one of which must be from a different discipline than that of the degree and approved by the supervisor	1.0
3. 0.0 credit in:	0.0
ITEC 5001 [0.0]	Information Technology Seminars
4. 0.0 credit in:	0.0
ITEC 6907 [0.0]	Doctoral Comprehensive
5. 0.0 credit in:	0.0
ITEC 6908 [0.0]	Doctoral Proposal
6. 0.0 credit in:	0.0
ITEC 6909 [0.0]	Doctoral Thesis
Total Credits	1.5

Milestones

Second Year: completion of ITEC 6907 [0.0] before the end of the sixth term of registration.

Third Year: completion of ITEC 6908 [0.0] before the end of the ninth term of registration.

Regulations

See the General Regulations section of this Calendar.

Admission

M.I.T. Digital Media

Students entering the program will have an undergraduate degree in one of the related three primary disciplines of Technology (e.g. Computer Science/Engineering and Information Technology), Content (e.g. Arts and Humanities), and People (e.g. Psychology, Communication and Business).

All students will apply for the 5.0 credit M.I.T. Digital Media.

Applicants with substantial professional experience in digital media in Canada may be considered for admission to professional entry, requiring them to complete 4.0 credits, to be determined by the School of Information

Technology and the Faculty of Graduate and Postdoctoral Affairs.

Accelerated Pathway Digital Media

The accelerated pathway in the Master of Information Technology - Digital Media (MIT-DM) is a flexible and individualized plan of graduate study. Students in their final year of a Carleton BIT IMD and IRM degree with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third#year of study in the BIT IMD and IRM degree should consult with both their Undergraduate Program Coordinator and the Associate Chair for Graduate Studies to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements:

1. At least 0.5 credit in one of the following courses ITEC 52XX or ITEC 5920 with a grade of B+ or higher;
2. Minimum overall CGPA of A-.

Students may receive advanced standing with transfer of up to 1.0 credit, which can reduce their time to completion.

M.I.T. Network Technology

Students entering the program will have an undergraduate degree in network technology, electrical engineering, computer science, engineering, or a closely-related discipline.

All students will apply for the 5.0 credit M.I.T. Network Technology.

Applicants with substantial professional experience in network technology in Canada may be considered for admission to professional entry, requiring them to complete 4.0 credits, to be determined by the School of Information Technology and the Faculty of Graduate and Postdoctoral Affairs.

Accelerated Pathway Network Technology

The accelerated pathway in the Master of Information Technology - Network Technology (MIT-NET) is a flexible and individualized plan of graduate study. Students in their final year of a Carleton BIT Network Technology degree with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third#year of study in the BIT Network Technology degree should consult with both their Undergraduate Program Coordinator and the Associate Chair for Graduate Studies to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements:

1. At least 0.5 credit from: ITEC 5110, ITEC 5111, ITEC 5112, ITEC 5113, ITEC 5114 with a grade of B+ or higher;
2. Minimum overall CGPA of A-.

Students may receive advanced standing with transfer of up to 1.0 credit, which can reduce their time to completion.

Admission

Applicants to this program will normally hold a Master's degree in one of the three related disciplines (Technology, Content, and People) but demonstrate the ability to work in multi-disciplinary groups and have some general technology (digital media) background.

Applicants judged to be generally acceptable but deficient in some preparation may be asked to complete course work in addition to the program requirements.

In addition to transcripts and letters of reference, application packages will include a statement of interest outlining the applicant's proposed area of research.

Information Technology (ITEC) Courses

ITEC 5001 [0.0 credit]

Information Technology Seminars

A seminar based course where the students make the presentations and participate in discussions. Some seminars done by guest lecturers. Graded Sat/Uns. Includes: Experiential Learning Activity

ITEC 5002 [0.5 credit]

Fundamentals of Information Technology Research

Basic concepts and techniques in information technology, including information systems, algorithms and software development process, research methods, and research and technical writing.

Includes: Experiential Learning Activity

Precludes additional credit for ITEC 5000 (no longer offered).

ITEC 5010 [0.5 credit]

Applied Programming I

Algorithm design and computer programming with practical industry problems in information technology. Topics include algorithms and pseudocode, programming fundamentals, memory operations, data structures, object oriented programming, program design, testing and debugging.

Includes: Experiential Learning Activity

ITEC 5100 [0.5 credit]

Planning and Design of Computer Networks

Planning process of computer networks; needs and technical requirements; modeling of different network planning problems; exact and approximate algorithms; topological planning and expansion problems; equipment (switch, router) location problem; approximate and optimal routing algorithms; presentation of various case studies.

Includes: Experiential Learning Activity

ITEC 5101 [0.5 credit]

Cross Layer Design for Wireless Multimedia Networks

Quality of service measures at different layers. Parameter adaptation, trade-offs, and optimization at physical, data-link, network, transport, and application layers. Cross-layer design in cellular, ad hoc, sensor, local area, green, and cognitive radio networks.

ITEC 5102 [0.5 credit]

Designing Secure Networking and Computer Systems

Network security with coverage of computer security in support of networking concepts. Security issues in data networks at different protocol layers. Routing security, worm attacks, and botnets. Security of new mobile networks and emerging networked paradigms such as social networks and cloud computing.

ITEC 5103 [0.5 credit]

Cloud and Datacentre Networking

Special issues of the networking requirements in datacentres and cloud computing environments. Performance, power requirements, redundancy of datacentre networks.

ITEC 5110 [0.5 credit]

Emerging Network Technologies

Overview of technologies, protocols and techniques related to Information Technology networking that are either in their early stage of adoption or are not yet mainstream (i.e. beta or prototype stage). Focus will vary from year to year to reflect the evolutionary nature of this domain.

Also offered at the undergraduate level, with different requirements, as NET 4000, for which additional credit is precluded.

ITEC 5111 [0.5 credit]

Multimedia Networking

Audio and video compression. H.261, JPEG, MPEG and DVI. Accessing audio and video from a web server. Real Time Streaming Protocol (RTSP). Multimedia operating systems. Multimedia database. Network support for multimedia applications. Multimedia synchronization. Also offered at the undergraduate level, with different requirements, as NET 4007, for which additional credit is precluded.

ITEC 5112 [0.5 credit]

Secure Mobile Networking

The concept, principle and rationale of mobile networking. Mobile network architecture, protocols, mobility management, routing and mobile TCP/IP; Security challenges, vulnerabilities and threats in mobile networks; Security defense techniques and countermeasures in mobile networks.

Also offered at the undergraduate level, with different requirements, as NET 4010, for which additional credit is precluded.

ITEC 5113 [0.5 credit]**Network Simulation**

Introduction to discrete event simulation; fundamental stochastic models for networking; queueing theory; deterministic algorithms for networking; confidence intervals; introduction to network modeling. Simulation exercises including traffic monitoring, congestion, routing protocols, resource utilization and growth planning using OPNET simulation tool.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as NET 4001, for which additional credit is precluded.

ITEC 5114 [0.5 credit]**Networked Applications**

Architectures for computing in modern data networks that adopt the Internet architecture. Topics covered include socket programming, RPC and RMI. Client-server and peer-to-peer models. Emerging application architectures. Also offered at the undergraduate level, with different requirements, as NET 4005, for which additional credit is precluded.

ITEC 5200 [0.5 credit]**Entertainment Technologies**

Advanced topics in entertainment technologies including web-based, film and television, video games and interactive systems.

ITEC 5201 [0.5 credit]**Computer Animation Technologies**

Advanced topics in computer animation: full body motion capture, space-time systems, physics-based animation, realistic rendering techniques, industry methods for large scene animations and live action integration; behavioural animation.

ITEC 5202 [0.5 credit]**Visual Effects Technologies**

Advanced look at the processes and technologies in visual effects, specifically in advanced processing of virtual sets (e.g. using chroma-keying), lighting and colour integration, filming technologies, motion tracking, and the integration of 3D objects/elements into real scenes.

ITEC 5203 [0.5 credit]**Game Design and Development Technologies**

Advanced technologies in the development of computer game systems and gaming experiences; the production process from idea to design: story, level, and character development. Games, game engine, theory and methodology.

ITEC 5204 [0.5 credit]**Emerging Interaction Techniques**

Advanced interaction styles and their associated technologies. Topics may include hand held and gestural interactions, ubiquitous computing, deformable user interfaces, physiological computing and tangible user interfaces.

Also listed as HCIN 5300.

ITEC 5205 [0.5 credit]**Design and Development of Data-Intensive Applications**

Design and development of data-intensive applications dealing with large-scale data. Data may include spatial data, time series, text, social media and different forms of digital media. Data modeling and management techniques will be discussed that enhance data analysis techniques and improve data-intensive applications.

ITEC 5206 [0.5 credit]**Data Protection and Rights Management**

Understanding how to use technology to implement data privacy, security, protection and related legal issues. Insights on how to develop systems for managing digital rights, data privacy rules, laws or policies relevant to different jurisdictions, rights, and responsibilities for protecting data and personal information.

ITEC 5207 [0.5 credit]**Data Interaction Techniques**

Design and development of how humans (e.g., end-users, knowledge-users and expert-users) interact with data ecosystem like data collection, storage, analysis and visualization. Techniques, methods and tools will be discussed on how humans interact with data based on capabilities of machines and needs of humans.

ITEC 5208 [0.5 credit]**Virtual and Augmented Reality Technology**

Research in and design of virtual/augmented reality systems. Applications, history, human factors, display and input hardware, and interaction techniques for navigation, selection and manipulation. Students develop and evaluate a VR/AR system using modern game engines and 3D hardware devices such as head-mounted displays. Includes: Experiential Learning Activity
Also listed as HCIN 5501.

ITEC 5900 [0.5 credit]**Directed Studies**

A course of independent study that fits the student's area of interest under the supervision of a faculty member of the School.

ITEC 5905 [1.0 credit]**Network Technology Project**

Students pursuing this degree will conduct a networking study, analysis, and/or design project under the supervision of a faculty member in the area of networks. Includes: Experiential Learning Activity

ITEC 5909 [2.5 credits]**Master's Thesis**

Includes: Experiential Learning Activity

ITEC 5910 [0.5 credit]**Selected Topics in Network Technologies**

Recent and advanced topics in network technologies. Trends in wireless networking, software defined networks, power-line networking. Students may be expected to contribute to lectures or seminars on selected topics.

ITEC 5920 [0.5 credit]**Selected Topics in Digital Media**

Recent and advanced topics in Digital Media. Students may be expected to contribute to lectures or seminars on selected topics.

ITEC 6200 [0.5 credit]**Introduction to Interdisciplinary Research in Information Technology**

Introduction to concepts and practices for research in Information Technology. Understanding the defining properties of computer-based systems and related technologies. Emphasis on bringing together skills related to technology, people and content in order to solve problems and explore new possibilities.

ITEC 6900 [0.5 credit]**Directed Studies**

A course of independent study that fits the student's area of interest under the supervision of a faculty member of the School.

ITEC 6907 [0.0 credit]**Doctoral Comprehensive**

Ph.D. comprehensive examination in the student's field. The exam consists of a written submission and an oral examination.

ITEC 6908 [0.0 credit]**Doctoral Proposal**

Ph.D. thesis proposal. Defending a proposal consists of a written submission and an oral examination. Prerequisite(s): ITEC 6907 and permission of the School.

ITEC 6909 [0.0 credit]**Doctoral Thesis**

Includes: Experiential Learning Activity
Prerequisite(s): ITEC 6908 and permission of the School.

ITEC 6920 [0.5 credit]**Selected Topics in Digital Media**

Recent and advanced topics in Digital Media. Students are expected to contribute to lectures or seminars.

Infrastructure Protection and International Security

This section presents the requirements for programs in:

- M. Infrastructure Protection and International Security
- M.Eng. Infrastructure Protection and International Security
- Graduate Diploma in Infrastructure Protection and International Security

Program Requirements**M. Infrastructure Protection and International Security (5.0 credits)****Requirements:**

1. 2.0 credits in:	2.0
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies

IPIS 5103 [0.5]	Infrastructure Engineering Principles	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
2. 1.0 credit from:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	
IPIS 5303 [0.5]	Intelligence Statecraft and International Affairs	
IPIS 5304 [0.5]	Intelligence and National Security: Policies and Operations	
IPIS 5305 [0.5]	National Security Policy and Law	
IPIS 5306 [0.5]	Emergency and Business Continuity Management	
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy	
Or 5000-level courses from the IIA or SDP designated fields offered by the Norman Paterson School of International Affairs.		
3. 1.0 credit from:		1.0
IPIS 5501 [0.5]	Transportation and Aviation Security	
IPIS 5504 [0.5]	Fundamentals of Fire Safety	
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact	
IPIS 5507 [0.5]	Blast-load Effects on Structures	
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components	
IPIS 5509 [0.5]	Introduction to Cybersecurity	
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure	
4. 1.0 credit normally comprised of courses with CIVE, INAF or IPIS course designations, but may also be chosen from related programs that have been selected in consultation with, and approved by, the MIPIS Director and Associate Director and associated faculty when necessary.		1.0
Total Credits		5.0

M.Eng. Infrastructure Protection and International Security (5.0 credits)**Requirements:**

1. 1.5 credits in:		1.5
IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies	
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment	
IPIS 5106 [0.5]	Management of Critical Infrastructure	
2. 1.0 credit from:		1.0
IPIS 5104 [0.5]	Terrorism and International Security	
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation	
IPIS 5302 [0.5]	Contemporary International Security	

IPIS 5303 [0.5]	Intelligence Statecraft and International Affairs
IPIS 5304 [0.5]	Intelligence and National Security: Policies and Operations
IPIS 5305 [0.5]	National Security Policy and Law
IPIS 5306 [0.5]	Emergency and Business Continuity Management
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy

Or 5000-level courses from the Intelligence and International Affairs (IIA) and Security Defence Policy (SDP) designated fields offered by the Norman Paterson School of International Affairs.

3. 1.5 credit from: 1.5

IPIS 5501 [0.5]	Transportation and Aviation Security
IPIS 5504 [0.5]	Fundamentals of Fire Safety
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact
IPIS 5507 [0.5]	Blast-load Effects on Structures
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components
IPIS 5509 [0.5]	Introduction to Cybersecurity
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure

or an engineering course approved by the IPIS Director or Associate Director.

4. 1.0 credit remaining may be selected as follows: 1.0

Coursework Program Option:

- 1.0 credit from graduate courses from the Faculty of Engineering and Design that have been selected in consultation with, and approved by, the MIPIS Director and Associate Director.

Research Project Option:

1.0 credit in:

IPIS 5907 [1.0]	Research Project
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Total Credits 5.0

Graduate Diploma in Infrastructure Protection and International Security (3.0 credits)

Level 2 (Concurrent)

Level 3 (Direct Entry)

Requirements:

1. 1.5 credits in: 1.5

IPIS 5101 [0.5]	Critical Infrastructure Protection: Issues and Strategies
IPIS 5105 [0.5]	Critical Infrastructure Risk Assessment
IPIS 5106 [0.5]	Management of Critical Infrastructure

2. 1.0 credit from electives: 1.0

IPIS 5104 [0.5]	Terrorism and International Security
IPIS 5301 [0.5]	Disarmament, Arms Control and Nonproliferation
IPIS 5302 [0.5]	Contemporary International Security
IPIS 5303 [0.5]	Intelligence Statecraft and International Affairs

IPIS 5304 [0.5]	Intelligence and National Security: Policies and Operations
IPIS 5305 [0.5]	National Security Policy and Law
IPIS 5320 [0.5]	Topics in Infrastructure Security Policy
IPIS 5501 [0.5]	Transportation and Aviation Security
IPIS 5504 [0.5]	Fundamentals of Fire Safety
IPIS 5505 [0.5]	Natural Hazards in Canada: Risk and Impact
IPIS 5507 [0.5]	Blast-load Effects on Structures
IPIS 5508 [0.5]	Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components
IPIS 5520 [0.5]	Selected Topics in Engineering of Critical Infrastructure

3. 0.5 credit in: 0.5

a) for students without a B.Eng. in Civil Engineering (or equivalent):

IPIS 5103 [0.5]	Infrastructure Engineering Principles
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b) for students with a B.Eng. in Civil Engineering (or equivalent):

0.5 additional credit from electives in Item 2 above

Total Credits 3.0

Co-op Option

Full-time M.IPIS and M.Eng. IPIS students who have completed a minimum of three classes in each of their first two terms, including 1.5 credits in core compulsory courses, and IPIS 5002 or IPIS 5003 as required, may select a co-op option to start in their third term. Registration in subsequent co-op terms will require the successful completion of all core program requirements.

IPIS 5913 [0.0] Co-operative Work Term is in addition to the 5.0 credits required for the IPIS program - Two (2) co-op terms must be successfully completed before the student is eligible to receive a co-op designation on their academic transcript. For details on requirements and regulations, please see section 14.0 (Co-operative Education Policy) of the Graduate Calendar.

Admission Requirements

Proficiency in English is necessary to pursue graduate studies at Carleton University. All applicants whose first language is not English must satisfy this requirement as per the General Regulations.

M. Infrastructure Protection and International Security

The minimum requirement for admission into the M. I.P.I.S. is a B.A. Honours degree in a discipline related to International Affairs or a Bachelor's degree in Science or Engineering. Students will normally be expected to have a B+ average (or higher) to be considered for admission.

Students without a background in engineering or science will be required to complete IPIS 5003 [0.0] Mathematics and Engineering Primer for non-Engineers, which will be in addition to the regular degree requirements and is to be completed in the first fall term in which the student is registered. IPIS 5003 is a prerequisite for the required

course in Infrastructure Engineering Principles, and for other engineering electives.

M. Eng. Infrastructure Protection and International Security

The minimum requirement for admission into the M.Eng. I.P.I.S. is a B.Eng. degree or equivalent. Students will normally be expected to have a B+ average (or higher) to be considered for admission.

Students without a background in the social sciences or policy work in the Canadian context will be required to complete IPIS 5002 [0.0] Policy Primer, which will be in addition to the regular degree requirements and is to be completed in the first fall term in which the student is registered.

Accelerated Pathway

The accelerated pathway to the Master of Infrastructure Protection and International Security and the Master of Engineering in Infrastructure Protection and International Security is a flexible and individualized plan of graduate study for students in their final year of a Carleton undergraduate degree in a related discipline.

Students in their third year of study in their undergraduate program who are interested in the accelerated pathway should consult with the Director and Associate Director in the I.P.I.S. Program to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses and Honours project/thesis supervisor for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. IPIS courses at the 5000-level with a grade of B+ or higher
2. Minimum overall CGPA of A-

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Infrastructure Protection and International Security (IPIS) Courses

IPIS 5002 [0.0 credit]

Policy Primer

Designed to provide MIPIS, MENG IPIS and Graduate Diploma in IPIS students with analytical, writing, and argument formulating strategies to apply in other courses during their studies. Includes review of policy making, government departments, writing for government, and proper citation strategies.

IPIS 5003 [0.0 credit]

Mathematics and Engineering Primer for non-Engineers

Review and application of basic mathematics, physics and engineering principles required to prepare non-engineers and other students without a previous background in mathematics for the required course in Infrastructure Engineering Principles and other engineering courses. Precludes additional credit for IPIS 5001.

IPIS 5101 [0.5 credit]

Critical Infrastructure Protection: Issues and Strategies

Examines critical infrastructure, its interdependencies, vulnerabilities, and security requirements; intentional and natural risks; policy responses to threat and vulnerability assessments; risk management approaches, prevention and protective security, emergency management and damage mitigation measures; continuity of critical operations and resilience planning.

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5103 [0.5 credit]

Infrastructure Engineering Principles

Introduction to infrastructure engineering: civil, municipal/environmental, energy, communications, and military infrastructure systems; engineering principles; design, analysis and construction techniques; lifecycle performance, maintenance and retrofit strategies; optimization, asset-management; decision-making and decision support tools.

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5104 [0.5 credit]

Terrorism and International Security

Contemporary international terrorism in comparative perspective; religious and ideological parameters motivating terrorism; sociology of recruitment and participation; evolving structure and dynamics of terror networks; terrorism finance, operations and related activities; impact of counter-terrorism measures; examples are drawn from international and domestic terrorism. Also listed as INAF 5244.

IPIS 5105 [0.5 credit]

Critical Infrastructure Risk Assessment

Risk-assessment techniques and methodologies relevant for the identification of threats. Assessment of vulnerabilities and evaluating the impact on infrastructures or systems considering the probability of such threats being realized.

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5106 [0.5 credit]**Management of Critical Infrastructure**

Management of critical infrastructure (CI) and its relationship to facility and asset management; asset maintenance, rehabilitation, and restoration; tools, systems and approaches to effective CI management, integration and linkages across CI and consequent challenges to managers of critical infrastructure systems. Precludes additional credit for CIVE 5809 (2005-2007), CIVE 5404 and IPIS 5102 (2010-2014).

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5301 [0.5 credit]**Disarmament, Arms Control and Nonproliferation**

Origins, theory and practice, with a focus on so-called weapons of mass destruction and current controversies. Emphasis on treaty negotiation and implementation, including monitoring, verification, facilitation and enforcement of compliance.

Also listed as INAF 5201.

IPIS 5302 [0.5 credit]**Contemporary International Security**

The evolving strategic and security environment since the end of the Cold War, encompassing both traditional and non-traditional concepts. Topics include hegemonism; the rise of new powers; terrorism; multilateralism; human security; and new security threats, including climate change.

Also listed as INAF 5202.

IPIS 5303 [0.5 credit]**Intelligence Statecraft and International Affairs**

The role of intelligence in foreign and security policy after the Cold War. Evolution of intelligence as regards strategic and policy requirements, the capabilities of selected services, interactions within government and civil society. Emphasis on the structure and functions of Canada's intelligence community.

Also listed as INAF 5204.

IPIS 5304 [0.5 credit]**Intelligence and National Security: Policies and Operations**

The roles and activities of intelligence services of selected countries. Their performance will be assessed in the light of historical experience, and in the context of the policy, legal and ethical constraints.

Also listed as INAF 5224.

IPIS 5305 [0.5 credit]**National Security Policy and Law**

The international legal and policy implications of identifying and responding to national security threats. Topics include: intelligence gathering; verification regimes; military and counter-terrorism operations; criminal prosecution; and, balancing human rights and security concerns.

Also listed as INAF 5234.

IPIS 5306 [0.5 credit]**Emergency and Business Continuity Management**

The disciplines of emergency management and business continuity, their interaction, and how they provide complementary contributions to critical infrastructure protection and resilience. A focus on Canada and Canadian Standards is supplemented by consideration of broader international approaches and contexts.

Precludes additional credit for IPIS 5320 taken before Winter 2021.

Prerequisite(s): Registration in the M.IPIS or M.Eng(IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5320 [0.5 credit]**Topics in Infrastructure Security Policy**

Courses in special topics related to infrastructure security, not covered by other graduate courses; course topics will be available prior to registration.

IPIS 5501 [0.5 credit]**Transportation and Aviation Security**

Canadian Public Security Strategy and Transportation System security environment; Civil Aviation security and operations: trends, impacts, and implications of evolving policies, operations, and technologies; security vulnerabilities in the transportation system; transportation of hazardous materials; secure movements on roads, highways and railways.

IPIS 5504 [0.5 credit]**Fundamentals of Fire Safety**

The fire safety system; social, economic and environmental issues; description of the fire safety regulatory system and the governing building codes and standards. This includes the global fire safety system in a facility and active fire protection systems; detection, suppression, smoke management.

Precludes additional credit for CIVE 5707 (2001-2003), CIVE 5609.

IPIS 5505 [0.5 credit]**Natural Hazards in Canada: Risk and Impact**

Earthquakes and ground motion, tsunamis, landslides, liquefaction; soil properties for ground response analysis: laboratory tests, in-situ tests; dams and embankments, slope stability, seismic effects on slope stability, retaining structures.

Also listed as EARTH 5215.

IPIS 5507 [0.5 credit]**Blast-load Effects on Structures**

Threats, risk analysis, vulnerability assessment; explosives: types and mechanisms; load determination; response of structural elements under blast loads, analysis and design for blast loads; blast mitigation, retrofit of structures; post-event assessment.

Also listed as CIVE 5507.

Precludes additional credit for CIVE 5707 (2007-2008).

IPIS 5508 [0.5 credit]**Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components**

Properties and effects of explosives, propellants and pyrotechnics, detonation, deflagration and consequence of confinement, commercial and military applications including areas of terrorism and entertainment, sensitivities and hazards in transport, storage and use, specialized charges, explosion effects and indicators, and bombings and accident investigations. Precludes additional credit for IPIS 5520.

IPIS 5509 [0.5 credit]**Introduction to Cybersecurity**

Introductory cyber security principles with an emphasis on critical infrastructure protection. Basic concepts in computer networking, including: local and remote access, cloud computing, vulnerability identification and threat assessment, attack methodologies and exposed access points, access control and authentication.

Precludes additional credit for IPIS 5520 taken before January 2021.

Prerequisite(s): Registration in the M.IPIS or M.Eng(IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5520 [0.5 credit]**Selected Topics in Engineering of Critical Infrastructure**

Courses in special topics related to infrastructure security, not covered by other graduate courses; course topics will be available prior to registration.

IPIS 5901 [0.5 credit]**Tutorials in Infra Protection and Intl Security**

To be selected in consultation with Director and/or Associate Director.

IPIS 5907 [1.0 credit]**Research Project**

Students may be given permission to undertake an approved research project that will conduct a study, analysis or design project that relates to the protection and security of infrastructure under the general supervision of an engineer approved by the MIPIS Director or Graduate Supervisor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the MIPIS Program Director or Graduate Supervisor.

IPIS 5908 [1.0 credit]**Research Paper**

Students may be given permission to conduct independent research under the general guidance of a research supervisor, examining an approved policy-relevant topic that integrates the infrastructure, engineering and security elements of their program of study.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the MIPIS Program Director or Graduate Supervisor.

IPIS 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): Full-time M. IPIS or M. Eng IPIS students who have completed a minimum of three classes (1.5 credits) in each of their first two terms, including 1.5 credits in core compulsory courses, and IPIS 5002 or IPIS 5003 as required are eligible for registration in their third term. Eligibility for registration in subsequent co-op terms requires the successful completion of all core program requirements.

International Affairs

This section presents the requirements for programs in:

- M.A. International Affairs
- M.A. International Affairs with Specialization in African Studies
- M.A. International Affairs with Specialization in Data Science
- M.A. International Affairs with Specialization in Latin American and Caribbean Studies
- Ph.D. International Affairs

Program Requirements**M.A. International Affairs (5.0 credits)****Full-time program requirements**

Students admitted to the full-time program must complete all of the degree requirements within two calendar years or six terms of full-time study. Students admitted into the full-time program are expected to continue to register as full-time students until completion of their program. The program may be completed within one calendar year, though it normally takes at least four terms of full-time study.

A minimum of 1.5 credits must normally be completed in each of the first two terms of full-time study, including the mandatory program courses.

All courses used for credit in the degree must be approved in advance by the M.A. Program Supervisor.

Requirements - Thesis pattern (5.0 credits)

1. 1.5 credits in:		1.5
INAF 5015 [0.5]	Research Design and Methods for International Affairs	
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
2. 0.5 credit in	economics, successfully completed by the	0.5
	end of the second term, from (See Note 1, below):	
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5308 [0.5]	International Trade: Theory and Policy	

INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
3. 1.0 credit in	Field and Elective courses (See Note 2, below)	1.0
4. 2.0 credits in:		2.0
INAF 5909 [2.0]	M.A. Thesis	
5. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		5.0

Requirements - Research Essay pattern (5.0 credits)

1. 1.5 credit in:		1.5
INAF 5015 [0.5]	Research Design and Methods for International Affairs	
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
2. 0.5 credit in	economics, successfully completed by the end of the second term, from (See Note 1, below):	0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
3. 2.0 credits in	Field and Elective courses (See Notes 1 and 2, below)	2.0
4. 1.0 credit in:		1.0
INAF 5908 [1.0]	Research Essay	
5. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		5.0

Requirements - Coursework pattern (5.0 credits)

1. 1.0 credit in:		1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
2. 0.5 credit in	economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5308 [0.5]	International Trade: Theory and Policy	

INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
3. 3.5 credits of	Field and Elective courses (See Notes 1 and 2, below)	3.5
4. Successful completion of	second language proficiency examination (see Note 3, below)	
Total Credits		5.0

Notes:

- All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed in order to receive the field designation.
- If students choose to complete by Research Essay or Thesis, 0.5 credit will be applied towards the field designation. For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
- Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies.

Fields

NPSIA's M.A. program is organized around eight fields. Each field has at least one designated economics course and a set of designated field courses. Each student is admitted into a field and receives priority in the required economics course and in any three of the non-shared designated field courses. Students who complete the required economics course and three designated field courses may receive a field concentration designation on their academic transcript and diploma. Students who choose not to complete the requirements of any given field may still graduate with a general M.A. in International Affairs without a field designation. Courses marked with an asterisk (*) are shared courses with limited enrolment; students in the field may claim such courses towards their field concentration but do not have priority for the limited space in those courses.

Students who already have a graduate or senior undergraduate economics course that is deemed to be the equivalent of the required economics course for their field must take another economics course from the School. Students with economics courses similar to those offered by the school must see the M.A. Program Supervisor to determine which economics course they should be taking.

The fields are:

International Economic Policy

Provides a foundation in basic international economic theory and examines policy questions and applications to institutional arrangements in areas of trade, foreign direct investment, finance, international economic law, and other international economic relations.

Note: students admitted in the IEP field will be exempt from taking one or both of the field-required economics courses (INAF 5308 and INAF 5309) if they have previously completed an equivalent one. They will receive advanced standing without transfer of credits for those courses and will replace them with alternative economics courses from NPSIA or another department (fourth year and up), selected with the approval of the M.A. Program Supervisor on the basis of their relevance to the chosen program of study.

Required economics courses: INAF 5308 and INAF 5309 or equivalent.

Designated Courses:

INAF 5101 [0.5]	The Politics and Institutions of International Trade
INAF 5300 [0.5]	Foreign Direct Investment: Theory and Policy
INAF 5306 [0.5]	Trade Policy in North America
INAF 5400 [0.5]	Trade Policy Analysis
INAF 5401 [0.5]	International Financial Institutions and Policy
INAF 5459 [0.5]	Selected Topics in International Economic Policy
INAF 5500 [0.5]	Comparative Trade Policy
INAF 5501 [0.5]	Global Political Economy
INAF 5502 [0.5]	State Sovereignty and Globalization
INAF 5507 [0.5]	International Economic Law: Regulation of Trade and Investment
INAF 5711 [0.5]	International Labour Migration

Conflict Analysis and Conflict Resolution

Examines causes and dynamics of interstate and intrastate peace and conflict, explores theoretical and practical dimensions of the prevention, management and resolution of international and civil wars, disputes and crises.

Required economics course: INAF 5205

Designated Courses:

INAF 5108 [0.5]	Conflict Analysis
INAF 5109 [0.5]	Conflict Management: Theory and Evidence
INAF 5200 [0.5]	Peacebuilding and Reconstruction: Theory and Practice
INAF 5202 [0.5]	Contemporary International Security
INAF 5203 [0.5]	International Mediation and Conflict Resolution
INAF 5209 [0.5]	Conflict and Development
INAF 5218 [0.5]	Post-Conflict Justice: Theory and Practice
INAF 5219 [0.5]	Rights, Development, and Conflict *

INAF 5449 [0.5]	Selected Topics in Conflict Analysis and Resolution
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INAF 5506 [0.5]	International Law: Use of Force *
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Security and Defence Policy

Examines the core theories, concepts, challenges and controversies in security and defence studies in the context of applied policy issues such as national security, defence policy, civil-military relations, foreign policy, and proliferation of weapons.

Required economics course: INAF 5214 or INAF 5205.

Designated Courses:

INAF 5201 [0.5]	Disarmament, Arms Control and Nonproliferation *	0.5
INAF 5202 [0.5]	Contemporary International Security	0.5
INAF 5206 [0.5]	Civil-Military Relations	0.5
INAF 5208 [0.5]	U.S. Foreign and Security Policy	0.5
INAF 5210 [0.5]	Technology and War	0.5
INAF 5211 [0.5]	Comparative Defence Policy	0.5
INAF 5212 [0.5]	Issues in War and Defence Studies	0.5
INAF 5234 [0.5]	National Security Policy and Law	0.5
INAF 5254 [0.5]	Capstone in Canadian Security Policy	0.5
INAF 5439 [0.5]	Selected Topics in Security and Defence Policy	0.5
INAF 5506 [0.5]	International Law: Use of Force	0.5

Intelligence and International Affairs

Examines the function, limits and impact of intelligence collection and analysis in foreign and international security policy, using both theoretical and practical approaches.

Required economics course: INAF 5214

Designated Courses:

INAF 5201 [0.5]	Disarmament, Arms Control and Nonproliferation *	0.5
INAF 5204 [0.5]	Intelligence and International Affairs	0.5
INAF 5220 [0.5]	Intelligence Analysis	0.5
INAF 5223 [0.5]	Counterterrorism	0.5
INAF 5224 [0.5]	Intelligence and National Security	0.5
INAF 5225 [0.5]	Cybersecurity in Canada	0.5
INAF 5226 [0.5]	Cyber Warfare	0.5
INAF 5234 [0.5]	National Security Policy and Law *	0.5
INAF 5244 [0.5]	Terrorism and International Security	0.5
INAF 5254 [0.5]	Capstone in Canadian Security Policy	0.5
INAF 5301 [0.5]	Strategic Foresight in International Security	0.5
INAF 5469 [0.5]	Selected Topics in Intelligence and International Affairs	0.5

International Organizations and Global Public Policy

Examines the role of states and other policy actors in addressing global policy problems. Global governance for policy problems encompasses international law, the formal UN system of international organizations as well as more ad hoc approaches with a greater role for nonstate actors. Specific policy issues analyzed include the environment and public health.

Required economics course: INAF 5703.

Designated Courses:

INAF 5101 [0.5]	The Politics and Institutions of International Trade
INAF 5401 [0.5]	International Financial Institutions and Policy*
INAF 5410 [0.5]	Global Public Policy
INAF 5405 [0.5]	International Organizations in International Affairs
INAF 5411 [0.5]	Internet Governance
INAF 5479 [0.5]	Selected Topics in International Organizations and Global Public Policy
INAF 5502 [0.5]	State Sovereignty and Globalization
INAF 5504 [0.5]	Advanced International Law: Principles and Practice
INAF 5612 [0.5]	International Development Institutions*
INAF 5701 [0.5]	Global Environmental Change: Human Implications
INAF 5702 [0.5]	International Environmental Affairs
INAF 5705 [0.5]	Global Social Policy
INAF 5706 [0.5]	Global Health Policy

International Development Policy

Examines the difficulties faced by poor and developing countries and the policy responses that have emerged at the international level, including development assistance, international institutions and regional cooperation.

Required economics course: INAF 5009 or equivalent.

Designated Courses:

INAF 5002 [0.5]	International Development Policy
INAF 5006 [0.5]	Food Security and Rural Development
INAF 5007 [0.5]	Theories of Development and Underdevelopment
INAF 5209 [0.5]	Conflict and Development*
INAF 5489 [0.5]	Selected Topics in International Development Policy
INAF 5601 [0.5]	Social Theory and International Development*
INAF 5602 [0.5]	Development Assistance: Theory and Practice*
INAF 5603 [0.5]	Issues in Development in Africa
INAF 5604 [0.5]	Issues in Development in Latin America
INAF 5609 [0.5]	Development Project Evaluation and Analysis*
INAF 5610 [0.5]	Fragile States: Theory and Policy*
INAF 5612 [0.5]	International Development Institutions
INAF 5801 [0.5]	Regional Cooperation Among Developing Countries

Health, Displacement and Humanitarian Policy

Examines global health challenges and humanitarian crises, including refugees and displacement, analyses how these issues impact socio-economic development and security, and assesses international responses.

Required economics course: INAF 5600 or equivalent.

Designated courses:

INAF 5003 [0.5]	Project Operations in a Developing Country Context
INAF 5203 [0.5]	International Mediation and Conflict Resolution*
INAF 5219 [0.5]	Rights, Development, and Conflict
INAF 5408 [0.5]	Gender in International Affairs
INAF 5499 [0.5]	Selected Topics in Health, Displacement and Humanitarian Policy
INAF 5602 [0.5]	Development Assistance: Theory and Practice*
INAF 5609 [0.5]	Development Project Evaluation and Analysis
INAF 5610 [0.5]	Fragile States: Theory and Policy
INAF 5704 [0.5]	Human Security: From Policy to Practice
INAF 5706 [0.5]	Global Health Policy
INAF 5707 [0.5]	Complex Humanitarian Emergencies
INAF 5708 [0.5]	Humanitarian Assistance: Policies and Issues
INAF 5710 [0.5]	Global Governance of Displacement

Diplomacy and Foreign Policy

Examines the theory, legal framework and practice of diplomacy and foreign policy, and analyzes the statecraft of Canada and major world powers, as well as regional inter-state relations.

Required economics course: INAF 5009, INAF 5308, INAF 5309, or INAF 5703 or equivalent.

INAF 5100 [0.5]	Canada in International Affairs	0.5
INAF 5102 [0.5]	Canada-U.S. Relations	0.5
INAF 5203 [0.5]	International Mediation and Conflict Resolution	0.5
INAF 5207 [0.5]	Middle East Economic and Political Relations	0.5
INAF 5208 [0.5]	U.S. Foreign and Security Policy	0.5
INAF 5305 [0.5]	International Bargaining and Negotiation: Theory and Practice	0.5
INAF 5403 [0.5]	Diplomacy and Foreign Policy: Theory and Practice	0.5
INAF 5405 [0.5]	International Organizations in International Affairs	0.5
INAF 5429 [0.5]	Selected Topics in Diplomacy and Foreign Policy	0.5
INAF 5510 [0.5]	Law and Diplomacy	0.5
INAF 5605 [0.5]	The Ethical Dimension of International Affairs	0.5
INAF 5709 [0.5]	Human Rights: International Politics and Policies	0.5
INAF 5800 [0.5]	Asia Pacific Economic and Political Relations	0.5
INAF 5801 [0.5]	Regional Cooperation Among Developing Countries	0.5
INAF 5804 [0.5]	International Relations in Europe	0.5
INAF 5805 [0.5]	The EU in International Affairs	0.5

Students that are admitted into the MA International Affairs program, with the approval of the NPSIA Admissions Committee, may receive advanced standing with transfer

of credit of up to 1.0 credit in INAF courses at the 5000-level with a grade of B+ or higher, which can reduce their time to completion. Please note: INAF courses eligible for advanced standing cannot include the core requirements of the NPSIA M.A. program.

M.A. International Affairs with Specialization in African Studies (5.0 credits)

Requirements - Thesis Pattern (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
2. 1.5 credit in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from (See Note 1, below):	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
4. 2.0 credits in:	2.0
INAF 5909 [2.0] M.A. Thesis (in the specialization)	
5. 0.5 credit in Field and Elective courses (see Note 2, below)	0.5
6. Successful completion of second language proficiency examination (See Note 3, below)	
Total Credits	5.0

Requirements - Research Essay Pattern (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
2. 1.5 credit in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5

INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
4. 1.0 credit in:		1.0
INAF 5908 [1.0]	Research Essay (in the specialization)	
5. 1.5 credits in Field and Elective courses (See Note 2, below)		1.5
6. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		5.0
Requirements - Course Work Pattern (5.0 credits)		
1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
2. 1.0 credit in:		1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
3. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)		0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
4. 1.0 credit in courses accepted by the Institute of African Studies Graduate Coordinator as having sufficient African content and accepted by the NPSIA M.A. Program Supervisor or Associate Director as being relevant to the student's program of study. These courses would normally be drawn from the social science courses listed under the collaborative program. In years that it is offered, It is strongly suggested that NPSIA students include INAF 5603.		1.0
5. 2.0 credits in Field and Elective courses (See Note 2, below)		2.0
6. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		5.0

1. All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed.
2. For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
3. Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. Details of the language requirement are provided on the School website.

M.A. International Affairs with Specialization in Data Science (5.0 credits)

Requirements - Thesis pathway:

1. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
2. 1.0 credit in:	1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process
INAF 5018 [0.25]	Law and International Affairs
3. 0.5 credit in Economics, successfully completed by the end of the second term from: (see Note 1, below)	0.5
INAF 5009 [0.5]	International Aspects of Economic Development
INAF 5205 [0.5]	Economics of Conflict
INAF 5214 [0.5]	Economics for Defence and Security
INAF 5308 [0.5]	International Trade: Theory and Policy
INAF 5309 [0.5]	International Finance: Theory and Policy
INAF 5600 [0.5]	The Economics of Human Development
INAF 5703 [0.5]	International Public Economics
4. 2.0 credits in:	2.0
INAF 5909 [2.0]	M.A. Thesis (in the specialization)
5. 1.0 credit in Field or Elective courses	1.0
6. Successful completion of second language proficiency examination (See Note 4, below)	
Total Credits	5.0

Requirements - Research essay pathway:

1. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
2. 1.0 credit in:	1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process

INAF 5018 [0.25]	Law and International Affairs	
3. 0.5 credit in Economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5	
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
4. 1.0 credit in:	1.0	
INAF 5908 [1.0]	Research Essay (in the specialization)	
5. 2.0 credits in Field or Elective Courses (See Note 3, below)	2.0	
6. Successful completion of second language proficiency examination (See Note 4, below)		

Total Credits **5.0**

Requirements - Coursework pathway:

1. 0.5 credit in:	0.5
DATA 5000 [0.5]	Data Science Seminar
2. 1.0 credit in:	1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process
INAF 5018 [0.25]	Law and International Affairs
3. 0.5 credit in specialization: (see Note 1, below)	0.5
INAF 5904 [0.5]	Quantitative Research Methods
INAF 6002 [0.5]	Quantitative Research Methods
4. 0.5 credit in Economics, successfully completed by the end of the second term, from: (see Note 2, below)	0.5
INAF 5009 [0.5]	International Aspects of Economic Development
INAF 5205 [0.5]	Economics of Conflict
INAF 5214 [0.5]	Economics for Defence and Security
INAF 5308 [0.5]	International Trade: Theory and Policy
INAF 5309 [0.5]	International Finance: Theory and Policy
INAF 5600 [0.5]	The Economics of Human Development
INAF 5703 [0.5]	International Public Economics
5. 2.5 credits in Field or Elective courses (See Note 3, below)	2.5
6. Successful completion of second language proficiency examination (see Note 4, below)	

Total Credits **5.0**

Notes:

1. The course must include at least one major assignment with a significant data science component. The selected course must be approved by the School and Institute for Data Science. An accepted data

science specialization course from outside the School can be used for this requirement with approval.

2. All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed.
3. For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
4. Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. Details of the language requirement are provided on the School website.

M.A. International Affairs with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.5 credits in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
4. 0.5 credit in ECON, successfully completed by the end of the second term, from (See Note 1, below):	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5205 [0.5] Economics of Conflict	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
5. 2.0 credits in:	2.0

INAF 5909 [2.0] M.A. Thesis (M.A. Thesis on an approved topic with significant content related to Latin American and Caribbean Studies, and under the supervision or co-supervision of a faculty member approved by the Graduate Supervisor of the LACS program.)	
6. 0.5 credit in: Field and Elective courses (see Note 2, below)	0.5
7. Successful completion of second language proficiency examination (See Note 3, below)	
Total Credits	5.0

Requirements - Research Essay pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.5 credits in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	
INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	
4. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5] International Aspects of Economic Development	
INAF 5214 [0.5] Economics for Defence and Security	
INAF 5205 [0.5] Economics of Conflict	
INAF 5308 [0.5] International Trade: Theory and Policy	
INAF 5309 [0.5] International Finance: Theory and Policy	
INAF 5600 [0.5] The Economics of Human Development	
INAF 5703 [0.5] International Public Economics	
5. 1.0 credit in:	1.0
INAF 5908 [1.0] Research Essay (on an approved topic with significant content related to Latin American and Caribbean Studies, and under the supervision or co-supervision of a faculty member approved by the Graduate Supervisor of the LACS program.)	
6. 1.5 credits in: Field and Elective courses (See Note 2, below)	1.5
7. Successful completion of second language proficiency examination (see Note 3, below)	
Total Credits	5.0

Requirements - Coursework pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	

2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
4. 0.5 credit in	economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
5. 1.0 credit in	courses accepted by the Latin American and Caribbean Studies Program Graduate Coordinator as having sufficient regional content and accepted by the NPSIA M.A. Program Supervisor or Associate Director as being relevant to the student's program of study.	1.0
6. 2.0 credits in	Field and Elective courses (See Note 2, below)	2.0
7. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		5.0

Notes:

1. All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed.
2. For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
3. Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. There is an administrative fee for the standard test (which leads to a certificate of language proficiency after successful completion). Details of the language requirement are provided on the School website.

Ph.D. International Affairs (5.0 credits)

Requirements:

1. 1.5 credits in:		1.5
INAF 6001 [0.5]	Qualitative Research Methods	
INAF 6002 [0.5]	Quantitative Research Methods	
INAF 6003 [0.5]	Advanced International Policy Analysis	
2. 0.5 credit in	required INAF economics course for the declared field listed below (see Note, below)	0.5
3. 1.5 credits in	courses in the declared field	1.5
4. 0.0 credit in:		
INAF 6800 [0.0]	Doctoral Field Comprehensive Seminar	
5. 0.5 credit from	Doctoral Field Examination in the declared field:	0.5
INAF 6100 [0.5]	Doctoral Field Examination in Conflict Management and Resolution	
INAF 6200 [0.5]	Doctoral Field Examination in International Development Policy	
INAF 6300 [0.5]	Doctoral Field Examination in International Economic Policy	
INAF 6400 [0.5]	Doctoral Field Examination in Security, Intelligence and Defence (SID)	
6. Language requirement (see details below)		
7. 1.0 credit in:	doctoral research seminar and public defence of the doctoral research prospectus	1.0
INAF 6906 [0.5]	Doctoral Research Prospectus Seminar	
INAF 6907 [0.5]	Doctoral Research Prospectus Defence	
8. 0.0 credits in:		0.0
INAF 6909 [0.0]	Doctoral Research Thesis	
Total Credits		5.0

Note: students without strong economics training may be required to complete additional INAF economics courses.

Language Requirement

Doctoral students must successfully complete an examination in a second language administered by the School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. Students are expected to complete this requirement or demonstrate significant progress by the end of their second year.

Completion Timeline

Ph.D. students must be registered full time for the duration of their program. Students are expected to successfully complete the field comprehensive examination (0.5 credit) by the end of the first year, the required 4.0 credits of coursework by the end of their second year, and defend their research prospectus (0.5 credit) no later than the end of the third year.

A student whose performance on the field comprehensive examination is not deemed satisfactory will be allowed to repeat the examination once, and the second attempt must take place no later than the next academic term. A student whose research prospectus defense is not

deemed satisfactory will be required to repeat the research prospectus defense in the next academic term, and no later than the end of the Fall term of the fourth year. Students who have not successfully completed the comprehensive examination and/or prospectus defence within the specified time will be subject to removal from the program.

Students may only register in INAF 6909 following successful defense of the research prospectus, are expected to demonstrate evidence of research progress annually, and will be required to present their work at the NPSIA Research Seminar Series or show equivalent research activity.

Regulations

See the General Regulations section of this Calendar.

A grade of B- or better must be obtained in each credit counted towards the master's degree. The School does not permit exceptions to this rule.

Students will be required to withdraw from the program if their grade point average falls below 7.0 (B-), or if they receive a grade of less than B- in any two courses that are eligible to be counted toward the Master's degree.

Part-time program requirements

In some cases, an applicant with relevant full-time employment experience may be admitted to a part-time M.A. program. While the program requirements are the same as those for full-time students, part-time students may take up to six calendar years from the date of initial registration to complete the program.

Part-time students must register for a minimum of one term in three, and must successfully complete INAF 5016, INAF 5017, and INAF 5018 within their first 2.5 program credits. In addition, the economics course requirement must be included in the first 2.5 credits completed.

Students enrolled in the full-time master's program may transfer to the part-time program only under exceptional circumstances as approved by the faculty of Graduate and Postdoctoral Studies.

Regulations

See the General Regulations section of this Calendar.

To complete the doctoral program, students must obtain a grade of B- or higher in each course credit, and Satisfactory in the comprehensive examination, the research prospectus defence, and the Ph.D. dissertation and its oral defence.

M.A. International Affairs/J.D.

A student will complete both the M.A. and the JD programs over four calendar years.

Students will be expected to fulfil the normal requirements of both the M.A. and JD programs.

Students must complete INAF 5509 in their second year of the program.

In addition, students in the combined program will be required to complete courses in international law to be specified by the Faculty of Law.

Of the 5.0 credits completed for the M.A. degree, up to 1.5 credits may be applied to the Juris Doctor degree.

In undertaking the M.A./J.D. research essay, students will be expected to integrate both components of the joint program into their work.

The normal sequence of courses for the two degrees is as follows:

First Year

Normal JD first year (required course work to include a 0.5-credit course in international law)

Second Year

Normal M.A. first year (as described in full-time M.A. program requirements) including completion of INAF 5509. Students who choose the coursework option must complete 4.0 credits by the end of their second year. Students who choose the research essay or thesis should consult the NPSIA M.A. program administrator for registration information.

Third and Fourth Year

Students are normally registered in at least 0.5 credit of an INAF course in each of the third and fourth years of their MA/JD program. Students who choose the research essay or thesis option are also required to register in INAF 5906 or INAF 5919. M.A./JD research essays and theses will have one supervisor from NPSIA and one supervisor from the Law School.

Internship Option

The Internship option is available to all first year, full-time students in the M.A. and the M.A.-JD programs. Registration in the Internship Program option requires departmental permission, and is limited by the availability of placements. Application for an internship placement will normally be considered after the student has successfully completed 1.5 credits, including INAF 5015 and INAF 5016.

Internship placements will locate students for one term in the public service, the private sector, or non-governmental organizations. During their work term, students are required to register in INAF 5914, which is additional to the program requirements described above. Registration in the Internship Program is restricted to full-time students.

Co-op Option

Details about co-op eligibility are provided on the School's website.

The 0.0 credit co-op is in addition to the 5.0 credits required for the M.A., and a minimum of two co-op terms must be successfully completed before the student is eligible to receive a co-op designation on their academic transcript. Students register in the co-op course INAF 5913 and are restricted from taking more than 0.5 credit at the same time.

Work terms are four months in duration, and typically students are employed at the junior officer level in government departments or other organizations. Information and procedures can be obtained from the Carleton University Co-op Office.

Admission

The minimum requirement for admission into the master's program is a B.A. (Honours) degree in a discipline related to international affairs.

Under current practice, at least a high honours standing (B+ minimum) is normally required to be considered for admission to the program.

Applicants may submit Graduate Record Examination (GRE) aptitude test scores; in some circumstances, students may be required to submit GRE scores.

The Faculty of Graduate and Postdoctoral Affairs requires applicants whose native tongue is not English to be tested for proficiency in English. NPSIA applicants must submit a CAEL Assessment™ score of a minimum of 70 or a TOEFL score of 250 computer-based or 600 regular 100 iBT (minimum score of 25 in each of reading, writing, speaking and listening).

Students admitted to the NPSIA M.A. program must have successfully completed a 1.0 credit (or the equivalent) course in introductory economics (introductory microeconomics and introductory macroeconomics for economics majors) before starting the program.

Students who have not completed one credit of introductory economics at the time of their application will have their admission into the program made conditional upon its successful completion prior to registration. In some cases where the student is deemed by the admissions committee to have an insufficient background in international affairs they may be required to complete up to two additional courses as part of their M.A. program. Students who are uncertain about whether they meet the background requirements are encouraged to contact the School of International Affairs.

Accelerated Pathway

The accelerated pathway to the Master of Arts degree at the Norman Paterson School of International Affairs (NPSIA) is a flexible and individualized plan of graduate study for students in their final year of a Carleton undergraduate degree in a related discipline such as the B.P.A.P.M. degree.

Students in the third year of study of their undergraduate program who are interested in the accelerated pathway should consult with the Associate Director (M.A. program) at NPSIA to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses and Honours project/thesis supervisor for their final year of undergraduate studies.

To be eligible to participate in the accelerated pathway, students must have a minimum overall CGPA of A- in undergraduate courses.

Admission

Admission into the Ph.D. program will be judged primarily on the applicant's ability to undertake research successfully, and his/her prospects for completion of the program. Admission to the Ph.D. program is governed by the requirements stated in the General Regulations section of this Calendar.

The normal requirement for admission to the doctoral program in International Affairs is a Master's degree in a social science with at least an A- average.

Relevant work experience is also considered. Students who lack sufficient background at the graduate level in international affairs will be required to take supplementary courses extra to the degree prior to admission.

Students with no formal training in economics must complete a 1.0 credit (or equivalent) course in introductory economics (introductory microeconomics and introductory macroeconomics for economics majors) plus at least 1.0 credit (or the equivalent) at the advanced, undergraduate (typically third or fourth year) or intermediate theory level to be considered for admission.

All applicants whose first language is not English will be required to obtain an overall score of 70 or over on the Canadian Academic English Language Assessment with a minimum score of 70 for the writing section or a TOEFL score of 250 computer-based, 100 iBT (minimum score of 25) in each of reading, writing, speaking and listening.

Transfer from the Master's to the Ph.D. Program

Students in the full-time M.A. program who demonstrate outstanding academic performance and research potential may, with permission of the Ph.D. Associate Director, be admitted to the Ph.D. program after two terms of registration.

Students considering this option will be advised, when selecting courses for their M.A. program, to choose those courses at the master's level which are open to doctoral students and which may assist them in the doctoral comprehensive examinations.

International Affairs (INAF) Courses

INAF 5002 [0.5 credit]

International Development Policy

Review of current political, social and economic issues in international development policy. Sample topics include international institutions and global governance, development assistance, economic liberalization, gender, the environment and natural resources, food security, crime and conflict.

INAF 5003 [0.5 credit]**Project Operations in a Developing Country Context**

Evolution, institutional framework and central policy issues of international development programming. Practical emphasis, with applications to project operations and planning, finance and funding, capital mobilization, administration, procurement, preventing fraud and corruption, monitoring, effectiveness measurement, and options for improving the planning and delivery of assistance.

INAF 5006 [0.5 credit]**Food Security and Rural Development**

How the agricultural sector affects rural development and food security. Topics include an examination of the global agricultural market, biofuels, structural change in agriculture and agrarian reform, agriculture and the environment, and public policies affecting agriculture and rural development.

INAF 5007 [0.5 credit]**Theories of Development and Underdevelopment**

A comparative analysis of approaches to the study of development processes and underdevelopment, including structural-functional, neo-classical, Marxist, and dependency theories.

Prerequisite(s): enrolment in the Development Administration stream of the M.A. program in the School of Public Policy and Administration, or permission of the School of International Affairs.

INAF 5008 [0.5 credit]**Economic Development Policy and Planning**

Developing country policies and planning and their impacts, including macro and sectoral techniques employed in development planning, budgeting, and problems in development administration.

Prerequisite(s): enrolment in the Development Administration stream of the M.A. program in the School of Public Policy and Administration, or permission of the School of International Affairs.

INAF 5009 [0.5 credit]**International Aspects of Economic Development**

Economic theory and policy dimensions of key issues in international economic development. Topics include: trade theory and policy for developing countries; debt, adjustment and macroeconomic stabilization; the role of international financial institutions; financial flows and the role of multinational corporations.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5015 [0.5 credit]**Research Design and Methods for International Affairs**

Key principles of social sciences research, basics of research design, and techniques of analysis. Emphasis on applications to international affairs and policy evaluation. Precludes additional credit for INAF 5001 (no longer offered) and INAF 5013 (no longer offered).

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School of International Affairs.

INAF 5016 [0.5 credit]**Statistical Analysis for International Affairs**

Applications of statistics to international policy issues, using statistical software to understand and present large sample empirical information. Topics include describing data, presenting data, comparing variables and hypothesis testing, and basic multiple linear regression.

Precludes additional credit for INAF 5001 (no longer offered) and INAF 5014 (no longer offered).

INAF 5017 [0.25 credit]**International Policymaking in Canada: Structure and Process**

Structure and policymaking processes of the Canadian government: the role of Parliament, the Prime Minister and Cabinet, central agencies, and departments involved in international and national security affairs; the application of theories of policymaking to international affairs.

Precludes additional credit for INAF 5011 (no longer offered).

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School of International Affairs.

INAF 5018 [0.25 credit]**Law and International Affairs**

Introduction to international law and its role in international affairs. International legal sources and subjects, state responsibility, succession, jurisdiction and immunities, dispute settlement, and domestic implementation.

Precludes additional credit for INAF 5012 (no longer offered).

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School of International Affairs.

INAF 5100 [0.5 credit]**Canada in International Affairs**

Canada's role in international affairs; issues of conflict and conflict resolution, international political economy, and international development. Analysis of the content and formulation of Canada's international policies.

INAF 5101 [0.5 credit]**The Politics and Institutions of International Trade**

Canadian trade practice; trade policy within the broader context of Canadian policy-making, comparison of Canadian policy and practice with that in the United States, Europe, Japan, and the major developing countries.

Precludes additional credit for INAF 5409 (taken prior to 1997-98).

INAF 5102 [0.5 credit]**Canada-U.S. Relations**

The relationship between Canada and the United States from political, economic, diplomatic, military, and cultural perspectives. The history of Canada's relations with the United States, as our neighbor, trading partner, ally, and sometime antagonist.

Precludes additional credit for INAF 5409, if taken 2003/04, 2004/05.

INAF 5108 [0.5 credit]**Conflict Analysis**

The causes of international and intrastate war and violent conflict, with a focus on preventable causes. Explores major theories, hypotheses, debates and historical controversies from a range of social science perspectives, with emphasis on the implications for diplomacy, foreign and military policy.

Precludes additional credit for INAF 5105 (taken prior to 2001).

INAF 5109 [0.5 credit]**Conflict Management: Theory and Evidence**

Evaluation of conflict management theory and practice in regional, interstate and intrastate conflict. Analyse the various dimensions of conflict management - including prevention, mitigation, and containment, as well as military engagement - and assess the efficacy of these approaches in contemporary case studies.

Includes: Experiential Learning Activity

INAF 5200 [0.5 credit]**Peacebuilding and Reconstruction: Theory and Practice**

Complexities and challenges of contemporary peacebuilding, reconstruction and reconciliation after violent conflict. Critical evaluation of post-war political, social, legal, and security arrangements and institutions for preventing violence and enhancing long-term peace and stability in war-torn societies.

Includes: Experiential Learning Activity

INAF 5201 [0.5 credit]**Disarmament, Arms Control and Nonproliferation**

Origins, theory and practice, with a focus on so-called weapons of mass destruction and current controversies. Emphasis on treaty negotiation and implementation, including monitoring, verification, facilitation and enforcement of compliance.

Also listed as IPIS 5301.

INAF 5202 [0.5 credit]**Contemporary International Security**

The evolving contemporary strategic and security environment, encompassing both traditional and non-traditional concepts. Topics include hegemony; the rise of new powers; terrorism; multilateralism; human security; and new security threats, including climate change.

Also listed as IPIS 5302.

INAF 5203 [0.5 credit]**International Mediation and Conflict Resolution**

Exploration of various approaches to the prevention, management and resolution of international conflict including peacekeeping, preventive diplomacy, mediation and peacebuilding, as well as less formal mechanisms for third party collaborative problem solving.

INAF 5204 [0.5 credit]**Intelligence and International Affairs**

Advanced introduction to the study of intelligence from an academic perspective, how it is conducted, its role and limits in democratic states. Topics include: the intelligence cycle; intelligence collection and analysis; intelligence and policy relationships; intelligence accountability and control; and international liaison and cooperation.

Also listed as IPIS 5303.

INAF 5205 [0.5 credit]**Economics of Conflict**

The economic dimensions of conflict and the application of economic methods to understanding conflict and conflict management.

Precludes additional credit for INAF 5409 [formerly 46.549R] (taken in 2002-03).

INAF 5206 [0.5 credit]**Civil-Military Relations**

Theoretical and practical issues of civil-military relations; analysis of the multidisciplinary and multidimensional nature of the relationship between society, political authority and the military, using comparative and global frames of reference.

Precludes additional credit for INAF 5409 sections R and S (taken 2002/03, 03/04).

INAF 5207 [0.5 credit]**Middle East Economic and Political Relations**

Economic and political relations among countries of the Middle East; emphasis on the peace process and arrangements for regional security and regional economic cooperation; prospects for regional collaboration.

INAF 5208 [0.5 credit]**U.S. Foreign and Security Policy**

Causes and consequences of U.S. foreign and security policy. Explanation and evaluation of past and present U.S. policies. Cases will be drawn from 20th century wars, interventions and crises; post-Cold War and post 9-11 U.S. policies.

Precludes additional credit for INAF 5409 section 'X' (taken 2001/02, 02/03).

INAF 5209 [0.5 credit]**Conflict and Development**

Examination of competing interpretations of conflict in developing countries; material conditions, institutional factors, and ideological, or identity-based framing processes. The impact of war on development, and implications for policy.

INAF 5210 [0.5 credit]**Technology and War**

The impact of technology on modern armed conflict, including the way states decide to use (or not use) force and debates over the ethics of war. Topics include: unmanned technologies, nuclear weapons, social media and technologies of peace.

INAF 5211 [0.5 credit]**Comparative Defence Policy**

Politics and processes shaping defence policies around the world. Topics include defence budgeting, recruitment and retention, gender and diversity in defence. Examines and assesses the roles played by armed forces, ministries/ departments of defence, political leadership and legislatures.

INAF 5212 [0.5 credit]**Issues in War and Defence Studies**

Contemporary issues and topics related to the conduct of warfare and defence policymaking. Topics include military strategy and conduct of operations, and challenges in defence policy such as procurement.

INAF 5214 [0.5 credit]**Economics for Defence and Security**

Examines the economic analysis of defence and security, applying economic analysis to topics such as defence production, procurement, offence and defence balance, alliance theory, deterrence, arms races, terrorism and terrorist financing.

INAF 5218 [0.5 credit]**Post-Conflict Justice: Theory and Practice**

Domestic and international responses to war crimes, wartime atrocities, and human rights abuses. Emphasis on theoretical and policy debates, and relationship of post-war trials, truth commissions, and other accountability measures to democratic development, rule of law, reconciliation, and violent conflict resolution and prevention.

Includes: Experiential Learning Activity

INAF 5219 [0.5 credit]**Rights, Development, and Conflict**

Uses economic institutionalism to examine the intersection of development and conflict, focusing on how the connection between property rights and development affects conflict. Topics include gender, land conflict, urban peripheries, migration and refugees, domestic and transnational crime, and state violence.

INAF 5220 [0.5 credit]**Intelligence Analysis**

Theoretical and empirical literature related to intelligence analysis including the role and challenges of intelligence analysis, politicization of intelligence, analytical mindsets and limits of intelligence analysis, current versus long-term intelligence, estimative analysis, Structured Analytical Techniques, intelligence analytical products, the intelligence to policymaker dimension.

INAF 5223 [0.5 credit]**Counterterrorism**

Theory and practice of counterterrorism based on contemporary and historical experience of Western democracies including the role of law enforcement, intelligence, military force, diplomacy, and civil society in counterterrorism and assessment of the legal, ethical, human rights and civil liberties implications of contemporary counterterrorism.

Includes: Experiential Learning Activity

INAF 5224 [0.5 credit]**Intelligence and National Security**

The function and purpose of intelligence and activities of intelligence agencies in relation to contemporary national security challenges faced by Western democratic states; role of intelligence in strategic and operational warning, decision-making, and the policy, legal and ethical dimensions of intelligence and national security.

Also listed as IPIS 5304.

INAF 5225 [0.5 credit]**Cybersecurity in Canada**

Social and technical issues arising from cybersecurity threats, and the public and private policy responses to threats. Cybersecurity in Canada, including the implications for Canada arising from cyber policy of other key countries as well.

INAF 5226 [0.5 credit]**Cyber Warfare**

Defines and examines the emerging issue of cyber conflict. Surveys existing techniques, policies, and legal tools for using, or defending against, cyberattacks during both peacetime and war.

INAF 5234 [0.5 credit]**National Security Policy and Law**

The international legal and policy implications of identifying and responding to national security threats. Topics include: intelligence gathering; verification regimes; military and counter-terrorism operations; criminal prosecution; and, balancing human rights and security concerns.

Also listed as IPIS 5305.

INAF 5244 [0.5 credit]**Terrorism and International Security**

Contemporary international terrorism in comparative perspective, including religious and ideological motivations, recruitment and participation, evolving structures and dynamics of terror networks, financing and operations, and counter-terrorism measures. Examples are drawn from international and domestic terrorism.

Also listed as IPIS 5104.

Precludes additional credit for INAF 5409 Section W in Winter 2008.

INAF 5254 [0.5 credit]**Capstone in Canadian Security Policy**

Students practice researching and writing reports in the area of national and cyber security policy. Students work in groups to explore a novel security consideration or puzzle in collaboration with a pre-selected government partner.

Includes: Experiential Learning Activity

INAF 5300 [0.5 credit]**Foreign Direct Investment: Theory and Policy**

Concepts, theories, evaluation and analysis of foreign direct investment (FDI) and policies affecting international investment. Effects of FDI on source and recipient countries; including FDI to and from emerging markets; and national and international policies affecting FDI.

Includes: Experiential Learning Activity

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs, or permission of the School of International Affairs.

INAF 5301 [0.5 credit]**Strategic Foresight in International Security**

Introduces students to the methods and approaches used to identify, explore, and assess emerging and future trends in international security. Students apply a variety of tools and techniques for thinking creatively about the future of terrorism, crime, cybersecurity, weaponry, warfare, and intelligence.

Includes: Experiential Learning Activity

INAF 5305 [0.5 credit]**International Bargaining and Negotiation: Theory and Practice**

An examination of bargaining and negotiation in international economic, political, and security issue areas, using case studies and theoretical analysis.

Includes: Experiential Learning Activity

INAF 5306 [0.5 credit]**Trade Policy in North America**

Canadian, American and Mexican trade and trade policy from colonial times to present, emphasizing the development of trade relations and the negotiation and operation of bilateral, regional (NAFTA), and multilateral trade agreements.

Includes: Experiential Learning Activity

Precludes additional credit for INAF 5409, section 'F' (taken in 2005/06).

INAF 5308 [0.5 credit]**International Trade: Theory and Policy**

The pure theory of international trade and selected policy issues. Topics include theories of the pattern of trade, the gains from trade, the theory of distortions and welfare, and theories of endogenous trade policy formation.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5309 [0.5 credit]**International Finance: Theory and Policy**

Theory and policy in open economy macroeconomics and international finance. Topics include: exchange rate and output determination, balance of payments adjustment, monetary and fiscal policy under different exchange rate regimes, and the structure and performance of the international monetary system.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5400 [0.5 credit]**Trade Policy Analysis**

Selected trade policy instruments and trade-related policy issues. Analytical approaches to tariffs, quotas, dumping and countervailing duties, global value chains and trade disputes.

Includes: Experiential Learning Activity

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs, or permission of the School of International Affairs.

INAF 5401 [0.5 credit]**International Financial Institutions and Policy**

Institutional arrangements, international financial flows, and critical events in international finance; development and operation of international financial institutions, and how they have shaped modern financial markets, events, and policy.

Includes: Experiential Learning Activity

Precludes additional credit for INAF 5409 (taken prior to 1997-98).

INAF 5402 [0.5 credit]**Territory and Territoriality**

Contemporary geographical and international relations theorizing is challenging conventional notions of boundaries and territories in the political organization of modernity. Using contemporary writings on geopolitics, security, sovereignty, self-determination and identity politics, this course investigates territoriality as a political and intellectual strategy.

Includes: Experiential Learning Activity

Also listed as GEOG 5400.

INAF 5403 [0.5 credit]**Diplomacy and Foreign Policy: Theory and Practice**

Introduces actors, institutions, and formats of modern diplomacy and foreign policy, and examines the changing global policy context. Focuses on practical skills development such as diplomatic briefing and negotiation.

Includes: Experiential Learning Activity

INAF 5405 [0.5 credit]**International Organizations in International Affairs**

Theory of international organizations, the history of their accelerated emergence since World War II and a critical analysis of the roles they play in international affairs, with an emphasis on the United Nations and its subsidiary, specialized and associated agencies, and regional and sub-regional organizations.

INAF 5407 [0.5 credit]**International Relations Theory**

Overview of theories of international relations. Organized both historically and conceptually, the course will examine a variety of theoretical approaches to international relations, among them the realist, liberal, structural, neo-realist, and critical perspectives.

INAF 5408 [0.5 credit]**Gender in International Affairs**

The role of gender differences in international affairs gender in the social sciences and feminist theories regarding war, nationalism, human rights, development, and the global economy.

Includes: Experiential Learning Activity

INAF 5409 [0.5 credit]**Selected Topics in International Affairs****INAF 5410 [0.5 credit]****Global Public Policy**

Public policy at the international level, including the roles of international institutions, states, non-governmental organizations and business in problem solving, policy making and governance. Examples of global policy problems include labour rights, public health, financial regulation, internet governance and environment.

INAF 5411 [0.5 credit]**Internet Governance**

Challenges of Internet governance at the national and global levels including trust, security and privacy; the expanding importance of the Internet to society and the economy; comparative and diffuse regulatory regimes, and challenges posed by the 'Dark Web' and the manipulation of content.

INAF 5419 [0.5 credit]**Selected Topics in International Affairs****INAF 5429 [0.5 credit]****Selected Topics in Diplomacy and Foreign Policy**

Selected Topics in Diplomacy and Foreign Policy. Topics may vary from year to year.

INAF 5439 [0.5 credit]**Selected Topics in Security and Defence Policy**

Selected Topics in Security and Defence Policy. Topic may vary from year to year.

INAF 5449 [0.5 credit]**Selected Topics in Conflict Analysis and Resolution****INAF 5459 [0.5 credit]****Selected Topics in International Economic Policy**

Includes: Experiential Learning Activity

INAF 5469 [0.5 credit]**Selected Topics in Intelligence and International Affairs**

Topic may vary from year to year.

INAF 5479 [0.5 credit]**Selected Topics in International Organizations and Global Public Policy****INAF 5489 [0.5 credit]****Selected Topics in International Development Policy****INAF 5499 [0.5 credit]****Selected Topics in Health, Displacement and Humanitarian Policy**

Selected Topics in Health, Displacement and Humanitarian Policy. Topics may vary from year to year.

INAF 5500 [0.5 credit]**Comparative Trade Policy**

Examination of trade policies of various states, and their associated institutional arrangement. Countries and country groupings to be examined include the United States, Japan, the European Union, and key developing countries.

INAF 5501 [0.5 credit]**Global Political Economy**

The interaction between states, interest groups, firms and markets, how the global nature of the world economy affects states, especially Canada, and the governance of economic issues at the international level including trade, investment, finance and development.

Precludes additional credit for INAF 5000 (taken prior to 2001).

INAF 5502 [0.5 credit]**State Sovereignty and Globalization**

How increased political, social and economic integration internationally affects a government's ability to formulate policy; examination of domestic and international policy issues and whether and how global forces and their domestic counterparts shape the policy-making environment.

Includes: Experiential Learning Activity

Precludes additional credit for INAF 5000 (taken prior to 2001).

INAF 5504 [0.5 credit]**Advanced International Law: Principles and Practice**

Critical assessment of international law in key areas of international affairs, including its development, content, application, and relationship to the behaviour and interests of various actors. Specific areas include human rights, self-determination, armed force, trade, criminal justice, and environmental law.

Prerequisite(s): INAF 5018 (may be taken concurrently) and M.A. standing in the Norman Paterson School of International Affairs, or permission of the School of International Affairs.

INAF 5505 [0.5 credit]**International Law: Theory and Practice**

Theoretical perspectives on international law and the role international law plays in the international system. Topics include basis, creation and sources of international law, international dispute resolution, and international law and world order transformation.

Also listed as LAWS 5603.

INAF 5506 [0.5 credit]**International Law: Use of Force**

Specialized international legal principles governing the use of armed force, and their theoretical and practical implications, with a view to understanding and critiquing their roles in limiting and justifying state recourse to armed force and regulating the conduct of resulting inter- and intra-state conflict.

Prerequisite(s): INAF 5018 (may be taken concurrently).

INAF 5507 [0.5 credit]**International Economic Law: Regulation of Trade and Investment**

Study of regulation of international economic relations. International institutions, legal aspects of integration, governmental regulation of trade and investment. Also listed as LAWS 5200.

Prerequisite(s): open only to graduate students in their master's year who have not previously studied international economic law.

INAF 5509 [0.5 credit]**Law, Politics, and Economics in International Affairs**

Linkages and differences between the disciplines of law, political science and economics as they relate to international affairs. How underlying assumptions of each discipline affect the way different issues in international affairs are considered.

Prerequisite(s): M.A./JD standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5510 [0.5 credit]**Law and Diplomacy**

International law as a tool of diplomacy and foreign policy, including international diplomatic law. Legal and practical considerations affecting treaty relationships, state recognition, dispute settlement, diplomatic relations (including inviolability, non-interference and asylum), consular activities and relations with international organizations.

Prerequisite(s): INAF 5018 (may be taken concurrently).

INAF 5600 [0.5 credit]**The Economics of Human Development**

The economic analysis and theory of the major areas of human development in developing countries. Topics include demography and population, education, health and nutrition, agriculture, women and development, the financial system and microfinance, the role of institutions.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5601 [0.5 credit]**Social Theory and International Development**

This seminar examines the theoretical foundations for understanding international development policy and practice. It provides a space for thinking about development as a normative ideal and about the possibility of generating alternative horizons.

INAF 5602 [0.5 credit]**Development Assistance: Theory and Practice**

Economic, moral, and political arguments for development assistance, aid effectiveness; the role of bilateral and multilateral donors; aid accounting, human development and human rights; NGOs and international assistance.

INAF 5603 [0.5 credit]**Issues in Development in Africa**

Analysis of structures and processes of political, social, and economic change in intertropical Africa at scales ranging from the intrahousehold and local community to the state and international system. Integration of gender and the environment into analyses which draw on theories of political economy.

INAF 5604 [0.5 credit]**Issues in Development in Latin America**

Principal development challenges, trends, and policies in the region since 1960, e.g. climate change, poverty, inequality, de-industrialization, urbanization, crime and violence, with gender and racialized minorities as cross-cutting themes.

INAF 5605 [0.5 credit]**The Ethical Dimension of International Affairs**

Critical examination of the ethical dimensions of development, global conflict, and international political economy; beliefs and values, rights and obligations, individual and state morality.

INAF 5609 [0.5 credit]**Development Project Evaluation and Analysis**

Examination of social cost-benefit analysis and other micro-economic methods of project evaluation in the context of the project cycle in developing countries with emphasis on policy analysis and implementation practice, case studies of development projects, including those of non-governmental organizations.

INAF 5610 [0.5 credit]**Fragile States: Theory and Policy**

Introduction to the linkages between state fragility, development, conflict and instability with specific attention given to theory, evidence, analysis and policy. Diagnosis and analysis of fragile states for the purposes of program evaluation and strategic planning.

Includes: Experiential Learning Activity

INAF 5612 [0.5 credit]**International Development Institutions**

Structure, operations and effects of major international development institutions on international development policy and the development process. Key institutions include the World Bank, and the regional development banks, UNDP, and other public and private institutions.

INAF 5701 [0.5 credit]**Global Environmental Change: Human Implications**

Global environmental change; its significance for societies, economies and international relations. Value systems underlying environmental discourse; political economy of the environment; sustainability and security. Environmental diplomacy and grassroots environmentalism. Regionalized impacts of pressures on natural environments; challenges of adaptation.

Includes: Experiential Learning Activity

Also listed as GEOG 5005.

INAF 5702 [0.5 credit]**International Environmental Affairs**

International environmental issues, with a focus on policy options and institutions relevant to addressing these issues. Topics include the relationship between the environment and trade, investment, globalization, development and conflict.

Precludes additional credit for INAF 5409 (formerly 46.549U)(taken in 2002/03).

INAF 5703 [0.5 credit]**International Public Economics**

The economic analysis of institutions and of factors associated with global governance, including theories of cooperation, bureaucratic behaviour, externalities, common resource and environmental problems, public goods and other economic theories for state intervention applied to the international level.

INAF 5704 [0.5 credit]**Human Security: From Policy to Practice**

Human security issues including perspectives of key governmental, international and non-governmental actors. Micro-disarmament, the protection of civilians, war economies, and post-conflict security issues.

Precludes additional credit for INAF 5409, section 'W' if taken in 2004/05 or 2005/06.

INAF 5705 [0.5 credit]**Global Social Policy**

Concepts of and approaches to international social policy. Concepts of social justice, comparative welfare regimes and citizenship. Topics include social reform, changes in the public/private provision of social services, participation in social policy, poverty reduction, health and education.

INAF 5706 [0.5 credit]**Global Health Policy**

Global dimensions of health issues, including the relationship between health and governance, development, human rights, and security. Develop skills to examine global health challenges, such as HIV/AIDS and pandemic influenza, and to evaluate the international policy responses.

Includes: Experiential Learning Activity

INAF 5707 [0.5 credit]**Complex Humanitarian Emergencies**

The causes and consequences of complex humanitarian emergencies, their impact on civilians and the responses of international and national actors. Critical review of policy responses of the international community - including donor governments, multilateral organizations, the military and non-governmental organizations.

Includes: Experiential Learning Activity

INAF 5708 [0.5 credit]**Humanitarian Assistance: Policies and Issues**

Legal, policy and programming dimensions of humanitarian assistance. Policy responses and good practice; evaluations of donor performance.

INAF 5709 [0.5 credit]**Human Rights: International Politics and Policies**

Overview of key international human rights policies and debates. Themes include human rights and religion, development, trade, culture, and gender. Readings from applied and scholarly disciplines, focusing on the actions of governments, civil society, development agencies, international organizations and regional bodies.

Also listed as IDMG 5605.

INAF 5710 [0.5 credit]**Global Governance of Displacement**

This course examines how international and national governance mechanisms are addressing the unprecedented global movement of forcibly displaced people, how this movement of people is straining existing international and national institutions and cooperation mechanisms, and explores innovative mechanisms to improve this global response.

INAF 5711 [0.5 credit]**International Labour Migration**

This course will expose students to a range of issues pertaining to labour migration in the 21st Century. It will focus primarily on trends in temporary labour mobility but will address permanent migration, and consider factors that influence the international movement of such workers.

INAF 5800 [0.5 credit]**Asia Pacific Economic and Political Relations**

The evolving pattern of economic and political relations in the Asia-Pacific region. Topics will include security issues; trade and investment; and development cooperation; institutional arrangements, including ASEAN, APEC, AFTA, and Canada's role in the regional affairs.

INAF 5801 [0.5 credit]**Regional Cooperation Among Developing Countries**

The discourse between traditional and Southern theorists on regional integration among developing countries. The effects of regional trade, governance, investment, security and environmental agreements on development.

INAF 5802 [0.5 credit]**The International Political Economy of Transition**

Problems of reintegration into the world economy and dilemmas of transition from command to market economies. Topics may include new trade and investment patterns, role in regional and international economic organizations, search for appropriate exchange rate policies, impact of Western assistance.

Also listed as EURR 5102.

INAF 5803 [0.5 credit]**European Economic Integration**

Economic issues and policies related to the process of European integration and the development of the post-World War II European Union.

Also listed as EURR 5105.

Prerequisite(s): ECON 1000.

INAF 5804 [0.5 credit]**International Relations in Europe**

International relations and organizations in Europe from theoretical and historical perspectives. Origins and development of European organizations such as the European Union and the Organization for Security and Co-operation in Europe.

INAF 5805 [0.5 credit]**The EU in International Affairs**

The impact of the EU on international affairs; the internal development of the EU, the evolution of integration theory, and the growth of the EU's external relations capabilities.

Includes: Experiential Learning Activity

Also listed as EURR 5109.

INAF 5807 [0.5 credit]**The European Union and its Eastern Neighbours**

The EU's European Neighbourhood Policy and Eastern partnership policy, the Russia-EU "strategic partnership". Policies and reactions of non-EU East European countries toward the EU. The interaction of Member state policies and EU policies. May include historical legacies, cultural factors, public opinion, energy security.

Includes: Experiential Learning Activity

Also listed as EURR 5205, PSCI 5111.

INAF 5809 [0.5 credit]**Turkey in the International System**

Analysis of topics related to modern Turkey. The course may cover aspects of the Turkish economy, politics and government, foreign policy, and broader regional relations.

INAF 5901 [0.5 credit]**Tutorials in International Affairs**

To be chosen in consultation with the director.

INAF 5904 [0.5 credit]**Quantitative Research Methods**

A basic introduction into the theory and application of quantitative analysis, primarily applied basic econometrics for the constructions and analysis of data sets with standard software packages.

Precludes additional credit for INAF 6002.

Prerequisite(s): permission of the School.

INAF 5905 [0.5 credit]**Qualitative Research Methods and Design**

Problem statements, research questions and approaches to knowledge acquisition in international affairs, focusing on policy relevance. Topics include advantages and limitations of inductive and deductive research methods, variable selection and hypothesis development, case studies and field research, data gathering, and methodology choice.

Precludes additional credit for INAF 6001.

Prerequisite(s): permission of the School.

INAF 5906 [1.0 credit]**M.A./JD Research Essay**

A research essay that allows an M.A./JD. student to integrate legal and international affairs studies in an analysis of a topic of his or her choice.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5908 [1.0 credit]**Research Essay**

A research essay option that allows an M.A. student to apply their international affairs studies to a topic of his or her choice.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5909 [2.0 credits]**M.A. Thesis**

A research thesis option that allows a student in the M.A. program to combine original research with international affairs studies in an analysis of a topic of his or her choice. Prerequisite(s): A- average in all M.A. required courses and a minimum of 3.0 full course credits, permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity
Prerequisite(s): registration in the Co-operative Education Option of the Master of Arts program.

INAF 5914 [0.25 credit]**Internship Placement**

Internship students are required to register in this course during their internship work term. Priority for the internship placement will be given to full time, first year students in the MA and MA-JD program.
Includes: Experiential Learning Activity
Prerequisite(s): full-time registration in the NPISA M.A. or M.A.-JD program.

INAF 5919 [2.0 credits]**M.A./JD Thesis**

A research thesis option that allows a student in the M.A./JD program to combine original research with legal and international affairs studies in an analysis of a topic of his or her choice.
Prerequisite(s): A- average in all M.A. required courses and a minimum of 3.0 full course credits, permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5920 [0.5 credit]**Selected Topics in Security and Defence Policy**

Selected Topics in Security and Defence Policy. Topic may vary from year to year.

INAF 5921 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5922 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5923 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5924 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5925 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 6001 [0.5 credit]**Qualitative Research Methods**

Problem statements, research questions and approaches to knowledge acquisition in international affairs, focusing on policy relevance. Topics include advantages and limitations of inductive and deductive research methods, variable selection and hypothesis development, case studies and field research, data gathering, and methodology choice.
Precludes additional credit for INAF 5406.
Prerequisite(s): standing in the NPSIA Ph.D. program or permission of the School.

INAF 6002 [0.5 credit]**Quantitative Research Methods**

Basic theory and application of quantitative analysis, primarily applied basic econometrics for the construction and analysis of data sets with standard software packages.
Precludes additional credit for INAF 5904.
Prerequisite(s): standing in the NPSIA Ph.D. program or permission of the School.

INAF 6003 [0.5 credit]**Advanced International Policy Analysis**

International public policies of a number of countries, including Canada; approaches to the policy process and case studies of the formulation and evaluation of economic, political, and security policies.
Precludes additional credit for INAF 5905.
Prerequisite(s): standing in the NPSIA Ph.D. program or permission of the School.

INAF 6004 [0.5 credit]**Doctoral Comprehensive Examination in Policy and Research Methods**

A comprehensive examination covering the policy and methods material in INAF 6001, INAF 6002, and INAF 6003.
Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6100 [0.5 credit]**Doctoral Field Examination in Conflict Management and Resolution**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in security, conflict analysis, management and prevention. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.
Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6200 [0.5 credit]**Doctoral Field Examination in International Development Policy**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in international development policy. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6300 [0.5 credit]**Doctoral Field Examination in International Economic Policy**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in international economic policy. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6400 [0.5 credit]**Doctoral Field Examination in Security, Intelligence and Defence (SID)**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in security, intelligence and defence. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): Enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6800 [0.0 credit]**Doctoral Field Comprehensive Seminar**

The seminar helps to prepare students for writing their doctoral field comprehensive examinations while exposing them to the issues and approaches across the different doctoral field.

Prerequisite(s): standing in the NPSIA Ph.D. program.

INAF 6906 [0.5 credit]**Doctoral Research Prospectus Seminar**

A seminar to assist students in developing their research prospectus, and prepare for the prospectus defence. Other research issues, such as ethics clearance, scholarly articles submission and field work logistics are also addressed.

Prerequisite(s): Completion of field comprehensive examination and required courses in the NPSIA Ph.D.

INAF 6907 [0.5 credit]**Doctoral Research Prospectus Defence**

Public defence of a research prospectus that will be the basis for the dissertation.

Prerequisite(s): Successful completion of INAF 6906, the Doctoral Research Prospectus Seminar.

INAF 6909 [0.0 credit]**Doctoral Research Thesis**

The doctoral dissertation, normally supervised by faculty in the Norman Paterson School of international Affairs with the possibility of supervision from faculty in other social sciences departments, schools, and institutes.

Prerequisite(s): completion of all other Ph.D. program requirements in the NPSIA Ph.D. program.

INAF 6921 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6922 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6923 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6924 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6925 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

Journalism

This section presents the requirements for programs in:

- M. Journalism
- M. Journalism with Specialization in African Studies

Program Requirements**M. Journalism (10.0 credits)****Requirements:****First Year**

Candidates admitted to Year One of the Master of Journalism program must complete the following courses before proceeding to the second year of study:

1. 4.0 credits in:		4.0
JOUR 5000 [0.5]	Journalism and Society I	
JOUR 5200 [1.0]	Introduction to Reporting	
JOUR 5202 [1.0]	Broadcast Journalism Laboratory	

JOUR 5206 [0.5]	Reporting Methods	
JOUR 5401 [0.5]	Journalism Law	
JOUR 5706 [0.5]	Professional Practices	

2. 1.0 credit in approved electives **1.0**

Year One M.Journalism candidates may be considered for advanced standing in certain of the required courses listed above, but in such cases will be required to replace waived courses with approved options.

Second Year 5.0

Students entering second year choose to complete their degree with an emphasis on either professional practice or journalism studies.

Second Year - Professional Practice Completion Pathway

Those choosing the professional practice completion pathway will each select a primary media area of interest; those selecting a text-based option will take JOUR 5700, and those selecting audio or video will take JOUR 5702.

Students will complete a Master's Research Project (MRP JOUR 5908) in a format consistent with their primary media area of interest and will enrol in a corresponding Advanced Journalism course. In addition, they will take one other Advanced Journalism course, two specialized "beat" journalism courses and 1.0 credits of approved electives. The course of studies is as follows:

3. 1.0 credit in:

JOUR 5908 [1.0]	M.Journalism Research Project (See Note, below)	
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4. 1.0 credit from:

JOUR 5700 [1.0]	Advanced Writing	
JOUR 5702 [1.0]	Broadcast Journalism	

5. 1.0 credit from:

JOUR 5003 [0.5]	Advanced Journalism: Multimedia	
JOUR 5004 [0.5]	Advanced Journalism: Audio	
JOUR 5005 [0.5]	Advanced Journalism: Video	

6. 1.0 credit from:

JOUR 5300 [0.5]	Specialized Journalism: Special Topic	
JOUR 5301 [0.5]	Specialized Journalism: Business and the Markets	
JOUR 5302 [0.5]	Specialized Journalism: Business and Canadian Society	
JOUR 5303 [0.5]	Specialized Journalism: Health and Science	
JOUR 5304 [0.5]	Specialized Journalism: Environment and Science	
JOUR 5306 [0.5]	Specialized Journalism: Canada and the World	
JOUR 5308 [0.5]	Specialized Journalism: Sports and Sport Culture	
JOUR 5309 [0.5]	Specialized Journalism: Arts and Culture	
JOUR 5310 [0.5]	Specialized Journalism: Justice and the Law	
JOUR 5311 [0.5]	Specialized Journalism: Justice and The Supreme Court	
JOUR 5315 [0.5]	Specialized Journalism: Canada and the U.S.	

7. 1.0 credit in approved electives

Note: under special circumstances, and with the School's approval, a student pursuing the professional practice completion pathway could replace JOUR 5908 and 1.0 credit of approved courses above with a 2.0 credit M.J. Thesis, JOUR 5909.

Second Year - Journalism Studies Completion Pathway

Students choosing the journalism studies completion pathway must complete the following:

3. 0.5 credit in:

JOUR 5500 [0.5]	Journalism and Society II	
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4. 2.5 credits in electives related to the study of the media, chosen in consultation with the Supervisor of Graduate Studies. JOUR 5000 is required if admitted directly to Year Two. Students who completed this course in first year will substitute an approved Journalism replacement option.

5. 2.0 credits in:

JOUR 5909 [2.0]	M.Journalism Thesis	
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Total Credits 10.0

Note: As a condition for graduation, all students in both completion options are required to have a minimum of four months of practical experience in the media, and a working knowledge of a second language, preferably French. For qualified applicants, the School may deem the requirement(s) to have been met.

M. Journalism with Specialization in African Studies (10.0 credits)

Requirements:

First Year

Candidates admitted to Year One of the Master of Journalism program must complete the following courses before proceeding to the second year of study:

1. 0.5 credit in: 0.5

AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
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2. 0.0 credit in: 0.0

AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
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3. 4.0 credits in: 4.0

JOUR 5000 [0.5]	Journalism and Society I (see note below)	
JOUR 5200 [1.0]	Introduction to Reporting	
JOUR 5202 [1.0]	Broadcast Journalism Laboratory	
JOUR 5206 [0.5]	Reporting Methods	
JOUR 5401 [0.5]	Journalism Law	
JOUR 5706 [0.5]	Professional Practices (see note below)	

4. 0.5 credit in approved African Studies elective **0.5**

Year One M.J. candidates may be considered for advanced standing in certain of the required courses listed above, but in such cases will be required to replace waived courses with approved options.

Note: course deliverables for JOUR 5000 and JOUR 5706 must be on an approved African Studies theme.

Second Year 5.0

Students entering second year choose to complete their degree with an emphasis on either professional practice or journalism studies.

Second Year - Professional Practice Completion Option

Those choosing the professional practice completion option will each select a primary media area of interest. Those selecting a text-based option will take JOUR 5700, and those selecting audio or video will take JOUR 5702.

Students will complete a Master's Research Project (JOUR 5908) in a format consistent with their primary media area of interest and will enrol in a corresponding Advanced Journalism course. In addition, they will take one other Advanced Reporting course, two specialized "beat" journalism courses and 1.0 credits of approved electives. The course of studies is as follows:

3. 1.0 credit in:

JOUR 5908 [1.0]	M.Journalism Research Project
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4. 1.0 credit from:

JOUR 5700 [1.0]	Advanced Writing
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JOUR 5702 [1.0]	Broadcast Journalism
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5. 1.0 credit from:

JOUR 5003 [0.5]	Advanced Journalism: Multimedia
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JOUR 5004 [0.5]	Advanced Journalism: Audio
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JOUR 5005 [0.5]	Advanced Journalism: Video
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6. 1.0 credit from:

JOUR 5300 [0.5]	Specialized Journalism: Special Topic
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JOUR 5301 [0.5]	Specialized Journalism: Business and the Markets
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JOUR 5302 [0.5]	Specialized Journalism: Business and Canadian Society
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JOUR 5303 [0.5]	Specialized Journalism: Health and Science
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JOUR 5304 [0.5]	Specialized Journalism: Environment and Science
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JOUR 5306 [0.5]	Specialized Journalism: Canada and the World
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JOUR 5308 [0.5]	Specialized Journalism: Sports and Sport Culture
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JOUR 5309 [0.5]	Specialized Journalism: Arts and Culture
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JOUR 5310 [0.5]	Specialized Journalism: Justice and the Law
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JOUR 5311 [0.5]	Specialized Journalism: Justice and The Supreme Court
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JOUR 5315 [0.5]	Specialized Journalism: Canada and the U.S.
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7. 1.0 credit in electives related to the study of the media, chosen in consultation with the Supervisor of Graduate Studies.

Note: under special circumstances, and with the School's approval, a student could replace JOUR 5908 and 1.0 credit of approved courses with a 2.0-credit thesis, JOUR 5909.

Second Year - Journalism Studies Completion Option

Students choosing the journalism studies completion with specialization in African Studies must complete the following:

3. 0.5 credit in:

JOUR 5500 [0.5]	Journalism and Society II
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4. 2.5 credits in electives related to the study of the media, chosen in consultation with the Supervisor of Graduate Studies. JOUR 5000 Journalism and Society I required if admitted directly to Year Two. Students who completed this course in first year will substitute an approved Journalism replacement option.

5. 2.0 credits in:

JOUR 5909 [2.0]	M.Journalism Thesis (in the specialization)
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Total Credits

10.0

Note: As a condition for graduation, all students in both completion options are required to have a minimum of four months of practical experience in the media, and a working knowledge of a second language, preferably French. For qualified applicants, the School may deem the requirement(s) to have been met.

Regulations

See the General Regulations section of this Calendar.

Admission

M. Journalism

The School of Journalism and Communication provides two points of entry into the Master of Journalism program – Year One or Year Two.

Most applicants will be admitted to Year One of the two-year M.Journalism program; however, some may qualify for admission to Year Two. A committee chaired by the Supervisor of Graduate Studies will determine the admissibility of each applicant.

For admission to Year One of the M.Journalism program, applicants must hold an honour's bachelor's degree or the equivalent, with, normally, B+ or better in the honours subject and B- or higher overall.

A limited number of spaces will be made available for direct admission to Year Two of the M. Journalism program. Students must normally possess one of the following qualifications to be considered for this admission option:

- a B.Journalism (Honours) or the equivalent;
- a degree in another discipline from a recognized university plus at least five years of professional experience in journalism;
- substantial professional journalism experience of a high standard.

Note: Students with prior journalistic experience or credentials who are admitted directly into Year Two will normally pursue the Journalism Studies completion option, or a path of coursework selected in consultation with the Supervisor of Graduate Studies, which will include a thesis or master's research project, as appropriate.

Admission will be selective. Admission will not be guaranteed to all who meet the published minimum requirements, as there are many more qualified applicants each year than there are available spaces.

Proficiency in English is necessary to pursue graduate studies at Carleton University. Journalism demands higher

levels of competence in English than specified in the general regulations of the graduate calendar.

All applicants whose first language is not English must satisfy this requirement by meeting one of the following criteria:

1. An official overall score of 70 on the Canadian Academic English Language (CAEL) Assessment; or
2. An official Test of English as a Foreign Language (TOEFL) score of 600 on the paper-based test (PBT), or an overall score of 100 on the Internet-based test (IBT) with a minimum score in each component of: writing 25; speaking 25; reading 25; and listening 25; or
3. An official overall international English Language Testing System (IELTS) score of 7.0 with a minimum of 7.0 in each band score; or
4. Official certification (transcripts) to indicate that they have completed an undergraduate or graduate degree within the past three years in a university in Canada, the United States, the United Kingdom or any other country in which the primary language is English, and where the language of instruction in the relevant education institution was exclusively English.

The Faculty of Graduate Studies and Postdoctoral Affairs reserves the right to require further documentation or additional testing if it deems it is necessary to demonstrate the required level of English language proficiency.

M. Journalism with Specialization in African Studies

Information about admission to the M. Journalism with Specialization in African Studies can be found at carleton.ca/africanstudies/graduate-studies/admissions

Journalism (JOUR) Courses

JOUR 5000 [0.5 credit] Journalism and Society I

An introduction to analysis of the news media in Western society, considering classical arguments and contemporary trends in the scholarly assessment of journalism practice.

JOUR 5003 [0.5 credit] Advanced Journalism: Multimedia

Designed to enhance storytelling, reporting and editing skills through the production of a digital publication.

Includes: Experiential Learning Activity
Precludes additional credit for JOUR 5704 (no longer offered), JOUR 5705 (no longer offered), JOUR 5701 (no longer offered).

Also offered at the undergraduate level, with different requirements, as JOUR 4003, for which additional credit is precluded.

JOUR 5004 [0.5 credit]

Advanced Journalism: Audio

Designed to enhance audio storytelling and reporting/producing skills through the production of a weekly program.

Includes: Experiential Learning Activity

Precludes additional credit for JOUR 5707 (no longer offered), JOUR 5703 (no longer offered).

Also offered at the undergraduate level, with different requirements, as JOUR 4004, for which additional credit is precluded.

Workshops averaging eight hours a week.

JOUR 5005 [0.5 credit]

Advanced Journalism: Video

Designed to enhance video storytelling skills through the production of a series of mini-documentaries for a digital program.

Includes: Experiential Learning Activity

Precludes additional credit for JOUR 5708 (no longer offered), JOUR 5703 (no longer offered).

Also offered at the undergraduate level, with different requirements, as JOUR 4005, for which additional credit is precluded.

Workshop averaging eight hours a week.

JOUR 5200 [1.0 credit]

Introduction to Reporting

A laboratory course in basic reporting and editing techniques and introduction to multimedia reporting, followed by application in print and multimedia.

Includes: Experiential Learning Activity

JOUR 5202 [1.0 credit]

Broadcast Journalism Laboratory

A laboratory course in reporting and editing in the broadcast media.

Includes: Experiential Learning Activity

JOUR 5206 [0.5 credit]

Reporting Methods

Topics covered will range from interviewing and observation skills to conducting a title search, lodging an access to information request and interpreting data.

Includes: Experiential Learning Activity

JOUR 5208 [0.5 credit]

Public Affairs Reporting

A course devoted to understanding selected political, economic and social issues, and to analytical reporting on timely issues under professional conditions.

Includes: Experiential Learning Activity

JOUR 5300 [0.5 credit]

Specialized Journalism: Special Topic

Advanced reporting in a specialized subject area.

Topics may vary from year to year. Emphasis on subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Also offered at the undergraduate level, with different requirements, as JOUR 4300, for which additional credit is precluded.

JOUR 5301 [0.5 credit]**Specialized Journalism: Business and the Markets**

The fundamentals of business journalism, including corporate structures, the markets, trade policy, contemporary business news and local publicly-traded companies. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4301, for which additional credit is precluded.

JOUR 5302 [0.5 credit]**Specialized Journalism: Business and Canadian Society**

How business affects every aspect of public policy, from climate change to corporate social responsibility. What business does and how the media covers it. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4302, for which additional credit is precluded.

JOUR 5303 [0.5 credit]**Specialized Journalism: Health and Science**

How health science research permeates everyday life. Global challenges confronting researchers and health science journalists. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4303, for which additional credit is precluded.

JOUR 5304 [0.5 credit]**Specialized Journalism: Environment and Science**

Analysis of global trends and research culture in climate and environmental sciences. Challenges confronting researchers and journalists. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4304, for which additional credit is precluded.

JOUR 5306 [0.5 credit]**Specialized Journalism: Canada and the World**

Canada's role in the world as shaped by diplomacy, war, terrorism, migration, the international economy and development. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4306, for which additional credit is precluded.

JOUR 5308 [0.5 credit]**Specialized Journalism: Sports and Sport Culture**

Beyond game scores—analysis of the culture of sports and evolution of sports reportage and writing. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4308, for which additional credit is precluded.

JOUR 5309 [0.5 credit]**Specialized Journalism: Arts and Culture**

An introduction to the crucial issues and trends necessary for reporters covering the arts and related cultural policy in Canada. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4309, for which additional credit is precluded.

JOUR 5310 [0.5 credit]**Specialized Journalism: Justice and the Law**

Building on basic media law through a practical exploration of how law works, and how to cover courts and write about legal issues. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4310, for which additional credit is precluded.

JOUR 5311 [0.5 credit]**Specialized Journalism: Justice and The Supreme Court**

Insight into the Supreme Court of Canada, and its role in the making and shaping of Canada. The relationship between the justices and journalists. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4311, for which additional credit is precluded.

JOUR 5315 [0.5 credit]**Specialized Journalism: Canada and the U.S.**

Fundamentals of the unique issues governing Canada-U.S. relations, from diplomacy to trade. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4305, for which additional credit is precluded.

JOUR 5401 [0.5 credit]**Journalism Law**

This course prepares journalists to function comfortably within the legal and ethical guidelines governing their occupation. Topics include: contempt of court; free press, fair trial; revealing of sources; civil defamation; obscenity; privacy; government secrecy.

JOUR 5500 [0.5 credit]**Journalism and Society II**

A critical examination of the conduct of the news media, exploring the social, political and economic contexts in which the media work and assessing the consequences of journalism practice for contemporary society. Prerequisite(s): JOUR 5000 or permission of the School.

JOUR 5508 [0.5 credit]**Professional Practices: Specialized Media**

A workshop course designed to give students instruction in specialized areas. Not all specialties will be offered each year. Includes: Experiential Learning Activity

JOUR 5700 [1.0 credit]**Advanced Writing**

Students will explore and apply advanced journalistic principles and practices through a combination of readings, discussion and reporting in specific areas. Includes: Experiential Learning Activity

JOUR 5702 [1.0 credit]**Broadcast Journalism**

A seminar combining critical analysis of broadcast journalism and practical skill development in broadcast reporting, writing and production. Includes: Experiential Learning Activity

JOUR 5706 [0.5 credit]**Professional Practices**

Students examine current journalism practices in a critical and analytical way, and explore ways of producing thorough and investigative journalism in print, broadcast and multimedia. Guest speakers share their expertise and skills. Includes: Experiential Learning Activity

JOUR 5800 [0.5 credit]**Survey Methods for Journalists**

An examination of basic research design and data collection with emphasis on problems of interpretation.

JOUR 5808 [0.5 credit]**Directed Readings**

Students, working under faculty direction, will undertake an intensive reading schedule in order to pursue a subject area of particular interest.

JOUR 5809 [0.5 credit]**Directed Research**

Students, working under faculty direction, will develop and undertake a research project in order to pursue a subject area of particular interest. Includes: Experiential Learning Activity

JOUR 5900 [1.0 credit]**Directed Studies**

Reading and research tutorials.

JOUR 5901 [0.5 credit]**Directed Studies**

Reading and research tutorials.

JOUR 5908 [1.0 credit]**M. Journalism Research Project**

The student will complete a substantial piece of public affairs journalism; or a research project on the media; or a document that makes a major contribution to journalism education. The format of the MRP will be determined by the stream of study. Includes: Experiential Learning Activity

JOUR 5909 [2.0 credits]**M. Journalism Thesis**

To fulfil the requirements of this 2.0-credit thesis course, students must produce a major piece of journalistic research or complete an academic thesis in the area of journalism studies. Includes: Experiential Learning Activity

Latin American and Caribbean Studies (Collaborative Program)

This section presents the requirements for programs in:

- M. A. Anthropology with Collaborative Specialization in Latin American and Caribbean Studies
- M.A. Geography with Specialization in Latin American and Caribbean Studies
- M.A. History with Specialization in Latin American and Caribbean Studies
- M.A. International Affairs with Specialization in Latin American and Caribbean Studies
- M.A. Political Economy with Specialization in Latin American and Caribbean Studies
- M.A. Political Science with Specialization in Latin American and Caribbean Studies
- M.A. Sociology with Collaborative Specialization in Latin American and Caribbean Studies
- M.A. Women's and Gender Studies with Specialization in Latin American and Caribbean Studies

Program Requirements

M. A. Anthropology with Collaborative Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway:

1. 0.5 credit in:

0.5

LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in: 1.0		
ANTH 5401 [0.5]	Theories and Methods I	
ANTH 5402 [0.5]	Theories and Methods II	
4. 1.5 credits in electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies 1.5		
5. 2.0 credits in: 2.0		
ANTH 5909 [2.0]	M.A. Thesis (on an approved topic with significant content related to Latin American and Caribbean Studies.)	

Total Credits 5.0

Requirements - Research essay pathway:

1. 0.5 credit in: 0.5		
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in: 1.0		
ANTH 5401 [0.5]	Theories and Methods I	
ANTH 5402 [0.5]	Theories and Methods II	
4. 2.5 credits in electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies 2.5		
5. 1.0 credit in: 1.0		
ANTH 5908 [1.0]	M.A. Research Essay (on an approved topic with significant content related to Latin American and Caribbean Studies)	

Total Credits 5.0

Requirements - Coursework pathway:

1. 0.5 credit in: 0.5		
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in: 1.0		
ANTH 5401 [0.5]	Theories and Methods I	
ANTH 5402 [0.5]	Theories and Methods II	
4. 0.5 credit from: 0.5		
ANTH 5109 [0.5]	Ethnography, Gender and Globalization	
ANTH 5202 [0.5]	The Anthropology of Underdevelopment	
ANTH 5208 [0.5]	Anthropology of Indigeneity	

ANTH 5210 [0.5]	Special Topics in Indigenous Studies	
ANTH 5355 [0.5]	Anthropology of Natural Resources	
ANTH 5560 [0.5]	Economic Anthropology	
ANTH 5570 [0.5]	Political Anthropology	
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment	
5. 3.0 credits in electives including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies. 3.0		

Total Credits 5.0

M.A. Geography with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in: 0.5		
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in: 0.0		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in: 1.0		
GEOG 5000 [0.5]	Approaches to Geographical Inquiry	
GEOG 5905 [0.5]	Masters Research Workshop	
4. 2.5 credits in: 2.5		
GEOG 5909 [2.5]	M.A. Thesis (in the specialization and including oral examination of the thesis)	

5. 1.0 credit in approved graduate-level electives 1.0

6. In addition to the formal requirements, MA students are required to attend the Departmental Seminar series, and the Graduate Field Camp.

Total Credits 5.0

M.A. History with Specialization in Latin American and Caribbean Studies (4.5 credits)

Requirements - Research Essay pathway (4.5 credits)

1. 0.5 credit in: 0.5		
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in: 0.0		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 0.5 credit in: 0.5		
HIST 5003 [0.5]	Historical Theory and Method	
4. 1.0 credit in HIST at the graduate level at Carleton 1.0		
5. 1.0 credit in a graduate seminar with sufficient Latin American and Caribbean Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with Latin American and Caribbean Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution. 1.0		

6. 0.5 credit in:	0.5
HIST 5900 [0.5] Directed Research	
7. 1.0 credit in:	1.0
HIST 5908 [1.0] M.A. Research Essay (in the specialization)	

Total Credits 4.5

Requirements - Thesis pathway (4.5 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	

2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	

3. 0.5 credit in:	0.5
HIST 5003 [0.5] Historical Theory and Method	

4. 0.5 credit in HIST at the graduate level at Carleton	0.5
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5. 1.0 credit in graduate seminars with sufficient Latin American and Caribbean Studies content, including at least 0.5 credit in a History course. With departmental permission, up to 0.5 credit of courses with Latin American and Caribbean Studies content may be taken from another unit at Carleton University, at the University of Ottawa, or at another credited institution.

6. 2.0 credits in:	2.0
HIST 5909 [2.0] M.A. Thesis (in the specialization)	

Total Credits 4.5

M.A. International Affairs with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	

2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	

3. 1.5 credits in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	
INAF 5016 [0.5] Statistical Analysis for International Affairs	

INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25] Law and International Affairs	

4. 0.5 credit in ECON, successfully completed by the end of the second term, from (See Note 1, below):

INAF 5009 [0.5] International Aspects of Economic Development	
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INAF 5205 [0.5] Economics of Conflict	
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INAF 5214 [0.5] Economics for Defence and Security	
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INAF 5308 [0.5] International Trade: Theory and Policy	
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INAF 5309 [0.5] International Finance: Theory and Policy	
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INAF 5600 [0.5] The Economics of Human Development	
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INAF 5703 [0.5] International Public Economics	
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5. 2.0 credits in: 2.0

INAF 5909 [2.0] M.A. Thesis (M.A. Thesis on an approved topic with significant content related to Latin American and Caribbean Studies, and under the supervision or co-supervision of a faculty member approved by the Graduate Supervisor of the LACS program.)	
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6. 0.5 credit in: Field and Elective courses (see Note 2, below) 0.5

7. Successful completion of second language proficiency examination (See Note 3, below)

Total Credits 5.0

Requirements - Research Essay pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	

2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	

3. 1.5 credits in:	1.5
INAF 5015 [0.5] Research Design and Methods for International Affairs	

INAF 5016 [0.5] Statistical Analysis for International Affairs	
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INAF 5017 [0.25] International Policymaking in Canada: Structure and Process	
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INAF 5018 [0.25] Law and International Affairs	
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4. 0.5 credit in economics, successfully completed by the end of the second term, from: (See Note 1, below) 0.5

INAF 5009 [0.5] International Aspects of Economic Development	
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INAF 5214 [0.5] Economics for Defence and Security	
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INAF 5205 [0.5] Economics of Conflict	
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INAF 5308 [0.5] International Trade: Theory and Policy	
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INAF 5309 [0.5] International Finance: Theory and Policy	
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INAF 5600 [0.5] The Economics of Human Development	
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INAF 5703 [0.5] International Public Economics	
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5. 1.0 credit in: 1.0

INAF 5908 [1.0] Research Essay (on an approved topic with significant content related to Latin American and Caribbean Studies, and under the supervision or co-supervision of a faculty member approved by the Graduate Supervisor of the LACS program.)	
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6. 1.5 credits in: Field and Elective courses (See Note 2, below) 1.5

7. Successful completion of second language proficiency examination (see Note 3, below)

Total Credits 5.0

Requirements - Coursework pathway (5.0 credits)

1. 0.5 credit in: 0.5

LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
INAF 5016 [0.5]	Statistical Analysis for International Affairs	
INAF 5017 [0.25]	International Policymaking in Canada: Structure and Process	
INAF 5018 [0.25]	Law and International Affairs	
4. 0.5 credit in	economics, successfully completed by the end of the second term, from: (See Note 1, below)	0.5
INAF 5009 [0.5]	International Aspects of Economic Development	
INAF 5205 [0.5]	Economics of Conflict	
INAF 5214 [0.5]	Economics for Defence and Security	
INAF 5308 [0.5]	International Trade: Theory and Policy	
INAF 5309 [0.5]	International Finance: Theory and Policy	
INAF 5600 [0.5]	The Economics of Human Development	
INAF 5703 [0.5]	International Public Economics	
5. 1.0 credit in	courses accepted by the Latin American and Caribbean Studies Program Graduate Coordinator as having sufficient regional content and accepted by the NPSIA M.A. Program Supervisor or Associate Director as being relevant to the student's program of study.	1.0
6. 2.0 credits in	Field and Elective courses (See Note 2, below)	2.0
7. Successful completion of second language proficiency examination (see Note 3, below)		
Total Credits		5.0

Notes:

- All students must complete the 0.5 credit economics course for their designated field, or an approved alternate economics course. For students in the IEP field both INAF 5308 and INAF 5309, or approved equivalent, must be completed.
- For elective courses, 1.5 credits of the total required 5.0 credits may be selected from courses offered in other departments, with a maximum of 1.0 credit from a single department and a maximum of 1.0 credit selected from fourth year undergraduate courses. Any course not identified as an INAF 5000-level course must be approved by the M.A. Program Supervisor.
- Students must successfully complete an examination in second language proficiency administered by Carleton University's School of Linguistics and Language Studies, or meet the equivalent standard as determined by the School of Linguistics and Language Studies. There is an administrative fee for the standard test (which leads to a certificate of language proficiency after successful completion). Details of the language requirement are provided on the School website.

M.A. Political Economy with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
PECO 5000 [0.5]	Theories of Political Economy	
PECO 5001 [0.5]	The Methodology of Political Economy	
4. 2.0 credits in:		2.0
PECO 5909 [2.0]	M.A. Thesis (in the specialization)	
5. 1.5 credits in	approved graduate level electives (see Selection of Courses, below) ¹	1.5
Total Credits		5.0

Requirements - Research essay pathway (5.0 credits)

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
PECO 5000 [0.5]	Theories of Political Economy	
PECO 5001 [0.5]	The Methodology of Political Economy	
4. 1.0 credits in:		1.0
PECO 5908 [1.0]	Research Essay (in the specialization)	
5. 2.5 credits in	approved graduate level electives (see Selection of Courses, below) ¹	2.5
Total Credits		5.0

¹ Up to one (1.0) credit may be taken at the 4000 (honours undergraduate) level.

M.A. Political Science with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in	course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Political Science Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.0
4. 2.0 credits in:		2.0
PSCI 5909 [2.0]	M.A. Thesis (in the specialization)	

5. 1.5 credits in approved courses	1.5
Total Credits	5.0
Requirements - Research essay pathway (5.0 credits)	
1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Political Science Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.0
4. 1.0 credit in:	1.0
PSCI 5908 [1.0]	M.A. Research Essay (in the specialization)
5. 2.5 credits in approved courses	2.5
Total Credits	5.0

M.A. Sociology with Collaborative Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in:	1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought
SOCI 5809 [0.5]	The Logic of the Research Process
4. 1.5 credits in electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.5
5. 2.0 credits in:	2.0
SOCI 5909 [2.0]	M.A. Thesis (on an approved topic with significant content related to Latin American and Caribbean Studies)
Total Credits	5.0

Requirements - Research Essay pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in:	1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought
SOCI 5809 [0.5]	The Logic of the Research Process

4. 2.5 credits in approved electives, including 1.0 credit in courses designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American Studies	2.5
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5. 1.0 credit in:	1.0
SOCI 5908 [1.0]	M.A. Research Essay (on an approved topic with significant content related to Latin American and Caribbean Studies)
Total Credits	5.0

Requirements - Coursework pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 1.0 credit in:	1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought
SOCI 5809 [0.5]	The Logic of the Research Process
4. 0.5 credit from:	0.5
ANTH 5109 [0.5]	Ethnography, Gender and Globalization
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
SOCI 5007 [0.5]	Social Change and Economic Development
SOCI 5409 [0.5]	The Politics of Social Movements and the State
5. 3.0 credits in approved electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	3.0

Total Credits	5.0
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M.A. Women's and Gender Studies with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies
2. 0.0 credit in:	0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies
3. 0.5 credit in:	0.5
WGST 5900 [0.5]	Program Seminar
4. 1.0 credit in:	1.0
WGST 5906 [0.5]	Feminist Theory
WGST 5907 [0.5]	Researching Women's and Gender Issues
5. 1.0 credit in courses designated as having sufficient Latin American and Caribbean Studies content, approved by both the Women's and Gender Studies Supervisor and the Latin American and Caribbean Studies Coordinator	1.0
6. 2.0 credits in:	2.0

WGST 5909 [2.0]	M.A. Thesis (in the specialization)	
Total Credits		5.0
Requirements - Research essay pathway (5.0 credits)		
1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 0.5 credit in:		0.5
WGST 5900 [0.5]	Program Seminar	
4. 1.0 credit in:		1.0
WGST 5906 [0.5]	Feminist Theory	
WGST 5907 [0.5]	Researching Women's and Gender Issues	
5. 1.0 credit in	courses designated as having sufficient Latin American and Caribbean Studies content, approved by both the Women's and Gender Studies Supervisor and the Latin American and Caribbean Studies Coordinator	1.0
6. 1.0 credit in	available elective courses	1.0
7. 1.0 credit in:		1.0
WGST 5908 [1.0]	Research Essay (in the specialization)	
Total Credits		5.0

Regulations

See the General Regulations section of this Calendar and the regulations of the participating unit.

Admission

Admission to the collaborative master's program in Latin American and Caribbean Studies is available to master's students who are admitted in one of the participating master's programs. To apply to one of the participating master's programs, please visit the Faculty of Graduate and Postdoctoral Affairs Admissions page.

Latin American and Caribbean Studies (LACS) Courses

LACS 5000 [0.5 credit]

Interdisciplinary Approaches to Latin American and Caribbean Studies

An interdisciplinary overview of the historical, cultural, economic, and political dimensions of the Latin American and Caribbean region.

LACS 5800 [0.0 credit]

Scholarly Preparation in Latin American and Caribbean Studies

This course will provide scholarly preparation in Latin American and Caribbean Studies by requiring participation in public talks as both audience member and presenter.

Legal Studies

This section presents the requirements for programs in:

- M.A. Legal Studies
- M.A. Legal Studies with Specialization in African Studies

- Ph.D. Legal Studies
- Ph.D. Legal Studies with Specialization in Political Economy

Program Requirements

M.A. Legal Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 2.0 credits in LAWS	2.0
2. 1.0 credit in:	1.0
LAWS 5000 [0.5]	Theories of Law and Social Transformation
LAWS 5001 [0.5]	Legal Method and Social Inquiry
3. 2.0 credits in:	2.0
LAWS 5909 [2.0]	M.A. Thesis

Total Credits 5.0

Requirements - Research essay option (5.0 credits)

1. 3.0 credits in LAWS	3.0
2. 1.0 credit in:	1.0
LAWS 5000 [0.5]	Theories of Law and Social Transformation
LAWS 5001 [0.5]	Legal Method and Social Inquiry
3. 1.0 credit in:	1.0
LAWS 5908 [1.0]	M.A. Research Essay

Total Credits 5.0

Requirements - Course option (5.0 credits)

1. 4.0 credits in LAWS	4.0
2. 1.0 credits in:	1.0
LAWS 5000 [0.5]	Theories of Law and Social Transformation
LAWS 5001 [0.5]	Legal Method and Social Inquiry

Total Credits 5.0

Selection of Courses in Related Disciplines

In addition to the graduate courses offered by the Department of Law and Legal Studies, students in the M.A. program are encouraged to take at least 0.5 credit in a related discipline, in consultation with the supervisor of graduate studies.

Students can propose taking a graduate level course from any department in the University but the following disciplines tend to provide courses of particular interest to Legal Studies students: Economics, Geography, History, Indigenous and Canadian Studies, International Affairs, Journalism and Communication, Political Science, Psychology, Public Administration, Sociology and Anthropology, Social Work.

M.A. Legal Studies with Specialization in African Studies (5.0 credits)

Requirements - Thesis option

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 1.0 credit in:	1.0
LAWS 5000 [0.5]	Theories of Law and Social Transformation
LAWS 5001 [0.5]	Legal Method and Social Inquiry

3. 0.0 credit in:		
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
4. 1.5 credits in LAWS	¹	1.5
5. 2.0 credits in:		2.0
LAWS 5909 [2.0]	M.A. Thesis (which includes an oral examination) ²	

Total Credits 5.0

Requirements - Research essay option (5.0 credits)

1. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
3. 1.0 credit in:		1.0
LAWS 5000 [0.5]	Theories of Law and Social Transformation	
LAWS 5001 [0.5]	Legal Method and Social Inquiry	
4. 2.5 credits in LAWS	¹	2.5
5. 1.0 credit in:		1.0
LAWS 5908 [1.0]	M.A. Research Essay ²	

Total Credits 5.0

¹ Students are encouraged to take 0.5 credit in a related discipline, in consultation with the supervisor of graduate studies.

² Thesis/Research Essay: The thesis or research essay must represent the result of the candidate's independent research undertaken after being admitted into graduate studies in the Department of Law and Legal Studies. Previous work of the candidate may be used only as introductory or background material for the thesis or research essay. A student may carry on research work related to the thesis or research essay off campus if the work is approved in advance and supervision arrangements have been made with the supervisor of graduate studies.

Ph.D. Legal Studies (4.5 credits)

Requirements:

1. 0.5 credit in:		0.5
LAWS 6000 [0.5]	Doctoral Seminar in Legal Studies	
2. 0.5 credit in:		0.5
LAWS 6001 [0.5]	Proseminar in Legal Studies	
3. 2.0 credits in:		2.0
LAWS 6095 [1.0]	Field Comprehensive	
LAWS 6096 [1.0]	Thesis Proposal	
4. 1.5 credits in	approved courses, at least 0.5 of which must be chosen from	1.5
LAWS 6002 [0.5]	Law, Regulation and Governance	
LAWS 6003 [0.5]	Human Rights, Citizenship and Global Justice	
LAWS 6004 [0.5]	Crime, Law, and Security	

Students will normally be required to take the course which relates to their field of study. Optional courses will be selected from a list approved annually by the department. Students may complete up to 1.0 credit of approved courses offered in other departments. Students may also choose directed reading courses with the core faculty of the program

5. 0.0 credits in:		
LAWS 6909 [0.0]	Ph. D. Thesis (must be successfully defended at an oral examination.)	

Total Credits 4.5

Ph.D. Legal Studies with Specialization in Political Economy (4.5 credits)

Requirements:

1. 0.5 credit in:		0.5
LAWS 6000 [0.5]	Doctoral Seminar in Legal Studies	
2. 0.5 credit in:		0.5
LAWS 6001 [0.5]	Proseminar in Legal Studies	
4. 2.0 credits in:		2.0
LAWS 6095 [1.0]	Field Comprehensive	
LAWS 6096 [1.0]	Thesis Proposal	
5. 0.5 credit from:		0.5
LAWS 6002 [0.5]	Law, Regulation and Governance	
LAWS 6003 [0.5]	Human Rights, Citizenship and Global Justice	
LAWS 6004 [0.5]	Crime, Law, and Security	
6. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
7. 0.5 credit in:		0.5
A relevant political economy course from the approved list		
8. 0.0 credits in:		0.0
LAWS 6909 [0.0]	Ph. D. Thesis (must be successfully defended at an oral examination.)	

Total Credits 4.5

Comprehensive Examination and Thesis Proposal

As indicated above, each doctoral candidate must successfully write and pass a field comprehensive examination (LAWS 6095 [1.0]). The examination will focus on the relevant theoretical and methodological issues related to the candidate's field of study:

1. Crime, Law and Security
2. Human Rights, Citizenship and Global Justice
3. Law, Regulation and Governance

The examination can take a variety of forms including, for example, a major paper, a take-home examination, or a course design, each of which may be required to be defended at an oral examination. The exact format of the comprehensive examination is at the discretion of the student's supervisory committee in consultation with the student. This committee will also form the examining board of the comprehensive examination. Evaluation is on the basis of Satisfactory/Unsatisfactory. LAWS 6095 [1.0] will normally be completed no later than the end of the fall of the second year of registration in the program. Failure to

complete the examination successfully will result in denial of permission to continue in the program.

Also as indicated above, each doctoral candidate must successfully complete and defend a thesis proposal (LAWS 6096 [1.0]). The proposal must be written after the completion of the other course requirements, and normally should be completed by the end of the second year of doctoral study. The proposal is defended at an oral examination conducted by the supervisory committee. Evaluation is on the basis: Pass/Fail. The proposal must be successfully defended before the candidate can register in the Ph.D. Thesis LAWS 6909.

Period of Study

This program is designed to be completed in four years of full-time study. Students admitted to part-time study will normally complete all requirements within eight years of registration.

Selection of Courses in Related Disciplines

In addition to the graduate courses offered by the Department of Law and Legal Studies, students in the Ph.D. program are permitted to take up to 1.0 credit of courses in a related discipline, in consultation with the Graduate Supervisor.

Students should be aware that the number of spaces in graduate courses offered by other departments may be limited, and that registration may be conditional upon obtaining the prior approval of the department concerned. It is the student's responsibility to ensure that permission is obtained from the appropriate department prior to registering in any of the department's courses.

For an up-to-date listing of offerings and course descriptions in other departments, please consult the graduate calendar and the class schedule at <https://central.carleton.ca>.

Regulations

See the General Regulations section of this Calendar.

Guidelines for Completion of Master's Degree

Full-time students are expected to complete the required two courses LAWS 5000 and LAWS 5001 and either an additional 2.0 credits (for those following the thesis program), or an additional 3.0 credits (for those following the research essay program) by the end of the second term of registration. The thesis or research essay should normally be submitted by the end of the fourth term of study.

Part-time students are expected to complete the required two courses LAWS 5000 and LAWS 5001 and either an additional 2.0 credits (for those following the thesis program) or an additional 3.0 credits (for those following the research essay program) by the end of their third year of study. The thesis or research essay should normally be submitted by the end of the fifth year of study.

Regulations

See the General Regulations section of this Calendar.

Doctoral students must normally obtain a grade of B- or better in each course counted toward the fulfillment of the requirements of the degree.

Admission - M.A.

The requirement for admission into the M.A. program in Legal Studies is an Honours bachelor's degree or the equivalent, with at least high honours standing.

Applicants will be considered for admission on the basis of their academic background and standing. Where relevant, previous professional experience may be taken into account.

The Supervisor of Graduate Studies may, in some circumstances, recommend that applicants with exceptional promise who have less than BA (Honours) status be admitted into a qualifying-year program designed to raise their standing to honours status.

Applicants without a background in law may be required to complete one or more designated courses from the department's undergraduate program before taking courses towards the master's degree.

Application deadlines can be found at: <https://gsapplications.carleton.ca>

Admission - Ph.D.

Applicants will normally hold a master's degree (or equivalent) with at least an A- average. Given the interdisciplinary nature of the department and the graduate program, applications are accepted from a wide variety of backgrounds, including, but not limited to, legal studies, political science, history, criminology, sociology, women's studies and philosophy. In cases of uncertainty, potential applicants are encouraged to contact the Graduate Supervisor as to the suitability of their background. Depending on their academic background, applicants may be asked to complete course work in addition to the Ph.D. program requirements.

Law (LAWS) Courses

Note: some graduate courses may also be open to interested fourth-year students with permission of the Department.

LAWS 5000 [0.5 credit]

Theories of Law and Social Transformation

Examines three groups of theories of law (liberal, sociological and Marxist) focusing on different ways law is conceived as an object of inquiry and on different accounts of trajectories of legal development. Potential of law for realizing or inhibiting social change provides analytic framework.

LAWS 5001 [0.5 credit]**Legal Method and Social Inquiry**

Introduces problems of research strategy and methods. Explores contrasting methodologies in legal research; evaluates methodologies employed in understanding legal reasoning, discourses, and practices. Includes seminars in which participants present outlines of their own research projects, focusing on methodologies and research questions.

LAWS 5002 [0.5 credit]**Law and Gender Relations**

Examines theoretical approaches informed by significance of gender to structure and operation of law. Concepts such as essentialism, difference, cultural determination, and social construction of gender relations examined in context of contemporary feminist debates. Focus on understanding and facility with feminist analysis and methodology.

LAWS 5003 [0.5 credit]**Law, Economy and Society**

Addresses the relationship between law, economy, and society. Competing theoretical accounts of the relationship between legal regulation and social and economic change explored through selected historical and contemporary case studies.

LAWS 5004 [0.5 credit]**Law, Crime and Social Order**

Examines issues of crime control and state security through topical, in-depth investigations into contemporary problems. Focus is on critically analyzing the criminal justice system, and crime control strategies, as order maintenance /social control.

LAWS 5005 [0.5 credit]**Law, State and Politics**

Examines theoretical explanations of relationships between law, state and politics. Selected areas such as rights theory, rule of law, separation of powers or judicial review may provide focus.

LAWS 5006 [0.5 credit]**Historical Perspectives on Law and Society**

Examines historical relationship between social forces, law and legal institutions and utility of historical forms of knowledge and methods to legal studies. Surveys selected issues in private, public and criminal law.

LAWS 5007 [0.5 credit]**Race, Ethnicity and the Law**

Examines ways race and racism interact with gender and class in shaping legal system. Explores ways legal system institutionalizes racism and potential for using the legal system to combat racism. Selected areas such as immigration law and native rights may be used to illustrate themes.

LAWS 5008 [0.5 credit]**Consuming Passions: The Regulation of Consumption, Appearance and Sexuality**

Examines rise of consumption and private pleasures and their regulation and self-regulation. Social history of regulation of two fields of consumption: surfaces of the person: personal appearance, in particular of dress, the body, sexuality; and intakes of the body, focusing on food, alcohol, drugs.

Also listed as SOCI 5204.

LAWS 5100 [0.5 credit]**Advanced Problems in Legal Philosophy**

Studies in legal theory and analyses of law advanced by Hart, Dworkin, and others, and legal concepts: for example, principles, rights, duties, liability, etc. Precise course content will vary from year to year and will be announced at the beginning of the term.

Also listed as PHIL 5100.

Prerequisite(s): either LAWS 3105 or LAWS 3101 (PHIL 3101) and LAWS 3102 (PHIL 3102), or permission of the Department.

LAWS 5200 [0.5 credit]**International Economic Law: Regulation of Trade and Investment**

Study of regulation of international economic activity. Discussion of relevant international institutions, legal aspects of integration, governmental regulation of trade and investment.

Also listed as INAF 5507.

Prerequisite(s): Open only to students in their master's year who have not studied international economic law.

LAWS 5302 [0.5 credit]**Feminism, Law and Social Transformation**

Drawing on contemporary cases and/or historical contexts to explore limits and impact of feminist legal engagement. Race, class, disability, sexuality and other social categories and changing feminist conceptions of law and sites of legal relations, politics and activism: the meaning of social transformation.

LAWS 5305 [0.5 credit]**Crime, Social Change and Criminal Law Reform**

Political, practical and ideological dimensions of criminal law reform and activism undertaken by individuals, groups and the state to achieve social transformation. Reform initiatives are considered in relation to their effects on race, class, gender, sexuality, disability and other sites of difference and discrimination.

LAWS 5306 [0.5 credit]**Police and Capital**

The idea of 'police' as a general historical project aimed at the fabrication of social order and the development of liberal philosophy, political economy and security. Contemporary public and private security provision considered in light of commodification, class conflict, and risk thinking.

Also listed as SOCI 5305.

LAWS 5500 [0.5 credit]**The Canadian Constitution**

Familiarizes students with terminology, principles, and doctrines of judicial interpretation of Constitution Acts 1867-1982 and other constitutional statutes. Emphasis on division of legislative powers in the Canadian federation. Prerequisite(s): open only to graduate students in their master's year who have not previously studied Canadian constitutional law.

LAWS 5603 [0.5 credit]**International Law: Theory and Practice**

Legal principles governing international relations; emphasis on different theoretical, historical and political perspectives, such as Natural Law, Positivism, Critical Legal Studies, TWAIL, Feminism, Marxism. Specific case studies or topics are examined to critically interrogate the foundations and practices of international law.

Also listed as INAF 5505.

LAWS 5662 [0.5 credit]**Law, Regulation and Governance**

Historical and contemporary roles of law and regulation in processes, practices and discourses of governance. Law and state; domestic and global governance; diversity of law-governance relationships; law as a constituent force, enforcement mechanism and a distinctive product of governance.

Also offered, with different requirements as appropriate, as LAWS 6002, for which additional credit is precluded.

LAWS 5663 [0.5 credit]**Human Rights, Citizenship and Global Justice**

The implications of law in selected issues involving human rights, citizenship and global justice. Topics may include justification and legitimation of human rights, contemporary citizenship, struggles for global justice, recognition and democracy, and post-nationalism and global economic regulation.

Also offered with different requirements where appropriate, as LAWS 6003, for which additional credit is precluded.

LAWS 5664 [0.5 credit]**Crime, Law and Security**

Contemporary debates around crime, criminal justice and security as mediated through law. The interrelationship between the politics, process and reform of criminal justice in a socio-legal context.

Also offered as LAWS 6004, with different requirements where appropriate, for which additional credit is precluded.

LAWS 5700 [0.5 credit]**Theories of Conflict Resolution**

An introduction to the field of conflict studies, negotiation and mediation theory including: analyzing and resolving conflict, negotiation styles, orientations and models of mediation, alternative dispute resolution, building consensus, current issues and trends in the field of conflict studies.

LAWS 5701 [0.5 credit]**Introduction to Conflict Resolution and Mediation**

Introduction to the practice of negotiation and mediation including: contextualizing conflict resolution, understanding how to negotiate and mediate, determining the role of the negotiator/ mediator, reviewing the current state of mediation and conflict resolution, and understanding the importance of a theory-informed practice.

Includes: Experiential Learning Activity

LAWS 5702 [0.5 credit]**Advanced Conflict Resolution and Mediation**

Building upon the theory and skills of conflict resolution and mediation introduced in LAWS 5701. Students will learn to convene a mediation, analyze the level of conflict, design a conflict resolution process, co-mediate, and facilitate a multi-party problem solving session.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5701.

LAWS 5703 [0.5 credit]**Organizational Conflict and System Design**

Students will learn to apply conceptual frameworks to the diagnosis and assessment of organizational conflict, develop and implement appropriate intervention programs and strategies, and design conflict management systems for organizations.

Includes: Experiential Learning Activity

LAWS 5704 [0.5 credit]**Multi-Party, Multi-Issue Conflict Resolution and Consensus Building**

Using case studies where mediators have successfully assisted competing interest groups in finding mutual-gains resolutions to conflicts, students will expand upon their personal skills of crisis intervention, group facilitation, assisted negotiation, dispute resolution process design and coaching.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5701 and LAWS 5702 or equivalent.

LAWS 5705 [0.5 credit]**Mediation in Family Matters**

Students will examine family dynamics and family conflict and explore conflict within intact families as well as conflict that arises when parties separate. The practical aspects of mediation such as ethics, professional standards and screening, as well as intake and outcome documents will be discussed.

Includes: Experiential Learning Activity

LAWS 5706 [0.5 credit]**Special Topics in Conflict Resolution**

Topics of contemporary controversy relating to conflict and dispute resolution. Topics vary from year to year and may include bargaining, negotiation, legal issues, restorative justice, and international issues.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700 or LAWS 5701 or permission of the department.

LAWS 5708 [0.5 credit]**Applied Research Project**

Independent research in the theory and practice of conflict analysis, prevention or intervention, including system design, process intervention, and evaluation. The project must represent the candidate's independent study after being admitted to the program. Previous work may be used only as introductory or background material.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700, LAWS 5701, LAWS 5702, LAWS 5703, LAWS 5704.

LAWS 5709 [0.5 credit]**Skills Assessment**

An evaluation of a student's readiness to mediate disputes through a simulated mediation. Students are prepared by way of practice sessions and debriefings. Must be completed within one year after completion of course work.

Includes: Experiential Learning Activity

Prerequisite(s): Completion of three credits in Graduate Diploma in Conflict Resolution courses.

LAWS 5710 [0.5 credit]**Directed Readings in Conflict and Dispute Resolution**

A reading course on selected topics may be arranged with the permission of the GDCR Director.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700 and LAWS 5701, written acceptance by a faculty member, and permission of the Department.

LAWS 5900 [0.5 credit]**Tutorials/Directed Readings in Law**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

LAWS 5901 [0.5 credit]**Tutorial/Directed Readings in Law**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

LAWS 5903 [0.5 credit]**Contemporary Topics in Legal Studies**

A research seminar which explores a selected topic from current debates in legal studies. Students should check with the Department regarding the topic offered.

LAWS 5904 [0.5 credit]**Contemporary Topics in Legal Studies**

A research seminar which explores a selected topic from current debates in legal studies.

LAWS 5908 [1.0 credit]**M.A. Research Essay**

Includes: Experiential Learning Activity

LAWS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

LAWS 6000 [0.5 credit]**Doctoral Seminar in Legal Studies**

Analysis of the major themes, approaches and literature in contemporary legal and social theory.

LAWS 6001 [0.5 credit]**Proseminar in Legal Studies**

A seminar which meets every two weeks throughout the academic year. Based on presentations of papers and works in progress by faculty, students and invited guests, as well as assigned readings on issues that deal with current research in legal studies.

LAWS 6002 [0.5 credit]**Law, Regulation and Governance**

Historical and contemporary roles of law and regulation in processes, practices and discourses of governance. Law and state; domestic and global governance; diversity of law-governance relationships; law as a constituent force, enforcement mechanism and a distinctive product of governance.

Also offered as LAWS 5662, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6003 [0.5 credit]**Human Rights, Citizenship and Global Justice**

The implications of law in selected issues involving human rights, citizenship and global justice. Topics may include justification and legitimation of human rights, contemporary citizenship, struggles for global justice, recognition and democracy, and post-nationalism and global economic regulation.

Also offered as LAWS 5663, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6004 [0.5 credit]**Crime, Law, and Security**

Contemporary debates around crime, criminal justice and security as mediated through law. The interrelationship between the politics, process and reform of criminal justice in a socio-legal context.

Also offered as LAWS 5664, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6010 [0.5 credit]**Directed Readings in Legal Studies**

Advanced directed readings in selected areas of legal studies, involving presentation of papers as the basis for discussion with the course instructor.

LAWS 6095 [1.0 credit]

Field Comprehensive

The field comprehensive examination will focus on the relevant theoretical and/or methodological issues related to the field of study. The examination can take a variety of forms and will be decided by the supervisory committee in consultation with the student.

The form of the exam will be in accordance with departmental policy.

LAWS 6096 [1.0 credit]

Thesis Proposal

The thesis proposal is written after completion of the other course requirements, and is normally completed by the end of the second year of doctoral study. The proposal is defended at an oral examination conducted by the supervisory committee. Graded Sat/Uns.

LAWS 6909 [0.0 credit]

Ph. D. Thesis

Includes: Experiential Learning Activity

Linguistics

This section presents the requirements for programs in:

- M.A. Linguistics
- Ph.D. Linguistics, Language Documentation and Revitalization
- Graduate Diploma in Linguistics

Program Requirements

M.A. Linguistics (5.0 credits)

Students will establish their programs in consultation with the School's supervisor of graduate studies. Each candidate will select one of the following program paths:

Requirements - Thesis Pathway (5.0 credits)

1. 0.5 credit from:	0.5
LING 5007 [0.5]	Phonology
LING 5077 [0.5]	Phonetics
2. 0.5 credit from:	0.5
LING 5004 [0.5]	Syntax
LING 5005 [0.5]	Morphology
LING 5505 [0.5]	Semantics
3. 0.5 credit from:	0.5
LING 5004 [0.5]	Syntax (If not already used to fulfil Item 2 above)
LING 5005 [0.5]	Morphology (If not already used to fulfil Item 2 above)
LING 5007 [0.5]	Phonology (If not already used to fulfil Item 1 above)
LING 5077 [0.5]	Phonetics (If not already used to fulfil Item 1 above)
LING 5505 [0.5]	Semantics (If not already used to fulfil Item 2 above)
LING 5608 [0.5]	Language and Cognition
LING 5704 [0.5]	Linguistic Analysis, Culture and Cognition
4. 1.0 credit in LING at the 5000 level, or chosen from the list of optional courses:	1.0
CGSC 5005 [0.5]	Cognition and Neuroscience

CGSC 5101 [0.5]	Experimental Methods and Statistics
FREN 5100 [0.5]	Le monde francophone: linguistique et littérature
FREN 5300 [0.5]	Méthodologie de la recherche
5. 2.5 credits in:	2.5
LING 5909 [2.5]	M.A. Thesis
Total Credits	5.0

Requirements - Research Essay Pathway (5.0 credits)

1. 0.5 credit from:	0.5
LING 5007 [0.5]	Phonology
LING 5077 [0.5]	Phonetics
2. 0.5 credit from:	0.5
LING 5004 [0.5]	Syntax
LING 5005 [0.5]	Morphology
LING 5505 [0.5]	Semantics
3. 1.0 credit from:	1.0
LING 5004 [0.5]	Syntax (If not already used to fulfil Item 2 above)
LING 5005 [0.5]	Morphology (If not already used to fulfil Item 2 above)
LING 5007 [0.5]	Phonology (If not already used to fulfil Item 1 above)
LING 5077 [0.5]	Phonetics (If not already used to fulfil Item 1 above)
LING 5505 [0.5]	Semantics (If not already used to fulfil Item 2 above)
LING 5608 [0.5]	Language and Cognition
LING 5704 [0.5]	Linguistic Analysis, Culture and Cognition
4. 2.0 credits in LING at the 5000 level, or chosen from the list of optional courses:	2.0
CGSC 5005 [0.5]	Cognition and Neuroscience
CGSC 5101 [0.5]	Experimental Methods and Statistics
FREN 5100 [0.5]	Le monde francophone: linguistique et littérature
FREN 5300 [0.5]	Méthodologie de la recherche
5. 1.0 credit in:	1.0
LING 5908 [1.0]	Research Essay
Total Credits	5.0
Ph.D. Linguistics, Language Documentation and Revitalization (3.0 credits)	
Students will establish their programs in consultation with the School's supervisor of graduate studies.	
Requirements:	
1. 1.0 credit in:	1.0
LING 6801 [1.0]	Language Documentation
2. 0.5 credit in:	0.5
ALDS 6407 [0.5]	Revitalization Policy
3. 1.5 credits from:	1.5
ALDS 5202 [0.5]	Curriculum in Language Teaching
ALDS 5302 [0.5]	Second Language Acquisition and Learning Theories
ALDS 5407 [0.5]	Language Policy and Planning
ALDS 5501 [0.5]	Language Testing and Assessment

ANTH 5106 [0.5]	North American Indigenous Peoples	
ANTH 5208 [0.5]	Anthropology of Indigeneity	
ANTH 5210 [0.5]	Special Topics in Indigenous Studies	
ANTH 5305 [0.5]	Special Topics in Ethnography	
CGSC 5101 [0.5]	Experimental Methods and Statistics	
LING 5004 [0.5]	Syntax	
LING 5005 [0.5]	Morphology	
LING 5007 [0.5]	Phonology	
LING 5077 [0.5]	Phonetics	
LING 5505 [0.5]	Semantics	
LING 5608 [0.5]	Language and Cognition	
LING 5704 [0.5]	Linguistic Analysis, Culture and Cognition	
4. 0.0 credit in:		0.0
LING 6907 [0.0]	Doctoral Comprehensive Examination	
LING 6908 [0.0]	Qualifying Paper	
5. 0.0 credits in:		
LING 6909 [0.0]	Ph.D. Thesis	

Total Credits **3.0**

Graduate Diploma in Linguistics (2.5 credits)

Requirements:

1. 0.5 credit from:		0.5
LING 5007 [0.5]	Phonology	
LING 5077 [0.5]	Phonetics	
2. 0.5 credit from:		0.5
LING 5004 [0.5]	Syntax	
LING 5005 [0.5]	Morphology	
LING 5505 [0.5]	Semantics	
3. 0.5 credit from:		0.5
LING 5004 [0.5]	Syntax (If not already used to fulfil Item 2 above)	
LING 5005 [0.5]	Morphology (If not already used to fulfil Item 2 above)	
LING 5007 [0.5]	Phonology (If not already used to fulfil Item 1 above)	
LING 5077 [0.5]	Phonetics (If not already used to fulfil Item 1 above)	
LING 5505 [0.5]	Semantics (If not already used to fulfil Item 2 above)	
4. 1.0 credit in LING at the 5000 level, or chosen from the following list:		1.0
ALDS 5102 [0.5]	Systemic-Functional Linguistics	
ALDS 5207 [0.5]	Pedagogical Grammar in Second and Foreign Language (SL/FL) Teaching	
ALDS 5301 [0.5]	Language and Cognition	
ALDS 5302 [0.5]	Second Language Acquisition and Learning Theories	
ALDS 5303 [0.5]	Linguistic Analysis, Culture and Cognition	
ALDS 5407 [0.5]	Language Policy and Planning	
ANTH 5106 [0.5]	North American Indigenous Peoples	
ANTH 5107 [0.5]	Issues in North American Ethnohistory	

ANTH 5208 [0.5]	Anthropology of Indigeneity	
ANTH 5210 [0.5]	Special Topics in Indigenous Studies	
ANTH 5305 [0.5]	Special Topics in Ethnography	
ANTH 5906 [0.5]	Fieldwork	
CGSC 5002 [0.5]	Experimental Research in Cognition	
CGSC 5003 [0.5]	Language and Cognition	
CGSC 5005 [0.5]	Cognition and Neuroscience	
CGSC 5101 [0.5]	Experimental Methods and Statistics	
CGSC 5103 [0.5]	Formal Methods	
CGSC 5303 [0.5]	Linguistic Analysis, Culture and Cognition	
ENGL 5207 [0.5]	Studies in Old English	
ENGL 5208 [0.5]	Studies in Middle English Literature	
ENGL 5303 [0.5]	Studies in Early Modern Literature I	
ENGL 5305 [0.5]	Studies in Early Modern Literature II	
FREN 5412 [0.5]	Diversité du français	
FREN 5414 [0.5]	Analyse du français	
FREN 5415 [0.5]	Variation du français	
FREN 5004 [0.5]	Linguistique du français canadien	
FREN 5100 [0.5]	Le monde francophone: linguistique et littérature	
FREN 5300 [0.5]	Méthodologie de la recherche	
5. 0.0 credit in:		0.0
LING 5907 [0.0]	Graduate Diploma Capstone Examination	

Total Credits **2.5**

Admission

The normal requirement for admission to the master's program is a BA Honours degree in linguistics or a related field (e.g. applied linguistics, cognitive science, psychology, anthropology).

Students must have achieved a minimum of B+ in a relevant field and B overall in their academic work in the last two years of study.

Accelerated Pathway

The accelerated pathway in the School of Linguistics and Language Studies is a flexible and individualized plan of graduate study for students in their final year of a Carleton B.A. Honours Linguistics degree. Students in their third year of study in the B.A. Honours degree in Linguistics should consult with both the undergraduate advisor and the graduate supervisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies. Students may receive advanced standing with transfer of credit up to 1.0 credit, which can reduce their time to completion in the MA program. The Accelerated Pathway requirements are two LING courses at the 5000 level and a minimum overall CGPA of B+.

Admission

The normal requirement for admission to the PhD in Linguistics, Language Documentation and Revitalization

program is a Master's degree in Linguistics with an overall GPA of at least A-.

Admission

In order to apply for admission into the Graduate Diploma in Linguistics, students must first be enrolled in a graduate program at Carleton. Application for those programs is independent of application for the Diploma. The normal requirement for admission to the Diploma is undergraduate or graduate coursework in linguistics or closely related fields. Preference will be given for students enrolled in one of these programs: Applied Linguistics and Discourse Studies, Anthropology, Cognitive Science, English, or French.

Regulations

See the General Regulations section of this Calendar, and in addition the following:

- Candidates must maintain a grade point average of 10.0 or better throughout this program.

M.A. Regulations

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.A. Linguistics including all specializations/concentrations is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Ph.D. Regulations

Residence Requirement

Ph.D. candidates must normally be registered full-time in a minimum of six terms to satisfy the residence requirement. If a candidate is registered part-time, the minimum residence requirement is eight terms.

Guidelines for Completion of Ph.D.

Full-time Ph.D. students are normally expected to complete their requirements in four calendar years. All part-time students must complete their requirements within a period of nine years, as set out in the General Regulations in the Graduate Calendar.

Linguistics (LING) Courses

LING 5004 [0.5 credit]

Syntax

A graduate seminar in contemporary syntactic theory. Includes: Experiential Learning Activity

LING 5005 [0.5 credit]

Morphology

A graduate seminar in contemporary morphological theory. Includes: Experiential Learning Activity

LING 5007 [0.5 credit]

Phonology

A graduate seminar in contemporary phonological theory. Includes: Experiential Learning Activity

LING 5009 [0.5 credit]

Special Topic in Linguistics

Examination of a topic or more specialized area in linguistics or language study. Topic to be announced. Repeatable for credit when the topic changes.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4009, for which additional credit is precluded.

LING 5077 [0.5 credit]

Phonetics

A graduate seminar in contemporary phonetics.

Includes: Experiential Learning Activity

LING 5412 [0.5 credit]

Diversité du français

Études des variétés du français, dans ses dimensions spatiales. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5412.

Also offered at the undergraduate level, with different requirements, as LING 4412 and FREN 4412., for which additional credit is precluded.

LING 5413 [0.5 credit]

Diachronie du français

Étude du français, dans ses dimensions historiques.

Le contenu précis de ce cours varie selon les années.

Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5413.

Also offered at the undergraduate level, with different requirements, as LING 4413 and FREN 4413., for which additional credit is precluded.

LING 5414 [0.5 credit]

Analyse du français

Étude du français, dans ses dimensions morphologiques, syntaxiques ou phonologiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5414.

Also offered at the undergraduate level, with different requirements, as LING 4414 and FREN 4414, for which additional credit is precluded.

LING 5415 [0.5 credit]

Variation du français

Étude des variations internes de la langue, dans ses dimensions orales et écrites. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5415.

Also offered at the undergraduate level, with different requirements, as FREN 4415 and LING 4415., for which additional credit is precluded.

LING 5505 [0.5 credit]**Semantics**

A graduate seminar in contemporary semantics.

Includes: Experiential Learning Activity

Also listed as PHIL 5650.

LING 5510 [0.5 credit]**Lexical Semantics**

Study of the meaning of words. Topics may include lexical decomposition, meaning variation, lexical relations, and lexical aspect.

Includes: Experiential Learning Activity

Also listed as PHIL 5660.

Also offered at the undergraduate level, with different requirements, as LING 4510 and PHIL 4055, for which additional credit is precluded.

LING 5601 [0.5 credit]**Cognitive Neuroscience of Language**

Further study of psychological and neurolinguistic mechanisms of adult language processing. May include topics from first language acquisition.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4601, for which additional credit is precluded.

LING 5603 [0.5 credit]**First Language Acquisition**

Advanced topics in language acquisition and development, and the relative contributions of the environment, cognitive development, and inborn knowledge.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4603, for which additional credit is precluded.

LING 5605 [0.5 credit]**Psycholinguistic Research Methods**

Introduction to experimental methodologies used in current psycholinguistic studies. Topics include experimental design and techniques, descriptive statistics, and interpreting and reporting research findings.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4605, for which additional credit is precluded.

LING 5606 [0.5 credit]**Statistics for Language Research**

Application of statistical procedures to analysis of language data and to problems of measurement in experimental linguistics, applied linguistics, psycholinguistics, and related fields.

Includes: Experiential Learning Activity

Also listed as ALDS 5604.

Also offered at the undergraduate level, with different requirements, as ALDS 4606 and LING 4606, for which additional credit is precluded.

LING 5608 [0.5 credit]**Language and Cognition**

Structure and representation of linguistic knowledge in human cognition. Evidence from child language acquisition, language processing and language impairment.

Includes: Experiential Learning Activity

Also listed as ALDS 5301 and CGSC 5003.

LING 5704 [0.5 credit]**Linguistic Analysis, Culture and Cognition**

Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

Includes: Experiential Learning Activity

Also listed as ALDS 5303.

LING 5801 [0.5 credit]**Linguistic Field Methods**

With a language consultant, students discover the phonological, morphological, and syntactic structures of the target language using linguistic elicitation. Language will vary from year to year but will normally be a non-European language. Language documentation, data management, ethical issues surrounding research in Indigenous communities.

Includes: Experiential Learning Activity

Also listed as ALDS 5801.

Also offered at the undergraduate level, with different requirements, as LING 4801, for which additional credit is precluded.

LING 5802 [0.5 credit]**Historical Linguistics: English**

A theory-intensive course that will study the development of English starting with Proto-Indo-European progressing through Common Germanic to the stages of English itself. Topics include phonological sound changes, phonemic inventories, and morphological and syntactic theory.

Also listed as ENGL 5101.

Also offered at the undergraduate level, with different requirements, as LING 4802, for which additional credit is precluded.

LING 5907 [0.0 credit]**Graduate Diploma Capstone Examination**

Students must pass an oral exam that will evaluate their knowledge of linguistic theory. Students will be provided with a reading list of literature in theoretical linguistics that they should be familiar with, based on their core linguistics courses and their research interests.

Includes: Experiential Learning Activity

LING 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

LING 5909 [2.5 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

LING 6801 [1.0 credit]**Language Documentation**

The core PhD seminar in Language Documentation. Topics include the detailed examination of foundational texts, current theories, research methodologies, and best practices in language documentation. Includes significant focus on interactions with language communities, field methods, and related ethics.

Includes: Experiential Learning Activity

LING 6907 [0.0 credit]**Doctoral Comprehensive Examination**

Students must pass an oral comprehensive exam that will evaluate their knowledge of linguistic theory. Students will be provided with a reading list of literature in theoretical linguistics that they should be familiar with, based on their core linguistics courses and their research interests.

Includes: Experiential Learning Activity

LING 6908 [0.0 credit]**Qualifying Paper**

Students are required to write a Qualifying Paper (QP) that assesses their potential for conducting original research. Their QP must include aspects of both linguistic theory and language documentation and/or revitalization, although the proportion devoted to each component will vary from student to student.

Includes: Experiential Learning Activity

LING 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Management

This section presents the requirements for programs in:

- M.Sc. Management
- M.Sc. Management with Collaborative Specialization in Climate Change
- Ph.D. Management

Program Requirements**M.Sc.****Management (5.0 credits)****Requirements (5.0 credits):**

1. 1.5 credits in:	1.5
BUSI 5980 [0.5]	Foundations of Management Theory and Research
BUSI 5981 [0.5]	Statistics for Business Research
BUSI 5982 [0.5]	Research Methodology in Business
2. 0.5 credit from:	0.5
BUSI 5983 [0.5]	Qualitative Research Design
BUSI 5984 [0.5]	Quantitative Research Design
3. 1.0 credit from:	1.0
BUSI 5080 [0.5]	Seminar in Accounting I
BUSI 5081 [0.5]	Seminar in Accounting II

BUSI 5180 [0.5]	Seminar in Management I: Modern Organization Theory
BUSI 5181 [0.5]	Seminar in Management II: Current Topics in Organizational Behaviour
BUSI 5280 [0.5]	Seminar in Marketing I: Management and Strategy
BUSI 5281 [0.5]	Seminar in Marketing II: Consumer Behaviour
BUSI 5380 [0.5]	Seminar in Management of Production/Operations I: Strategic Management of Production Systems
BUSI 5381 [0.5]	Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface
BUSI 5383 [0.5]	Systems Optimization: Methods and Models
BUSI 5480 [0.5]	Seminar in Information Systems I: Research Issues
BUSI 5481 [0.5]	Seminar in Information Systems II: Current Trends
BUSI 5580 [0.5]	Seminar in Finance I: Topical Issues in Investments
BUSI 5581 [0.5]	Seminar in Finance II: Theories and Empirical Methods in Corporate Finance
BUSI 5780 [0.5]	Seminar in International Business I: International Markets and Strategy
BUSI 5781 [0.5]	Seminar in International Business II: Managing in a Global Environment

or elective courses taken with the permission of the Director of the Graduate Research Program

4. Completion of the Research Tutorial	
5. 2.0 credits in:	2.0
BUSI 5989 [2.0]	M.Sc. Thesis
Total Credits	5.0

M.Sc. Management with Collaborative Specialization in Climate Change (5.0 credits)**Requirements (5.0 credits):**

1. 1.0 credit from:	1.0
CLIM 5000 [1.0]	Climate Collaboration
2. 0.0 credit in:	
CLIM 5800 [0.0]	Climate Seminar Series
3. 1.5 credits in:	1.5
BUSI 5980 [0.5]	Foundations of Management Theory and Research
BUSI 5981 [0.5]	Statistics for Business Research
BUSI 5982 [0.5]	Research Methodology in Business
4. 0.5 credit from:	0.5
BUSI 5983 [0.5]	Qualitative Research Design
BUSI 5984 [0.5]	Quantitative Research Design
5. Completion of the Research Tutorial	
6. 2.0 credits in:	2.0
BUSI 5989 [2.0]	M.Sc. Thesis (in the specialization)
Total Credits	5.0

Research Tutorial

Students working with their supervisors will identify appropriate research topics and questions and will be mentored on how to conduct their thesis research. Research seminar attendance and participation are required.

Thesis

BUSI 5989 [2.0] M.Sc. Thesis is equivalent to 2.0 credits and should relate to issues consistent with the general focus of the M.Sc. program. The thesis must represent the results of the candidate's independent research undertaken after being admitted to graduate studies at Carleton University's Sprott School of Business. Previous work of the candidate may be used only as introductory or background material for the thesis.

A candidate may carry on research work related to the thesis off-campus, provided that the work is approved in advance and arrangements have been made for regular supervision of research thesis activities with the Director of Graduate Research Programs.

All students require the Sprott School's approval for their research topic.

Each candidate submitting a thesis will be required to pass an oral examination on the subject of the thesis.

Transfer from the Master's to the Ph.D. Program

Students enrolled full-time in the M.Sc. in Management program at Carleton University may be permitted to transfer into the Ph.D. program without completing the master's program, provided they meet the following conditions:

- Completion of 2.5 credits of master's courses with a minimum average of A
- Have demonstrated exceptional research potential
- Make a formal application for admission to the Ph.D. program no later than the third term of initial registration in the M.Sc. program
- Have permission of the Director of Graduate Research Programs.

Ph.D. Management (5.0 credits)

This degree can be pursued on a full-time or part-time basis.

Requirements:

1. 1.5 credits in research and analysis methods	1.5
2. 1.5 credits in seminar courses in functional areas of business, including at least one functional pair of courses	1.5
3. 1.5 credits from a selection of course electives approved by the thesis supervisor or mentor	1.5
4. Presentation and oral defence of the thesis proposal	0.5
5. A Thesis, which must be defended at an oral examination	0.0
6. One written and one oral comprehensive examination	
7. Participation in the Sprott School of Business research seminar series	
8. Participation in the Sprott School of Business teaching seminar series	

9. Classroom teaching or equivalent research supported seminar delivery to professional audiences

Total Credits **5.0**

Specific course requirements

All students in the doctoral program are required to complete the following courses successfully:

1. 1.5 credits (BUSI 6902 and BUSI 6905 are mandatory) in:	1.5
BUSI 6902 [0.5]	Research Methodology in Business
BUSI 6903 [0.5]	Qualitative Research Design
BUSI 6904 [0.5]	Quantitative Research Design
BUSI 6905 [0.5]	Advanced Statistical Methods for Business Research
2. 1.5 credits in seminars including at least one functional pair of courses, from the following doctoral seminar courses:	1.5
BUSI 6000 [0.5] & BUSI 6001 [0.5]	Seminar in Accounting I Seminar in Accounting II
BUSI 6100 [0.5] & BUSI 6101 [0.5]	Seminar in Management I: Modern Organization Theory Seminar in Management II: Current Topics in Organizational Behaviour
BUSI 6103 [0.5]	Seminar in Strategic Management
BUSI 6200 [0.5] & BUSI 6201 [0.5]	Seminar in Marketing I: Management and Strategy Seminar in Marketing II: Consumer Behaviour
BUSI 6300 [0.5] & BUSI 6301 [0.5]	Seminar in Management of Production/Operations I: Strategic Management of Production Systems Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface
BUSI 6400 [0.5] & BUSI 6401 [0.5]	Seminar in Information Systems I: Research Issues Seminar in Information Systems II: Current Trends
BUSI 6500 [0.5] & BUSI 6501 [0.5]	Seminar in Finance I: Topical issues in Investments Seminar in Finance II: Theories and Empirical Methods in Corporate Finance
BUSI 6600 [0.5]	Entrepreneurship
BUSI 6700 [0.5] & BUSI 6705 [0.5]	Seminar in International Business I: International Markets and Strategy Seminar in International Business II: Managing in a Global Environment
3. The remaining 1.5 credits will be electives that are chosen with the approval of the thesis supervisor to assist in the thesis research process. Courses may be chosen from the list below, from the lists above or from outside the School in a supporting discipline with permission.	1.5
BUSI 6009 [0.5]	Special Topics in Accounting
BUSI 6104 [0.5]	Managing the Change Process
BUSI 6105 [0.5]	Women in Management
BUSI 6109 [0.5]	Special Topics in Management
BUSI 6209 [0.5]	Special Topics in Marketing
BUSI 6303 [0.5]	Systems Optimization: Methods and Models

BUSI 6304 [0.5]	Management of Innovation and Technology	
BUSI 6306 [0.5]	Advanced Methods and Models of Management Science	
BUSI 6309 [0.5]	Special Topics in Operations Management	
BUSI 6409 [0.5]	Special Topics in Information Systems	
BUSI 6509 [0.5]	Special Topics in Finance	
BUSI 6709 [0.5]	Special Topics in International Business	
BUSI 6900 [0.5]	Directed Readings	
BUSI 6901 [0.5]	Special Topics	
BUSI 6910 [0.5]	Foundations of Management Theory and Research	
4. 0.5 credits in:		0.5
BUSI 6907 [0.5]	Ph.D. Thesis Tutorial	
5. 0.0 credit in:		0.0
BUSI 6909 [0.0]	Ph.D. Thesis	

Directed Reading: a student may, with the approval of his or her thesis supervisor, take up to two directed readings courses (BUSI 6900 Directed Readings). These courses should relate directly to the student's thesis work.

Second Point of Entry

Doctoral students who hold an M.Sc. in Management from Carleton University and have been admitted to the second point of entry are required to complete the following courses successfully:

1. 0.5 credit in:		0.5
BUSI 6905 [0.5]	Advanced Statistical Methods for Business Research	
2. 0.5 credit to complete a functional pair of courses (I+II), based on previous coursework or a course taken from item 3 or 4.		0.5
BUSI 6000 [0.5]	Seminar in Accounting I	
or BUSI 6001 [0.5]	Seminar in Accounting II	
BUSI 6100 [0.5]	Seminar in Management I: Modern Organization Theory	
or BUSI 6101 [0.5]	Seminar in Management II: Current Topics in Organizational Behaviour	
BUSI 6200 [0.5]	Seminar in Marketing I: Management and Strategy	
or BUSI 6201 [0.5]	Seminar in Marketing II: Consumer Behaviour	
BUSI 6300 [0.5]	Seminar in Management of Production/Operations I: Strategic Management of Production Systems	
or BUSI 6301 [0.5]	Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface	
BUSI 6400 [0.5]	Seminar in Information Systems I: Research Issues	
or BUSI 6401 [0.5]	Seminar in Information Systems II: Current Trends	
BUSI 6500 [0.5]	Seminar in Finance I: Topical issues in Investments	
or BUSI 6501 [0.5]	Seminar in Finance II: Theories and Empirical Methods in Corporate Finance	

BUSI 6700 [0.5]	Seminar in International Business I: International Markets and Strategy	
or BUSI 6705 [0.5]	Seminar in International Business II: Managing in a Global Environment	
3. 0.5 credit in functional seminars, from any of the courses listed above in item 2, or BUSI 6103 [0.5] Seminar in Strategic Management, or BUSI 6600 [0.5] Entrepreneurship. With departmental permission, students who have previously and successfully completed at least 1.0 credit in functional seminars at the masters level may replace this requirement with an appropriate graduate elective.		0.5
4. 0.5 credit in an elective chosen with the approval of the thesis supervisor to assist in the thesis research process. Courses may be chosen from the list below, from the lists above or from outside the School in a supporting discipline with permission.		0.5
BUSI 6009 [0.5]	Special Topics in Accounting	
BUSI 6104 [0.5]	Managing the Change Process	
BUSI 6105 [0.5]	Women in Management	
BUSI 6109 [0.5]	Special Topics in Management	
BUSI 6209 [0.5]	Special Topics in Marketing	
BUSI 6303 [0.5]	Systems Optimization: Methods and Models	
BUSI 6304 [0.5]	Management of Innovation and Technology	
BUSI 6306 [0.5]	Advanced Methods and Models of Management Science	
BUSI 6309 [0.5]	Special Topics in Operations Management	
BUSI 6409 [0.5]	Special Topics in Information Systems	
BUSI 6509 [0.5]	Special Topics in Finance	
BUSI 6709 [0.5]	Special Topics in International Business	
BUSI 6900 [0.5]	Directed Readings	
BUSI 6901 [0.5]	Special Topics	
BUSI 6910 [0.5]	Foundations of Management Theory and Research	
5. 0.5 credit in:		0.5
BUSI 6907 [0.5]	Ph.D. Thesis Tutorial	
6. 0.0 credit in:		0.0
BUSI 6909 [0.0]	Ph.D. Thesis	

Comprehensive Examinations

All Ph.D. candidates are required to successfully complete a comprehensive examination. The examination will cover material relating to the student's area of specialization, research methodology associated with that area, and important works in the management field. Questions for the examination will be set by the student's comprehensive examination committee. The comprehensive examination will take place over a period of two to three weeks and will consist of a written and an oral part.

The comprehensive examinations must be completed successfully before the Ph.D. proposal defense is scheduled. Under normal circumstances, the written comprehensive and the oral defense must occur within eight terms of a full-time student's initial registration in the Ph.D. program. Part-time students should complete the

comprehensives within sixteen terms of initial registration in the Ph.D. program. Students who do not fulfil this requirement will be asked to withdraw from the program.

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or higher is normally required in each credit counted towards the degree. However, a candidate may, with the recommendation of the School and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed to count a grade of C+ in 0.5 credit.

Withdrawal from the program will be required if an M.Sc. student:

- Receives a grade of lower than B- in 1.0 credit or more, or
- Fails to achieve a weighted GPA of 7.0 after completing 2.0 credits of study, or to maintain it, or
- Receives a grade lower than C+ in the same course more than once.

M.Sc. Management

Admission into the M.Sc. in Management program will be judged primarily on the applicant's potential to undertake research successfully and his/her prospects for completion of the program. Applicants will submit a research proposal statement on applying to the program.

The normal requirement for admission to the master's program in management is an Honours Bachelor of Commerce degree (or equivalent, e.g. 4-year Commerce, Bachelor of Business Administration or similar degrees) with at least a B+ average. Applicants who do not meet the normal requirements for admission may be required to complete additional courses, extra to the normal program requirements.

All applicants to the program are required to submit a GMAT (Graduate Management Admission Test) score with a minimum of 600 or an equivalent GRE (Graduate Record Exam) score. To calculate the equivalent GRE score, applicants can use the GRE Comparison Table for Business Schools.

Transfer from the Master's to the Ph.D. Program

Students enrolled full-time in the M.Sc. in Management program at Carleton University may be permitted to transfer into the Ph.D. program without completing the master's program, provided they meet the following conditions:

- Completion of 2.5 credits of master's courses with a minimum average of A
- Have demonstrated exceptional research potential
- Make a formal application for admission to the Ph.D. program no later than the third term of initial registration in the M.Sc. program
- Have permission of the Director of Graduate Research Programs.

Regulations - PhD

See the General Regulations section of this Calendar.

Academic Standing: doctoral students must normally obtain a grade of B- or better in each credit, and Satisfactory on the comprehensive examinations, the Ph.D. thesis and its oral defence.

Ph.D. Management

Admission into the Ph.D. Management program will be judged primarily on the applicant's ability to undertake research successfully and his/her prospects for completion of the program.

The normal requirement for admission to the doctoral program in management is a master's degree (or equivalent) in business or a related field with an A-average and a bachelor's degree. A number of years of work experience is desirable.

A student enrolled in a research-based master's program in business who has completed a minimum of 2.5 credits and who has shown outstanding academic performance and research promise may be admitted to the Ph.D. program without completing the master's program. Normal Ph.D. program requirements, as stated below, will apply. Each case will be considered on an individual basis for advanced standing in the Ph.D. program. Advanced standing will be considered for a maximum of 1.5 credits.

Applicants who have completed a thesis-based master's program in business or a related area may have their program requirements adjusted at the time of admission.

Applicants who have completed the M.Sc. Management at Carleton University may be eligible for admission to a second point of entry, to be determined by the Sprott School of Business and the Faculty of Graduate and Postdoctoral Affairs, as outlined in the program requirements.

All Ph.D. candidates, regardless of their previous field of specialization, are expected to have or to acquire a basic knowledge of statistics and at least two of the following areas of management: accounting, finance, information systems, international business, management science, marketing, organizational behaviour, and productions/operations management. Students will be admitted to the program with a course of study designed where appropriate to supplement previous education, experience, and training.

Graduate Management Admission Test (GMAT) - the School requires that all applicants submit scores obtained in the Graduate Management Admission Test (GMAT) offered by the Graduate Management Admission Council (GMAC). Successful candidates will normally have a GMAT score of at least 600. Equivalent GRE scores (as defined by the Educational Testing Service) may be considered.

All applicants whose first language is not English must be tested for proficiency in the English language. See Section 3.6 of the General Regulations section of this Calendar for details.

Transfer from the Master's to the Ph.D. Program

Students enrolled full-time in the M.Sc. in Management program at Carleton University may be permitted to transfer into the Ph.D. program without completing the master's program, provided they meet the following conditions:

- Completion of 2.5 credits of master's courses with a minimum average of A
- Have demonstrated exceptional research potential
- Make a formal application for admission to the Ph.D. program no later than the third term of initial registration in the M.Sc. program
- Have permission of the Director of Graduate Research Programs.

Business (BUSI) Courses

BUSI 5080 [0.5 credit]

Seminar in Accounting I

Foundations in accounting theory and research methods in financial accounting, management accounting, taxation and assurance.

Also offered, with different requirements, as BUSI 6000, for which additional credit is precluded.

BUSI 5081 [0.5 credit]

Seminar in Accounting II

Research methods, theory and practice in reporting, performance measurement, control, risk management and governance.

Also offered, with different requirements, as BUSI 6001, for which additional credit is precluded.

BUSI 5106 [0.25 credit]

Business Case Analysis and Presentations

Introduction to, and practical application of, the methods and tools of rigorous business case analysis and the design of strategic responses, including the preparation and delivery of presentations designed to convince decision makers of the validity of the analysis and strategic response.

Includes: Experiential Learning Activity

BUSI 5108 [0.25 credit]

Sustainable Business Development

An integration of sustainable business strategies examining corporate perspectives on environmental and social issues, and the implications on stakeholder management strategies. Students will apply concepts of sustainable business development in analyzing successful and flawed organizational strategies drawn from current business literature.

Includes: Experiential Learning Activity

BUSI 5180 [0.5 credit]

Seminar in Management I: Modern Organization Theory

The development of post-structuralist organization theory is examined. Theories of organizational culture and symbolism, political theories of organization, ethnomethodological, decision-based and population ecology approaches are investigated. The social, economic, and intellectual forces shaping organization theory provides a major focus.

Also offered, with different requirements, as BUSI 6100, for which additional credit is precluded.

BUSI 5181 [0.5 credit]

Seminar in Management II: Current Topics in Organizational Behaviour

Current topics and debates in the research on organizational behaviour. Potential topics include motivation, learning, communication, decision-making, small group behaviour, leadership, careers, power and conflict.

Also offered, with different requirements, as BUSI 6101, for which additional credit is precluded.

BUSI 5280 [0.5 credit]

Seminar in Marketing I: Management and Strategy

Marketing theory, history, and developments through the analysis, synthesis, and extension of theoretical and empirical papers on marketing management and strategy including all aspects of the marketing mix plus alliances, competitive advantage, global marketing strategies and segmenting, targeting and positioning.

Also offered, with different requirements, as BUSI 6200, for which additional credit is precluded.

BUSI 5281 [0.5 credit]

Seminar in Marketing II: Consumer Behaviour

Consumer decision making theory and practice including information processing, behavioural decision theory and consumer culture theory perspectives.

Also offered, with different requirements, as BUSI 6201, for which additional credit is precluded.

BUSI 5380 [0.5 credit]

Seminar in Management of Production/Operations I: Strategic Management of Production Systems

Developing a firm's strategies with respect to facilities, locations, technologies, vertical integration and sourcing arrangements. Recent developments in management policies and practices that enable production systems to excel and grow in the era of innovation-, cost-, time- and quality-based competition.

Also offered, with different requirements, as BUSI 6300, for which additional credit is precluded.

BUSI 5381 [0.5 credit]**Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface**

The evolution and management of process innovation; management of productivity and sustainability using process technologies; integration of production strategy and technology; and supply chain interactions with development chain. Topics include process re-engineering, quality function deployment, supply chain restructuring and the deployment of process innovations. Also offered, with different requirements, as BUSI 6301, for which additional credit is precluded.

BUSI 5383 [0.5 credit]**Systems Optimization: Methods and Models**

Management science approaches in modeling systems for decision-making under certainty and uncertainty. Linear programming, network flows problems and applications, discrete optimization models, heuristics and metaheuristics, dynamic programming, nonlinear programming, simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Also offered, with different requirements, as BUSI 6303, for which additional credit is precluded.

BUSI 5480 [0.5 credit]**Seminar in Information Systems I: Research Issues**

Research themes, approaches, and methods prevalent in the Information Systems area. Students will engage in examining research issues in IS and perform critical analyses of the research methodologies used to investigate and report on them.

Includes: Experiential Learning Activity

Also offered, with different requirements, as BUSI 6400, for which additional credit is precluded.

BUSI 5481 [0.5 credit]**Seminar in Information Systems II: Current Trends**

Theory and practice in current information systems research.

Also offered, with different requirements, as BUSI 6401, for which additional credit is precluded.

BUSI 5580 [0.5 credit]**Seminar in Finance I: Topical Issues in Investments**

Selected topics in financial theory. Topics chosen according to new developments in theory and with the interests of the students in mind and may include theory of derivatives, pricing theory, information asymmetries, agency theory, economic efficiency, and empirical methods.

Also offered, with different requirements, as BUSI 6500, for which additional credit is precluded.

BUSI 5581 [0.5 credit]**Seminar in Finance II: Theories and Empirical Methods in Corporate Finance**

Foundations for empirical research methodologies used in selected papers in finance; informational issues and their impact on capital market efficiency; economics of mergers and acquisitions, dividend and information; and emerging areas in finance such as market failures, corporate governance, financial crisis, and behavioural finance.

Also offered, with different requirements, as BUSI 6501, for which additional credit is precluded.

BUSI 5780 [0.5 credit]**Seminar in International Business I: International Markets and Strategy**

An advanced examination of contemporary theory on the international expansion of the firm: Globalization, trade and investment flows, trade blocs, and free trade zones; consumers and culture; key actors in global markets; sequential internationalization, expansion modes, and location theory; strategy by firm size.

Also offered, with different requirements, as BUSI 6700, for which additional credit is precluded.

BUSI 5781 [0.5 credit]**Seminar in International Business II: Managing in a Global Environment**

The role of culture, cognition, and behaviour as it relates to management theory and practices. Issues related to globalization, technology, and workplace diversity are explored through an investigation of cultural theories and their implications for cognition, behaviour, and management.

Also offered, with different requirements, as BUSI 6705, for which additional credit is precluded.

BUSI 5801 [0.25 credit]**Statistics for Managers**

Techniques for using data to make an informed use of statistics. Applications, interpretation and limitations of results. Sampling, descriptive statistics, probability concepts, estimation and testing of hypotheses and regression, using practical business situations.

Precludes additional credit for BUSI 5904.

BUSI 5802 [0.25 credit]**Business Ethics**

Impact of corporate decisions on society. Models and standards of business ethics and corporate social responsibility (CSR). Methods of measuring and reporting. The rise of corporate power, stakeholder analysis, corporate governance, sustainability, national and international pressures on CSR.

BUSI 5900 [0.5 credit]**Tutorials/Directed Studies in Business**

Tutorials or directed readings in selected areas of business, involving presentation of papers as the basis for discussion with the tutor.

Prerequisite(s): GPA of 10.0 or higher and permission of the School.

BUSI 5905 [0.5 credit]**Special Topics**

At the discretion of the School, a course dealing with selected topics of interest to students in the MBA Program. Topics will vary from year to year, and will be announced in advance of the registration period.

Prerequisite(s): Permission of the School.

BUSI 5906 [0.25 credit]**Special Topics**

At the discretion of the School, a course dealing with selected topics of interest to students in the MBA program. Topics will vary from year to year, and will be announced in advance of the registration period.

Prerequisite(s): permission of the School.

BUSI 5907 [0.5 credit]**M.B.A. Thesis Tutorial**

A seminar designed to help the student formulate and evaluate specific research topics. The successful submission of a thesis proposal is necessary for the completion of the course.

Prerequisite(s): admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5908 [1.0 credit]**M.B.A. Research Project**

Includes: Experiential Learning Activity

Prerequisite(s): admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5909 [1.5 credit]**M.B.A. Thesis Research**

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5907 and admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5980 [0.5 credit]**Foundations of Management Theory and Research**

Exploration of foundational works in management theory and research. Review of the foundational thinking of scholars that influenced and shaped the management discipline.

Also offered, with different requirements, as BUSI 6910, for which additional credit is precluded.

BUSI 5981 [0.5 credit]**Statistics for Business Research**

In-depth examination and critique of statistical inference. Linear regression. Statistical computing software will be used.

BUSI 5982 [0.5 credit]**Research Methodology in Business**

The study of research techniques commonly used in research on business and management issues. The development of knowledge of these methodologies and their application, and their possible use in the thesis research of the student.

Also offered, with different requirements, as BUSI 6902, for which additional credit is precluded.

BUSI 5983 [0.5 credit]**Qualitative Research Design**

The use of qualitative data in business research. Discussion of research design, data collection, analysis and interpretation techniques; overview of philosophy of science debates regarding epistemological and ontological stance, with practical experience.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5982.

Also offered, with different requirements, as BUSI 6903, for which additional credit is precluded.

BUSI 5984 [0.5 credit]**Quantitative Research Design**

In-depth study of theories and assumptions of quantitative research design methodologies in management; exploration of alternative research designs; conceptual understanding and application of statistical methods for data analysis; critique of research from a variety of practice settings applying quantitative design methods; design a research project.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5982.

Also offered, with different requirements, as BUSI 6904, for which additional credit is precluded.

BUSI 5989 [2.0 credits]**M.Sc. Thesis**

M.Sc. Thesis.

Includes: Experiential Learning Activity

BUSI 5992 [0.25 credit]**Tutorials/Directed Studies in Business**

Tutorials or directed readings in selected areas of business, involving presentation of papers as the basis for discussion with the tutor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School of Business.

BUSI 5997 [0.5 credit]**Project Based Service Learning**

An experiential work environment in which students serve as consultants for a real-world client. Various types of projects are possible depending on the company and their goals/needs. Clients may be internal (Carleton, Sprott) or external (large firm, start-up, individual entrepreneur, not-for-profit).

Includes: Experiential Learning Activity

Prerequisite(s): Permission of the School of Business.

Also offered at the undergraduate level, with different requirements, as BUSI 4800, for which additional credit is precluded.

BUSI 5998 [0.0 credit]**MBA Skills Workshop**

Provides preparation for the MBA program, as well as professional and career development. The course is graded SAT/UNSAT based on attendance and engagement.

Includes: Experiential Learning Activity

BUSI 5999 [1.0 credit]**Internship**

A degree requirement for students with less than two years of relevant experience within a professional environment. Focus on the application of MBA course knowledge and building management skills in a business environment.

Includes: Experiential Learning Activity

Prerequisite(s): successful completion of two academic terms; subject to approval by the MBA Office.

Minimum 480 hours.

BUSI 6000 [0.5 credit]**Seminar in Accounting I**

Foundations in accounting theory and research methods in financial accounting, management accounting, taxation and assurance.

Also offered, with different requirements, as BUSI 5080, for which additional credit is precluded.

BUSI 6001 [0.5 credit]**Seminar in Accounting II**

Research methods, theory and practice in reporting, performance measurement, control, risk management and governance.

Also offered, with different requirements, as BUSI 5081, for which additional credit is precluded.

BUSI 6009 [0.5 credit]**Special Topics in Accounting**

Designed to expose students to new and emerging issues in selected areas of accounting research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6100 [0.5 credit]**Seminar in Management I: Modern Organization Theory**

The development of post-structuralist organization theory is examined. Theories of organizational culture and symbolism, political theories of organization, ethnomethodological, decision-based and population ecology approaches are investigated. The social, economic, and intellectual forces shaping organization theory provides a major focus.

Also offered, with different requirements, as BUSI 5180, for which additional credit is precluded.

BUSI 6101 [0.5 credit]**Seminar in Management II: Current Topics in Organizational Behaviour**

Current topics and debates in the research on organizational behaviour. Potential topics include motivation, learning, communication, decision-making, small group behaviour, leadership, careers, power and conflict.

Also offered, with different requirements, as BUSI 5181, for which additional credit is precluded.

BUSI 6103 [0.5 credit]**Seminar in Strategic Management**

Current topics and debates in the research on strategic management, sustainable business development and corporate governance. Foundational theories to be reviewed may include agency, institutional, network, resource-based view, resource dependence, stakeholder, stewardship and transaction cost economics theories. Precludes additional credit for BUSI 6803 (no longer offered).

BUSI 6104 [0.5 credit]**Managing the Change Process**

The process of organizational change and the external forces which drive such changes. Topics include both micro and macro theories of change and issues around change management such as leadership and resistance to change.

Precludes additional credit for BUSI 6704 (no longer offered).

BUSI 6105 [0.5 credit]**Women in Management**

An exploration of the research and organizational challenges arising from changing gender roles. Topics include: the sex segregation of work, gender differences in management styles, work-family conflict, women's careers, managing sexual harassment, employment equity and pay equity.

Precludes additional credit for BUSI 6802 (no longer offered).

BUSI 6109 [0.5 credit]**Special Topics in Management**

Designed to expose students to new and emerging issues in selected areas of management research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6200 [0.5 credit]**Seminar in Marketing I: Management and Strategy**

Marketing theory, history, and developments through the analysis, synthesis, and extension of theoretical and empirical papers on marketing management and strategy including all aspects of the marketing mix plus alliances, competitive advantage, global marketing strategies and segmenting, targeting and positioning.

Also offered, with different requirements, as BUSI 5280, for which additional credit is precluded.

BUSI 6201 [0.5 credit]**Seminar in Marketing II: Consumer Behaviour**

Consumer decision making theory and practice including information processing, behavioural decision theory and consumer culture theory perspectives.

Also offered, with different requirements, as BUSI 5281, for which additional credit is precluded.

BUSI 6209 [0.5 credit]**Special Topics in Marketing**

Designed to expose students to new and emerging issues in selected areas of marketing research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6300 [0.5 credit]**Seminar in Management of Production/Operations I: Strategic Management of Production Systems**

Developing a firm's strategies with respect to facilities, locations, technologies, vertical integration and sourcing arrangements. Recent developments in management policies and practices that enable production systems to excel and grow in the era of innovation-, cost-, time- and quality-based competition.

Also offered, with different requirements, as BUSI 5380, for which additional credit is precluded.

BUSI 6301 [0.5 credit]**Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface**

The evolution and management of process innovation; management of productivity and sustainability using process technologies; integration of production strategy and technology; and supply chain interactions with development chain. Topics include process reengineering, quality function deployment, supply chain restructuring and the deployment of process innovations.

Also offered, with different requirements, as BUSI 5381, for which additional credit is precluded.

BUSI 6303 [0.5 credit]**Systems Optimization: Methods and Models**

Management science approaches in modeling systems for decision-making under certainty and uncertainty.

Linear programming, network flows problems and applications, discrete optimization models, heuristics and metaheuristics, dynamic programming, nonlinear programming, simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 6703.

Prerequisite(s): permission of the School.

Also offered, with different requirements, as BUSI 5383, for which additional credit is precluded.

BUSI 6304 [0.5 credit]**Management of Innovation and Technology**

Introduction to issues in the management of technology. Topics include: technology strategy and policy, technology forecasting and planning, the process of technology innovation from concept to market, research and development management, technology adoption, diffusion and implementation, technology transfer, and technology and social issues.

Precludes additional credit for BUSI 6801 (no longer offered).

BUSI 6306 [0.5 credit]**Advanced Methods and Models of Management Science**

Advanced study of decision-making under certainty and uncertainty. Preprocessing and reformulation methods, optimization theory for large scale problems; stochastic programming; metaheuristics; multicriteria analysis; simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 6906 (no longer offered).

Prerequisite(s): BUSI 6303 or permission of the School.

BUSI 6309 [0.5 credit]**Special Topics in Operations Management**

Designed to expose students to new and emerging issues in selected areas of operations management research.

The topics covered vary from year to year according to varied research expertise among the area faculty.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

BUSI 6400 [0.5 credit]**Seminar in Information Systems I: Research Issues**

Research themes, approaches, and methods prevalent in the Information Systems area. Students will engage in examining research issues in IS and perform critical analyses of the research methodologies used to investigate and report on them.

Also offered, with different requirements, as BUSI 5480, for which additional credit is precluded.

BUSI 6401 [0.5 credit]**Seminar in Information Systems II: Current Trends**

Theory and practice in current information systems research.

Also offered, with different requirements, as BUSI 5481, for which additional credit is precluded.

BUSI 6409 [0.5 credit]**Special Topics in Information Systems**

Designed to expose students to new and emerging issues in selected areas of information systems research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6500 [0.5 credit]**Seminar in Finance I: Topical issues in Investments**

Selected topics in financial theory. Topics chosen according to new developments in theory and with the interests of the students in mind and may include theory of derivatives, pricing theory, information asymmetries, agency theory, economic efficiency, and empirical methods.

Prerequisite(s): graduate-level finance courses or permission of the School.

Also offered, with different requirements, as BUSI 5580, for which additional credit is precluded.

BUSI 6501 [0.5 credit]**Seminar in Finance II: Theories and Empirical Methods in Corporate Finance**

Foundations for empirical research methodologies used in selected papers in finance; informational issues and their impact on capital market efficiency; economics of mergers and acquisitions, dividend and information; and emerging areas in finance such as market failures, corporate governance, financial crisis, and behavioural finance.

Prerequisite(s): graduate-level finance courses or permission of the School.

Also offered, with different requirements, as BUSI 5581, for which additional credit is precluded.

BUSI 6509 [0.5 credit]**Special Topics in Finance**

Designed to expose students to new and emerging issues in selected areas of finance research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6600 [0.5 credit]**Entrepreneurship**

An examination of research in entrepreneurship focusing on theory building and empirical testing of factors that shapes the identification, evaluation and exploitation of opportunities and the creation of new organizations. Precludes additional credit for BUSI 6806 (no longer offered).

BUSI 6700 [0.5 credit]**Seminar in International Business I: International Markets and Strategy**

An advanced examination of contemporary theory on the international expansion of the firm: Globalization, trade and investment flows, trade blocs, and free trade zones; consumers and culture; key actors in global markets; sequential internationalization, expansion modes, and location theory; strategy by firm size.

Precludes additional credit for BUSI 6804 (no longer offered).

Also offered, with different requirements, as BUSI 5780, for which additional credit is precluded.

BUSI 6705 [0.5 credit]**Seminar in International Business II: Managing in a Global Environment**

The role of culture, cognition, and behaviour as it relates to management theory and practices. Issues related to globalization, technology, and workplace diversity are explored through an investigation of cultural theories and their implications for cognition, behaviour, and management.

Also offered, with different requirements, as BUSI 5781, for which additional credit is precluded.

BUSI 6709 [0.5 credit]**Special Topics in International Business**

Designed to expose students to new and emerging issues in selected areas of international business research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6900 [0.5 credit]**Directed Readings**

Directed readings in selected areas of business, involving presentation of papers as the basis for discussion. A part of the requirement for the course may be participation in an advanced course at the undergraduate/graduate level.

Prerequisite(s): permission of the School.

BUSI 6901 [0.5 credit]**Special Topics**

Designed to expose students to new and emerging issues in selected areas of business research. Integrative problems involving two or more areas of business research are also explored. The topics covered may vary from year to year.

Prerequisite(s): permission of the School.

BUSI 6902 [0.5 credit]**Research Methodology in Business**

Research techniques commonly used in research on business and management issues. The development of knowledge of these methodologies and their application, and their possible use in the thesis research of the student.

Also offered, with different requirements, as BUSI 5982, for which additional credit is precluded.

BUSI 6903 [0.5 credit]**Qualitative Research Design**

The use of qualitative data in business research. Discussion of research design, data collection, analysis and interpretation techniques; overview of philosophy of science debates regarding epistemological and ontological stance; with practical experience.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 6902.

Also offered, with different requirements, as BUSI 5983, for which additional credit is precluded.

BUSI 6904 [0.5 credit]**Quantitative Research Design**

In-depth study of theories and assumptions of quantitative research design methodologies in management; exploration of alternative research designs; conceptual understanding and application of statistical methods for data analysis; critique of research from a variety of practice settings applying quantitative design methods; design a research project.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 6902.

Also offered, with different requirements, as BUSI 5984, for which additional credit is precluded.

BUSI 6905 [0.5 credit]**Advanced Statistical Methods for Business Research**

A practical introduction to advanced statistical methods used in business research, with particular focus on discrete categorical data. Topics include the analysis of two-way and three-way tables; loglinear modeling; logistic regression; generalized linear models. Students will analyze real data using appropriate software packages. Includes: Experiential Learning Activity

BUSI 6907 [0.5 credit]**Ph.D. Thesis Tutorial**

An intensive preparation for Ph.D. thesis research, under the direction of one or more members of the School. The successful submission of a thesis proposal is necessary for the completion of the course.

BUSI 6908 [0.0 credit]**Ph.D. Comprehensives**

Preparation for comprehensive examinations.

BUSI 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

BUSI 6910 [0.5 credit]**Foundations of Management Theory and Research**

Exploration of foundational works in management theory and research. Review of the foundational thinking of scholars that influenced and shaped the management discipline.

Also offered, with different requirements, as BUSI 5980, for which additional credit is precluded.

Mathematics and Statistics

This section presents the requirements for programs in:

- M.Sc. Mathematics with Concentration in Mathematics
- M.Sc. Mathematics and Statistics with Specialization in Bioinformatics
- M.Sc. Mathematics with Concentration in Statistics
- M.Sc. Mathematics and Statistics with Collaborative Specialization in Biostatistics
- Ph.D. Mathematics and Statistics

Program Requirements

Students must complete the requirements for the concentration in Mathematics or the concentration in

Statistics. The M.Sc. in Mathematics and Statistics: Specialization in Bioinformatics is part of the M.Sc. in Mathematics and Statistics with Concentration in Mathematics. The M.Sc. in Mathematics and Statistics: Specialization in Biostatistics is part of the M.Sc. in Mathematics and Statistics with Concentration in Statistics.

- 2.0 credits in course work and 2.0 credits in a thesis, or
- 3.0 credits in course work and 1.0 credit in a research project, or
- 4.0 credits in course work.

M.Sc. Mathematics**with Concentration in Mathematics (4.0 credits)****Requirements - Thesis Option (4.0 credits)**

1. 2.0 credits in course work	2.0
2. 2.0 credits from:	2.0
MATH 5909 [2.0] M.Sc. Thesis in Mathematics	
Total Credits	4.0

Requirements - Research Project option (4.0 credits)

1. 3.0 credits in course work	3.0
2. 1.0 credit from:	1.0
MATH 5910 [1.0] M.Sc. Project in Mathematics	
Total Credits	4.0

Requirements - Course work option (4.0 credits)

1. 4.0 credits in courses	4.0
Total Credits	4.0

Notes:

1. Students must receive approval for course selection from their supervisor before registering in courses.
2. More than one half of the total required credits must be completed in the Concentration in Mathematics.
3. All master's students should normally participate in a seminar or research talks under the guidance of their supervisors.
4. A maximum of 1.0 credit taken outside of the School of Mathematics and Statistics at Carleton University or the Department of Mathematics and Statistics at the University of Ottawa may be allowed for credit, subject to the approval of the School.

M.Sc. Mathematics and Statistics**with Specialization in Bioinformatics (4.5 credits)****Requirements:**

1. 1.0 credit in:	1.0
BIOL 5515 [0.5] Bioinformatics	
BIOL 5517 [0.5] Bioinformatics Seminar	
2. 1.5 credits in coursework	1.5
3. 2.0 credits in:	2.0
MATH 5909 [2.0] M.Sc. Thesis in Mathematics (on an approved bioinformatics topic)	
Total Credits	4.5

1. Students must receive approval for course selection from their supervisor before registering in courses.

- All master's students should normally participate in a seminar or research talks under the guidance of their supervisors.

M.Sc. Mathematics with Concentration in Statistics (4.0 credits)

Requirements - Thesis Option (4.0 credits)

1. 2.0 credits in course work	2.0
2. 2.0 credits in:	2.0
STAT 5909 [2.0] M.Sc. Thesis in Statistics	
Total Credits	4.0

Requirements - Research Project option (4.0 credits)

1. 3.0 credits in course work	3.0
2. 1.0 credit in:	1.0
STAT 5910 [1.0] M.Sc. Project in Statistics	
Total Credits	4.0

Requirements - Course work option (4.0 credits)

1. 4.0 credits in courses	4.0
Total Credits	4.0

Notes:

- Students must receive approval for course selection from their supervisor before registering in courses.
- More than one half of the total required credits must be completed in the Concentration in Statistics.
- All master's students should normally participate in a seminar or research talks under the guidance of their supervisors.
- A maximum of 1.0 credit taken outside of the School of Mathematics and Statistics at Carleton University or the Department of Mathematics and Statistics at the University of Ottawa may be allowed for credit, subject to the approval of the School.

M.Sc. Mathematics and Statistics with Collaborative Specialization in Biostatistics (6.0 credits)

The M.Sc. in Mathematics and Statistics: Specialization in Biostatistics is part of the M.Sc. in Mathematics and Statistics with Concentration in Statistics and has two completion options.

Requirements - Thesis option (6.0 credits)

1. 3.5 credits in course work	3.5
2. 0.5 credit in:	0.5
STAT 5902 [0.5] Seminar in Biostatistics	
3. 2.0 credits in Thesis	2.0
Total Credits	6.0

Requirements - Coursework option (5.0 credits)

1. 4.5 credits in courses	4.5
2. 0.5 credit in:	0.5
STAT 5902 [0.5] Seminar in Biostatistics	
Total Credits	5.0

Unless prior approval by the Director of the collaborative program has been obtained, students in the M.Sc. Mathematics program should take EPIJ 5240, EPIJ 5241, EPIJ 6178, EPIJ 6278, STAT 5600 (MAT 5375) or

STAT 5610 (MAT 5375), and STAT 5501 (MAT 5191) or STAT 5602 (MAT 5317). The remaining courses should be in Mathematics and Statistics at the graduate level.

Course Selection

Concentration in Mathematics

Mathematics

All MATH courses are eligible for the Concentration in Mathematics.

Statistics

In addition, the following STAT courses may be used toward the Concentration in Mathematics:

STAT 5501 [0.5]	Mathematical Statistics II
STAT 5504 [0.5]	Stochastic Processes and Time Series Analysis
STAT 5508 [0.5]	Topics in Stochastic Processes
STAT 5600 [0.5]	Mathematical Statistics I
STAT 5601 [0.5]	Stochastic Optimization
STAT 5604 [0.5]	Stochastic Analysis
STAT 5701 [0.5]	Stochastic Models
STAT 5704 [0.5]	Network Performance
STAT 5708 [0.5]	Probability Theory I
STAT 5709 [0.5]	Probability Theory II

Concentration in Statistics

Statistics

All STAT courses are eligible for the Concentration in Statistics

Undergraduate Courses

With the exception of students in the coursework option, all courses must be taken at the graduate level. Students in the coursework option may take up to 1.0 credit of undergraduate courses at the 4000 level from the following list:

MATH 4002 [0.5]	Fourier Analysis (Honours)
MATH 4105 [0.5]	Rings and Modules (Honours)
MATH 4107 [0.5]	Commutative Algebra (Honours)
MATH 4109 [0.5]	Fields and Coding Theory (Honours)
MATH 4207 [0.5]	Foundations of Geometry (Honours)
MATH 4208 [0.5]	Introduction to Differentiable Manifolds (Honours)
MATH 4700 [0.5]	Partial Differential Equations (Honours)
MATH 4703 [0.5]	Dynamical Systems (Honours)
MATH 4801 [0.5]	Topics in Combinatorics (Honours)
MATH 4802 [0.5]	Introduction to Mathematical Logic (Honours)
MATH 4803 [0.5]	Computable Functions (Honours)
MATH 4806 [0.5]	Numerical Linear Algebra (Honours)
MATH 4808 [0.5]	Graph Theory and Algorithms (Honours)
MATH 4811 [0.5]	Combinatorial Design Theory (Honours)
STAT 4501 [0.5]	Probability Theory (Honours) (may be used toward the Concentration in Mathematics)
STAT 4502 [0.5]	Survey Sampling (Honours)

STAT 4504 [0.5]	Statistical Design and Analysis of Experiments (Honours)
STAT 4506 [0.5]	Nonparametric Statistics (Honours)
STAT 4555 [0.5]	Monte Carlo Simulation (Honours) (may be used toward the Concentration in Mathematics)
STAT 4601 [0.5]	Data Mining I (Honours)
STAT 4603 [0.5]	Time Series and Forecasting (Honours)
STAT 4604 [0.5]	Statistical Computing (Honours)
All MATH courses are eligible for the Concentration in Mathematics.	
All STAT courses are eligible for the Concentration in Statistics.	

Ph.D. Mathematics and Statistics (3.0 credits)

Requirements:

1. 3.0 credits in courses	3.0
2. 0.0 credits from:	0.0
MATH 6909 [0.0]	Ph.D. Thesis (including a final oral examination on the thesis subject)
STAT 6909 [0.0]	Ph.D. Thesis (including a final oral examination on the thesis subject)
3. All candidates must take comprehensive examinations. See note on Comprehensive Examinations below.	
Total Credits	3.0

Comprehensive Examinations

Students specializing in mathematics or probability undertake a comprehensive examination in the following areas:

- The candidate's general area of specialization at the Ph.D. level
- Examinations on two topics chosen from applied analysis, discrete applied mathematics, algebra, analysis, probability, topology, and statistics.

Students specializing in statistics must write an examination in the following areas:

- Mathematical statistics which includes multivariate analysis
- An examination in probability, and
- An examination in either (i) applied statistics or (ii) analysis.

In all cases, the examination must be completed successfully within twenty months of initial registration in the Ph.D. program in the case of full-time students, and within thirty-eight months of initial registration in the case of part-time students.

All Ph.D. candidates are also required to undertake a final oral examination on the subject of their thesis.

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the following programs is considered a regularly scheduled break approved by the University.

- M.Sc. Mathematics with Concentration in Mathematics (coursework and research essay pathways)
- M.Sc. Mathematics with Concentration in Statistics (coursework and research essay pathways)
- M.Sc. Mathematics and Statistics with Collaborative Specialization in Biostatistics (coursework pathway)

Students should resume full-time studies in September.

Admission

The normal requirement for admission to the master's program is an Honours bachelor's degree in mathematics, statistics or the equivalent, with B+ or higher in the honours subject and B- or higher overall.

Applicants holding a general (three-year) degree with an overall GPA of at least B+ may be admitted to a qualifying-year program. Subsequent admission to the regular master's program depends on performance during the qualifying-year program and will be decided no later than one year after admission to the qualifying-year program. Details are outlined in the General Regulations section of this Calendar.

Admission

The normal requirement for admission to the Ph.D. program is a master's degree in mathematics, or the equivalent, with at least B+ standing. Details are outlined in the General Regulations section of this Calendar.

Epidemiology - Joint (EPIJ) Courses

EPIJ 5240 [0.5 credit] (EPI 5240) Epidemiology

EPIJ 5241 [0.5 credit] (EPI 5241) Epidemiology II

EPIJ 5330 [0.5 credit] (EPI 5330) Vital and Health Statistics

EPIJ 5340 [0.25 credit] (5340) Epidemiological Methods

Major principles of study design and analysis: validity in epidemiologic studies; precision and statistics in epidemiology studies; confounding; additive and multiplicative interaction; stratified analysis; regression models; regression modeling; bias analysis; analytical strategy.

Includes: Experiential Learning Activity
Prerequisite(s): EPI 5240, (EPI 5242 or MAT 5375).

EPIJ 5344 [0.25 credit] (EPI 5344)

Survival Analysis in the Health Sciences

Types of survival data. Hazard function and its links to incidence rate/density. Nonparametric analysis including actuarial life tables, Kaplan-Meier method and log-rank test. Proportional hazards (Cox regression) modeling. Methods for time varying covariates and non-proportional hazards. SAS software for hands-on modeling.

Includes: Experiential Learning Activity
Prerequisite(s): EPI 5340.

EPIJ 5345 [0.25 credit] (EPI 5340)**Applied Logistic Regression**

Foundation of model estimation: maximum likelihood; modeling dichotomous outcome (dependent) variables; logistic regression; logistic models with several independent variables; interpretation of model parameters; model-building strategies; assessing the fit of the model; regression diagnostics. Classes will include hands-on modeling examples using SAS statistical software.

Includes: Experiential Learning Activity

Prerequisite(s): EPI 5340.

EPIJ 5346 [0.25 credit] (EPI 5346)**Applied Longitudinal and Clustered Data Analysis**

Introduction to longitudinal (repeated measures) and clustered data and overview of regression models for correlated data; linear mixed effects models: modelling the mean; modelling the covariance structure; generalized estimating equations and generalized linear mixed effects models; regression diagnostics; missing data and drop-out; case studies.

Includes: Experiential Learning Activity

Prerequisite(s): EPI 5340.

EPIJ 6178 [0.5 credit] (EPI 6178)**Clinical Trials****EPIJ 6278 [0.5 credit] (EPI 6278)****Advanced Clinical Trials****Mathematics (MATH) Courses****MATH 5001 [0.5 credit] (MAT 5144)****Commutative Algebra**

Prime spectrum of a commutative ring (as a topological space); localization of rings and modules; tensor product of modules and algebras; Hilbert's Nullstellensatz and consequences for finitely generated algebras; Krull dimension of a ring; integral dependence, going-up, going-down; Noether Normalization Lemma and dimension theory.

MATH 5002 [0.5 credit] (MAT 5149)**Algebraic Geometry**

Brief overview of commutative algebra, Hilbert's Nullstellensatz, algebraic sets, and Zariski topology. Affine and projective varieties over algebraically closed fields. Regular functions and rational maps. Additional topics.

MATH 5003 [0.5 credit] (MAT 5122)**Banach Algebras**

Commutative Banach algebras; the space of maximal ideals; representation of Banach algebras as function algebras and as operator algebras; the spectrum of an element. Special types of Banach algebras: for example, regular algebras with involution, applications.

MATH 5005 [0.5 credit] (MAT 5127)**Complex Analysis**

Complex differentiation and integration, harmonic functions, maximum modulus principle, Runge's theorem, conformal mapping, entire and meromorphic functions, analytic continuation.

MATH 5007 [0.5 credit] (MAT 5125)**Real Analysis I (Measure Theory and Integration)**

General measure and integral, Lebesgue measure and integration on \mathbb{R} , Fubini's theorem, Lebesgue-Radon-Nikodym theorem, absolute continuity and differentiation, LP-spaces. Selected topics such as Daniell-Stone theory. Also offered at the undergraduate level, with different requirements, as MATH 4007, for which additional credit is precluded.

MATH 5008 [0.5 credit] (MAT 5126)**Real Analysis II (Functional Analysis)**

Banach and Hilbert spaces, bounded linear operators, dual spaces. Topics selected from: weak-topologies, Alaoglu's theorem, compact operators, differential calculus in Banach spaces, Riesz representation theorems.

Prerequisite(s): MATH 5007 (MAT 5125) or permission of the School.

Also offered at the undergraduate level, with different requirements, as MATH 4003, for which additional credit is precluded.

MATH 5009 [0.5 credit] (MAT 5121)**Introduction to Hilbert Space**

Geometry of Hilbert Space, spectral theory of linear operators in Hilbert Space.

MATH 5102 [0.5 credit] (MAT 5148)**Group Representations and Applications**

An introduction to group representations and character theory, with selected applications.

MATH 5103 [0.5 credit] (MAT 5146)**Rings and Modules**

Generalizations of the Wedderburn-Artin theorem and applications, homological algebra.

MATH 5104 [0.5 credit] (MAT 5143)**Lie Algebras**

Basic concepts: ideals, homomorphisms, nilpotent, solvable, semi-simple. Representations, universal enveloping algebra. Semi-simple Lie algebras: structure theory, classification, and representation theory.

Prerequisite(s): MATH 5107 (MAT 5141) and MATH 5109 (MAT 5142) or permission of the School.

MATH 5106 [0.5 credit] (MAT 5145)**Group Theory**

Fundamental principles as applied to abelian, nilpotent, solvable, free, and finite groups; representations.

Also offered at the undergraduate level, with different requirements, as MATH 4106, for which additional credit is precluded.

MATH 5107 [0.5 credit] (MAT 5141)**Algebra I: Rings and Modules**

Noetherian and artinian modules and rings. Varieties, Hilbert Basis Theorem, radical ideals, Hilbert Nullstellensatz. Localization and tensor products of modules and algebras. Semisimple rings and modules, Schur's Lemma, Jacobson Density Theorem, Artin-Wedderburn Theorem. Short exact sequences. Free, projective, injective and flat modules.

MATH 5108 [0.5 credit] (MAT 5147)**Homological Algebra and Category Theory**

Axioms of set theory, categories, functors, natural transformations; free, projective, injective and flat modules; tensor products and homology functors, derived functors; dimension theory.

Also offered at the undergraduate level, with different requirements, as MATH 4108, for which additional credit is precluded.

MATH 5109 [0.5 credit] (MAT 5142)**Algebra II: Groups and Galois Theory**

Group actions, class equation, Sylow theorems, central composition and derived series, Jordan-Holder theorem, field extensions and minimal polynomials, algebraic closure, separable extensions, integrality, Galois groups, fundamental theorem of Galois theory, finite fields, cyclotomic field extensions, fundamental theorem of algebra, transcendental extensions.

MATH 5201 [0.5 credit] (MAT 5150)**Topics in Geometry**

Various axiom systems of geometry. Detailed examinations of at least one modern approach to foundations, with emphasis upon the connections with group theory.

MATH 5202 [0.5 credit] (MAT 5168)**Homology Theory**

The Eilenberg-Steenrod axioms and their consequences, singular homology theory, applications to topology and algebra.

Prerequisite(s): MATH 5205 (MAT 5151) or permission of the School.

MATH 5205 [0.5 credit] (MAT 5151)**Topology I**

Topological spaces, product and identification topologies, countability and separation axioms, compactness, connectedness, homotopy, fundamental group, net and filter convergence.

Also offered at the undergraduate level, with different requirements, as MATH 4205, for which additional credit is precluded.

MATH 5206 [0.5 credit] (MAT 5152)**Topology II**

Covering spaces, homology via the Eilenberg-Steenrod Axioms, applications, construction of a homology functor. Prerequisite(s): MATH 5205 (MAT 5151) or permission of the School.

Also offered at the undergraduate level, with different requirements, as MATH 4206, for which additional credit is precluded.

MATH 5207 [0.5 credit] (MAT 5169)**Foundations of Geometry**

A study of at least one modern axiom system of Euclidean and non-Euclidean geometry, embedding of hyperbolic and Euclidean geometries in the projective plane, groups of motions, models of non-Euclidean geometry.

MATH 5208 [0.5 credit] (MAT 5155)**Differentiable Manifolds**

A study of differentiable manifolds from the point of view of either differential topology or differential geometry. Topics such as smooth mappings, transversality, intersection theory, vector fields on manifolds, Gaussian curvature, Riemannian manifolds, differential forms, tensors, and connections are included.

MATH 5300 [0.5 credit] (MAT 5160)**Mathematical Cryptography**

Analysis of cryptographic methods used in authentication and data protection, with particular attention to the underlying mathematics, e.g. Algebraic Geometry, Number Theory, and Finite Fields. Advanced topics on Public-Key Cryptography: RSA and integer factorization, Diffie-Hellman, discrete logarithms, elliptic curves. Topics in current research.

MATH 5301 [0.5 credit] (MAT 5161)**Mathematical Logic**

A basic graduate course in mathematical logic. Propositional and predicate logic, proof theory, Gentzen's Cut-Elimination, completeness, compactness, Henkin models, model theory, arithmetic and undecidability. Special topics (time permitting) depending on interests of instructor and audience.

MATH 5305 [0.5 credit] (MAT 5163)**Analytic Number Theory**

Dirichlet series, characters, Zeta-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, binary quadratic forms.

MATH 5306 [0.5 credit] (MAT 5164)**Algebraic Number Theory**

Algebraic number fields, bases, algebraic integers, integral bases, arithmetic in algebraic number fields, ideal theory, class number.

Also offered at the undergraduate level, with different requirements, as MATH 4306, for which additional credit is precluded.

MATH 5403 [0.5 credit] (MAT 5187)
Topics in Applied Mathematics

MATH 5405 [0.5 credit] (MAT 5131)
Ordinary Differential Equations

Linear systems, fundamental solution. Nonlinear systems, existence and uniqueness, flow. Equilibria, periodic solutions, stability. Invariant manifolds and hyperbolic theory. One or two specialized topics taken from, but not limited to: perturbation and asymptotic methods, normal forms and bifurcations, global dynamics.

MATH 5406 [0.5 credit] (MAT 5133)
Partial Differential Equations

First-order equations, characteristics method, classification of second-order equations, separation of variables, Green's functions. L_p and Sobolev spaces, distributions, variational formulation and weak solutions, Lax-Milgram theorem, Galerkin approximation. Parabolic PDEs. Wave equations, hyperbolic systems, nonlinear PDEs, reaction-diffusion equations, infinite-dimensional dynamical systems, regularity.

MATH 5407 [0.5 credit] (MAT 5134)
Topics in Partial Differential Equations

Theory of distributions, initial-value problems based on two-dimensional wave equations, Laplace transform, Fourier integral transform, diffusion problems, Helmholtz equation with application to boundary and initial-value problems in cylindrical and spherical coordinates. Prerequisite(s): MATH 5406 or permission of the School. Also offered at the undergraduate level, with different requirements, as MATH 4701, for which additional credit is precluded.

MATH 5408 [0.5 credit] (MAT 5185)
Asymptotic Methods of Applied Mathematics

Asymptotic series: properties, matching, application to differential equations. Asymptotic expansion of integrals: elementary methods, methods of Laplace, Stationary Phase and Steepest Descent, Watson's Lemma, Riemann-Lebesgue Lemma. Perturbation methods: regular and singular perturbation for differential equations, multiple scale analysis, boundary layer theory, WKB theory.

MATH 5605 [0.5 credit] (MAT 5165)
Theory of Automata

Algebraic structure of sequential machines, decomposition of machines; finite automata, formal languages; complexity. Also offered at the undergraduate level, with different requirements, as MATH 4805/COMP 4805, for which additional credit is precluded.

MATH 5607 [0.5 credit] (MAT 5324)
Game Theory

Two-person zero-sum games; infinite games; multi-stage games; differential games; utility theory; two-person general-sum games; bargaining problem; n -person games; games with a continuum of players. Also offered at the undergraduate level, with different requirements, as MATH 4807, for which additional credit is precluded.

MATH 5609 [0.5 credit] (MAT 5301)
Topics in Combinatorial Mathematics

Courses in special topics related to Combinatorial Mathematics, not covered by other graduate courses.

MATH 5801 [0.5 credit] (MAT 5303)
Linear Optimization

Linear programming problems; simplex method, upper bounded variables, free variables; duality; postoptimality analysis; linear programs having special structures; integer programming problems; unimodularity; knapsack problem.

MATH 5803 [0.5 credit] (MAT 5304)
Nonlinear Optimization

Methods for unconstrained and constrained optimization problems; Kuhn-Tucker conditions; penalty functions; duality; quadratic programming; geometric programming; separable programming; integer nonlinear programming; pseudo-Boolean programming; dynamic programming.

MATH 5804 [0.5 credit] (MAT 5307)
Topics in Operations Research

MATH 5805 [0.5 credit] (MAT 5308)
Topics in Algorithm Design

MATH 5806 [0.5 credit] (MAT 5180)
Numerical Analysis

Error analysis for fixed and floating point arithmetic; systems of linear equations; eigen-value problems; sparse matrices; interpolation and approximation, including Fourier approximation; numerical solution of ordinary and partial differential equations.

MATH 5807 [0.5 credit] (MAT 5167)
Formal Language and Syntax Analysis

Computability, unsolvable and NP-hard problems. Formal languages, classes of language automata. Principles of compiler design, syntax analysis, parsing (top-down, bottom-up), ambiguity, operator precedence, automatic construction of efficient parsers, LR, LR(O), LR(k), SLR, LL(k). Syntax directed translation. Also listed as COMP 5807. Prerequisite(s): MATH 5605.

MATH 5808 [0.5 credit] (MAT 5305)
Combinatorial Optimization I

Network flow theory and related material. Topics will include shortest paths, minimum spanning trees, maximum flows, minimum cost flows. Optimal matching in bipartite graphs.

MATH 5809 [0.5 credit] (MAT 5306)**Combinatorial Optimization II**

Topics include optimal matching in non-bipartite graphs, Euler tours, and the Chinese Postman problem. Other extensions of network flows: dynamic flows, multicommodity flows, and flows with gains, bottleneck problems. Matroid optimization. Enumerative and heuristic algorithms for the Traveling Salesman and other problems. Prerequisite(s): MATH 5808 or permission of the school.

MATH 5818 [0.5 credit] (MAT 5105)**Discrete Applied Mathematics I: Graph Theory**

Paths and cycles, trees, connectivity, Euler tours and Hamilton cycles, edge colouring, independent sets and cliques, vertex colouring, planar graphs, directed graphs. Selected topics from one or more of the following areas: algebraic graph theory, topological graph theory, random graphs.

MATH 5819 [0.5 credit] (MAT 5107)**Discrete Applied Mathematics II: Combinatorial Enumeration**

Ordinary and exponential generating functions, product formulas, permutations, rooted trees, cycle index, WZ method. Lagrange inversions, singularity analysis of generating functions and asymptotics. Selected topics from one or more of the following areas: random graphs, random combinatorial structures, hypergeometric functions.

MATH 5821 [0.5 credit] (MAT 5341)**Quantum Computing**

Space of quantum bits; entanglement. Observables in quantum mechanics. Density matrix and Schmidt decomposition. Quantum cryptography. Classical and quantum logic gates. Quantum Fourier transform. Shor's quantum algorithm for factorization of integers.

MATH 5822 [0.5 credit] (MAT 5343)**Mathematical Aspects of Wavelets and Digital Signal Processing**

Lossless compression methods. Discrete Fourier transform and Fourier-based compression methods. JPEG and MPEG. Wavelet analysis. Digital filters and discrete wavelet transform. Daubechies wavelets. Wavelet compression.

Also offered at the undergraduate level, with different requirements, as MATH 4822, for which additional credit is precluded.

MATH 5900 [0.5 credit] (MAT 5990)**Seminar****MATH 5901 [0.5 credit] (MAT 5991)****Directed Studies****MATH 5906 [0.5 credit] (MAT 5996)****Research Internship**

This course affords students the opportunity to undertake research in mathematics as a cooperative project with governmental or industrial sponsors. The grade will be based upon the mathematical content and upon oral and written presentation of results.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the graduate director.

MATH 5909 [2.0 credits] (MAT 7999)**M.Sc. Thesis in Mathematics**

Includes: Experiential Learning Activity

MATH 5910 [1.0 credit] (MAT 6997)**M.Sc. Project in Mathematics**

Project in mathematics supervised by a professor approved by the graduate director resulting in a major report (approximately 30-40 pages), together with a short presentation on the report. Graded by the supervisor and another professor appointed by the graduate director.

Includes: Experiential Learning Activity

Precludes additional credit for MATH 5909.

MATH 5993 [0.0 credit] (MAT 5993)**Research Participation**

Includes: Experiential Learning Activity

MATH 6002 [0.5 credit] (MAT 5309)**Harmonic Analysis on Groups**

Transformation groups; Haar measure; unitary representations of locally compact groups; completeness and compact groups; character theory; decomposition.

MATH 6008 [0.5 credit] (MAT 5326)**Topics in Analysis****MATH 6101 [0.5 credit] (MAT 5327)****Topics in Algebra****MATH 6104 [0.5 credit] (MAT 5158)****Lie Groups**

Matrix groups: one-parameter groups, exponential map, Campbell-Hausdorff formula, Lie algebra of a matrix group, integration on matrix groups. Abstract Lie groups. Prerequisite(s): MATH 5007 and PADM 5107 or permission of the School.

MATH 6201 [0.5 credit] (MAT 5312)**Topics in Topology****MATH 6507 [0.5 credit] (MAT 5319)****Topics in Probability****MATH 6806 [0.5 credit] (MAT 5361)****Topics in Mathematical Logic**

MATH 6807 [0.5 credit] (MAT 5162)**Mathematical Foundations of Computer Science**

Foundations of functional languages, lambda calculi (typed, polymorphically typed, untyped), Curry-Howard Isomorphism, proofs-as-programs, normalization and rewriting theory, operational semantics, type assignment, introduction to denotational semantics of programs, fixed-point programming.

MATH 6900 [0.5 credit] (MAT 6990)**Seminar****MATH 6901 [0.5 credit] (MAT 6991)****Directed Studies****MATH 6909 [0.0 credit] (MAT 9999)****Ph.D. Thesis**

Includes: Experiential Learning Activity

Statistics (STAT) Courses**STAT 5500 [0.5 credit] (MAT 5177)****Multivariate Normal Theory**

Multivariate normal distribution properties, characterization, estimation of means, and covariance matrix. Regression approach to distribution theory of statistics; multivariate tests; correlations; classification of observations; Wilks' criteria.

STAT 5501 [0.5 credit] (MAT 5191)**Mathematical Statistics II**

Confidence intervals and pivots; Bayesian intervals; optimal tests and Neyman-Pearson theory; likelihood ratio and score tests; significance tests; goodness-of-fit tests; large sample theory and applications to maximum likelihood and robust estimation.

Prerequisite(s): STAT 5600 or permission of the School. Also offered at the undergraduate level, with different requirements, as STAT 4507, for which additional credit is precluded.

STAT 5502 [0.5 credit] (MAT 5192)**Sampling Theory and Methods**

Unequal probability sampling with and without replacement; unified theory for standard errors; prediction approach; ratio and regression estimation; stratification and optimal designs; multistage cluster sampling; double sampling; domains of study; post-stratification; nonresponse; measurement errors; related topics.

STAT 5503 [0.5 credit] (MAT 5193)**Linear Models**

Theory of non full rank linear models; estimable functions, best linear unbiased estimators, hypotheses testing, confidence regions; multi-way classifications; analysis of covariance; variance component models; maximum likelihood estimation, Minque, Anova methods; miscellaneous topics.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5504 [0.5 credit] (MAT 5194)**Stochastic Processes and Time Series Analysis**

Stationary stochastic processes, inference for stochastic processes, applications to time series and spatial series analysis.

STAT 5505 [0.5 credit] (MAT 5195)**Design of Experiments**

Overview of linear model theory; orthogonality; randomized block and split plot designs; latin square designs; randomization theory; incomplete block designs; factorial experiments: confounding and fractional replication; response surface methodology. Miscellaneous topics.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5506 [0.5 credit] (MAT 5175)**Robust Statistical Inference**

Tests for location, scale, and regression parameters; derivation of rank tests; distribution theory of linear rank statistics and their efficiency. Robust estimation of location, scale and regression parameters; Huber's M-estimators, Rank-methods, L-estimators. Influence function. Adaptive procedures.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5507 [0.5 credit] (MAT 5176)**Advanced Statistical Inference**

Pure significance test; uniformly most powerful unbiased and invariant tests; asymptotic comparison of tests; confidence intervals; large-sample theory of likelihood ratio and chi-square tests; likelihood inference; Bayesian inference; fiducial and structural methods; resampling methods.

Prerequisite(s): STAT 5501 or permission of the School.

STAT 5508 [0.5 credit] (MAT 5172)**Topics in Stochastic Processes**

Course contents will vary, but will include topics drawn from Markov processes. Brownian motion, stochastic differential equations, martingales, Markov random fields, random measures, and infinite particle systems, advanced topics in modeling, population models.

STAT 5509 [0.5 credit] (MAT 5196)**Multivariate Analysis**

Multivariate methods of data analysis, including principal components, cluster analysis, factor analysis, canonical correlation, MANOVA, profile analysis, discriminant analysis, path analysis.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5516 [0.5 credit] (MAT 5197)**Nonparametric Statistics**

Order statistics; projections; U-statistics; L-estimators; rank, sign, and permutation test statistics; nonparametric tests of goodness-of-fit, homogeneity, symmetry, and independence; nonparametric density estimation; nonparametric regression analysis: kernel estimators, orthogonal series estimators, smoothing splines; high-dimensional inference problems and false discovery. Prerequisite(s): STAT 5600 or permission of the School.

Also offered at the undergraduate level, with different requirements, as STAT 4506, for which additional credit is precluded.

Lectures three hours a week.

STAT 5600 [0.5 credit] (MAT 5190)**Mathematical Statistics I**

Statistical decision theory; likelihood functions; sufficiency; factorization theorem; exponential families; UMVU estimators; Fisher's information; Cramer-Rao lower bound; maximum likelihood, moment estimation; invariant and robust point estimation; asymptotic properties; Bayesian point estimation.

Also offered at the undergraduate level, with different requirements, as STAT 4500, for which additional credit is precluded.

STAT 5601 [0.5 credit] (MAT 5197)**Stochastic Optimization**

Topics chosen from stochastic dynamic programming, Markov decision processes, search theory, optimal stopping.

STAT 5602 [0.5 credit] (MAT 5317)**Analysis of Categorical Data**

Analysis of one-way and two-way tables of nominal data; multi-dimensional contingency tables, log-linear models; tests of symmetry, marginal homogeneity in square tables; incomplete tables; tables with ordered categories; fixed margins, logistic models with binary response; measures of association and agreement.

Prerequisite(s): STAT 5600 and STAT 5501, or permission of the School.

STAT 5603 [0.5 credit] (MAT 5318)**Reliability and Survival Analysis**

Types of censored data; nonparametric estimation of survival function; graphical procedures for model identification; parametric models and maximum likelihood estimation; exponential and Weibull regression models; nonparametric hazard function models and associate statistical inference; rank tests with censored data applications.

Prerequisite(s): STAT 5600 and STAT 5501 or permission of the School.

STAT 5604 [0.5 credit] (MAT 5173)**Stochastic Analysis**

Brownian motion, continuous martingales, and stochastic integration.

Prerequisite(s): STAT 5708 or permission of the School.

STAT 5610 [0.5 credit] (MAT 5375)**Introduction to Mathematical Statistics**

Limit theorems. Sampling distributions. Parametric estimation. Concepts of sufficiency and efficiency. Neyman-Pearson paradigm, likelihood ratio tests.

Parametric and non-parametric methods for two-sample comparisons. Notions of experimental design, categorical data analysis, the general linear model, decision theory and Bayesian inference.

Precludes additional credit for STAT 5600.

Also offered at the undergraduate level, with different requirements, as STAT 4500, for which additional credit is precluded.

STAT 5701 [0.5 credit] (MAT 5198)**Stochastic Models**

Markov systems, stochastic networks, queuing networks, spatial processes, approximation methods in stochastic processes and queuing theory. Applications to the modeling and analysis of computer-communications systems and other distributed networks.

Also offered at the undergraduate level, with different requirements, as STAT 4508, for which additional credit is precluded.

STAT 5702 [0.5 credit] (MAT 5182)**Modern Applied and Computational Statistics**

Resampling and computer intensive methods: bootstrap, jackknife with applications to bias estimation, variance estimation, confidence intervals, and regression analysis. Smoothing methods in curve estimation; statistical classification and pattern recognition: error counting methods, optimal classifiers, bootstrap estimates of the bias of the misclassification error.

STAT 5703 [0.5 credit] (MAT 5181)**Data Mining**

Visualization and knowledge discovery in massive datasets; unsupervised learning: clustering algorithms; dimension reduction; supervised learning: pattern recognition, smoothing techniques, classification.

Computer software will be used.

Includes: Experiential Learning Activity

STAT 5704 [0.5 credit] (MAT 5174)**Network Performance**

Advanced techniques in performance evaluation of large complex networks. Topics may include classical queueing theory and simulation analysis; models of packet networks; loss and delay systems; blocking probabilities.

STAT 5705 [0.5 credit] (MAT 5373)
Statistical Machine Learning

Discriminant analysis, principal component analysis, support vector machines; reproducing kernel Hilbert spaces and kernel methods; neural networks; VC Theory, PAC learning. Additional topics may include: Bayesian modelling, manifold learning, boosting.
Includes: Experiential Learning Activity

STAT 5708 [0.5 credit] (MAT 5170)
Probability Theory I

Probability spaces, random variables, expected values as integrals, joint distributions, independence and product measures, cumulative distribution functions and extensions of probability measures, Borel-Cantelli lemmas, convergence concepts, independent identically distributed sequences of random variables.

STAT 5709 [0.5 credit] (MAT 5171)
Probability Theory II

Laws of large numbers, characteristic functions, central limit theorem, conditional probabilities and expectations, basic properties and convergence theorems for martingales, introduction to Brownian motion.
Prerequisite(s): STAT 5708 (MAT 5170) or permission of the School.

STAT 5713 [0.5 credit]
Advanced Data Mining

Topics from recent literature on mining complex data structures and data such as: tree/graph, sequence, web/test, stream, spatiotemporal, high-dimensional, multivariate time series, mixed-mode; clustering (EM, topic modeling, fuzzy), SVM; multi-label learning; deep learning; combining learners, network analysis/link prediction/graphical models (Bayesian, Markov networks); anomaly detection.

STAT 5900 [0.5 credit] (MAT 5990)
Seminar

STAT 5901 [0.5 credit] (MAT 6991)
Directed Studies

STAT 5902 [0.5 credit] (MAT 5992)
Seminar in Biostatistics

Students work in teams on the analysis of experimental data or experimental plans. The participation of experimenters in these teams is encouraged. Student teams present their results in the seminar, and prepare a brief written report on their work.

STAT 5904 [0.5 credit] (MAT 5993)
Statistical Internship

This project-oriented course allows students to undertake statistical research and data analysis projects as a cooperative project with governmental or industrial sponsors. Practical data analysis and consulting skills will be emphasized. The grade will be based upon oral and written presentation of results.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the graduate director.

STAT 5909 [2.0 credits]
M.Sc. Thesis in Statistics

STAT 5910 [1.0 credit]
M.Sc. Project in Statistics

Project in statistics supervised by a professor approved by the graduate director resulting in a major report (approximately 30-40 pages), together with a short presentation on the report. Graded by the supervisor and another professor appointed by the graduate director.
Includes: Experiential Learning Activity

STAT 6508 [0.5 credit] (MAT 5314)
Topics in Probability and Statistics

STAT 6900 [0.5 credit] (MAT 6990)
Seminar

STAT 6901 [0.5 credit] (MAT 6991)
Directed Studies

STAT 6909 [0.0 credit] (MAT 9999)
Ph.D. Thesis

Includes: Experiential Learning Activity

Mechanical and Aerospace Engineering

This section presents the requirements for programs in:

- M.A.Sc. Aerospace Engineering
- M.A.Sc. Materials Engineering
- M.A.Sc. Mechanical Engineering
- M.A.Sc. Aerospace Engineering with Collaborative Specialization in Climate Change
- M.A.Sc. Materials Engineering with Collaborative Specialization in Climate Change
- M.A.Sc. Mechanical Engineering with Collaborative Specialization in Climate Change
- M. Eng. Aerospace
- M. Eng. Materials
- M. Eng. Mechanical
- Ph.D. Aerospace Engineering
- Ph.D. Mechanical Engineering

Program Requirements

Students are expected to complete the master's program within the maximum limits outlined in the Section 13.2 of the General Regulations section of this Calendar.

The requirements for course work are specified in terms of credits: one credit is one hour/week for one term (thirteen weeks).

M.A.Sc. Aerospace Engineering (5.0 credits)

M.A.Sc. Materials Engineering (5.0 credits)

M.A.Sc. Mechanical Engineering (5.0 credits)

Requirements:

1. **2.5 credits** in courses offered by the OCIMAE. 2.5
2. Participation in the Mechanical and Aerospace Engineering seminar series

3. **2.5 credits in:** 2.5
 MECH 5909 [2.5] M.A.Sc. Thesis

Total Credits 5.0

M.A.Sc. Aerospace Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. **1.0 credit in:** 1.0
 CLIM 5000 [1.0] Climate Collaboration

2. **0.0 credit in:**
 CLIM 5800 [0.0] Climate Seminar Series

3. **1.5 credits in** courses offered by the OCIMAE. 1.5

4. Participation in the Mechanical and Aerospace Engineering seminar series

5. **2.5 credits in:** 2.5
 MECH 5909 [2.5] M.A.Sc. Thesis (in the specialization)

Total Credits 5.0

M.A.Sc. Materials Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. **1.0 credit in:** 1.0
 CLIM 5000 [1.0] Climate Collaboration

2. **0.0 credit in:**
 CLIM 5800 [0.0] Climate Seminar Series

3. **1.5 credits in** courses offered by the OCIMAE. 1.5

4. Participation in the Mechanical and Aerospace Engineering seminar series

5. **2.5 credits in:** 2.5
 MECH 5909 [2.5] M.A.Sc. Thesis (in the specialization)

Total Credits 5.0

M.A.Sc. Mechanical Engineering with Collaborative Specialization in Climate Change (5.0 credits)

Requirements:

1. **1.0 credit in:** 1.0
 CLIM 5000 [1.0] Climate Collaboration

2. **0.0 credit in:**
 CLIM 5800 [0.0] Climate Seminar Series

3. **1.5 credits in** courses offered by the OCIMAE. 1.5

4. Participation in the Mechanical and Aerospace Engineering seminar series

5. **2.5 credits in:** 2.5
 MECH 5909 [2.5] M.A.Sc. Thesis (in the specialization)

Total Credits 5.0

M. Eng. Aerospace (5.0 credits)

Requirements:

1. **1.5 credits from** the Aerospace Restricted Course List. Up to 1.0 credit can be completed by taking courses in AERO at the 4000 level and MAAE at the 4000 level with the approval of the Associate Chair for Graduate Studies. 1.5

2. **3.5 credits from** any graduate level course offered by the OCIMAE 3.5

Total Credits 5.0

Requirements by Project (Independent Study) (5.0 credits)

1. **1.5 credits in:** 1.5
 MECH 5908 [1.5] Independent Engineering Study

2. **1.5 credits from** the Aerospace Restricted Course List. Up to 1.0 credit can be completed by taking courses in AERO at the 4000 level and MAAE at the 4000 level with the approval of the Associate Chair for Graduate Studies. 1.5

3. **2.0 credits from** any graduate level course offered by the OCIMAE 2.0

Total Credits 5.0

M. Eng. Materials (5.0 credits)

Requirements:

1. **1.5 credits from** the Materials Restricted Course List. Up to 1.0 credit can be completed by taking courses in materials oriented MECH at the 4000 level and MAAE at the 4000 level with the approval of the Associate Chair for Graduate Studies. 1.5

2. **3.5 credits from** any graduate level course offered by the OCIMAE 3.5

Total Credits 5.0

Requirements by Project (Independent Study) (5.0 credits)

1. **1.5 credits in:** 1.5
 MECH 5908 [1.5] Independent Engineering Study

2. **1.5 credits from** the Materials Restricted Course List. Up to 1.0 credit can be completed by taking courses in materials oriented MECH at the 4000 level and MAAE at the 4000 level with the approval of the Associate Chair for Graduate Studies. 1.5

3. **2.0 credits from** any graduate level course offered by the OCIMAE 2.0

Total Credits 5.0

M. Eng. Mechanical (5.0 credits)

Requirements:

1. **5.0 credits from** the Unrestricted Course List. Up to 1.0 credit can be completed by taking courses in MECH at the 4000 level and MAAE at the 4000 with the approval of the Associate Chair for Graduate Studies. 5.0

Total Credits 5.0

Requirements by Project (Independent Study) (5.0 credits)

1. **1.5 credits in:** 1.5
 MECH 5908 [1.5] Independent Engineering Study

2. **3.5 credits from** the Unrestricted Course List. Up to 1.0 credit can be completed by taking courses in MECH at the 4000 level and MAAE at the 4000 level with the approval of the Associate Chair for Graduate Studies. 3.5

Total Credits 5.0

Ph.D. Aerospace Engineering (1.5 credits)

Ph.D. Mechanical Engineering (1.5 credits)

Requirements (from the master's degree):

(from the master's degree)

1. **1.5 credits in** courses 1.5

2. Participation in the Mechanical and Aerospace Engineering seminar series	
3. Successful completion of the comprehensive examination according to section 9.4 and 9.5 of the General Regulations section of this Calendar	
4. 0.0 credits in thesis.	0.0
MECH 6909 [0.0] Ph.D. Thesis	
Total Credits	1.5

Graduate Courses

In addition, graduate courses offered by departments in other disciplines may be taken for credit with approval by the department in which the student is registered.

Not all of the following courses are offered in a given year. Consult the Ottawa-Carleton Joint Institute for Mechanical and Aerospace Engineering (OCIMAE) website for course offerings.

The following codes identify the department offering the course:

- 'MECH' Department of Mechanical and Aerospace Engineering, Carleton University
- 'MAAJ' Department of Mechanical Engineering, University of Ottawa

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Aerospace Restricted List

MECH 5100 (MCG 5310)	Performance and Economics of Aircraft
MECH 5101 (MCG 5311)	Dynamics and Aerodynamics of Flight
MECH 5105 (MCG 5315)	Orbital Mechanics and Space Control
MECH 5106 (MCG 5121)	Space Mission Analysis and Design
MECH 5301 (MCG 5331)	Aeroacoustics

Materials Restricted List

MECH 5604 (MCG 5364)	Computational Metallurgy
MECH 5609 (MCG 5123)	Microstructure and Properties of Materials
MECH 5700 (MCG 5345)	Surfaces and Coatings
MECH 5701 (MCG 5369)	Metallic Phases and Transformations

Unrestricted List

MECH 5009 (MCG 5309)	Environmental Fluid Mechanics Relating to Energy Utilization
MECH 5104 (MCG 5314)	Ground Transportation Systems and Vehicles
MECH 5201 (MCG 5321)	Methods of Energy Conversion
MECH 5203 (MCG 5322)	Nuclear Engineering
MECH 5205 (MCG 5324)	Building Performance Simulation
MECH 5300 (MCG 5330)	Engineering Acoustics
MECH 5500 (MCG 5350)	Advanced Vibration Analysis

MECH 5704 (MCG 5374)	Integrated Manufacturing Systems (CIMS)
MECH 5107 (MCG 5317)	Experimental Stress Analysis
MECH 5302 (MCG 5332)	Instrumentation Techniques
MECH 5407 (MCG 5347)	Conductive and Radiative Heat Transfer
MECH 5408 (MCG 5348)	Convective Heat and Mass Transfer
MECH 5601 (MCG 5361)	Creative Problem Solving and Design
MECH 5602 (MCG 5362)	Failure Prevention (Fracture Mechanics and Fatigue)
MECH 5603 (MCG 5381)	Lightweight Structures
MECH 5605 (MCG 5365)	Finite Element Analysis I
MECH 5606 (MCG 5366)	Finite Element Analysis II
MECH 5607 (MCG 5367)	The Boundary Element Method (BEM)
MECH 5000 (MCG 5300)	Fundamentals of Fluid Dynamics
MECH 5001 (MCG 5301)	Theory of Viscous Flows
MECH 5003 (MCG 5303)	Incompressible Non-Viscous Flow
MECH 5004 (MCG 5304)	Compressible Non-Viscous Flow
MECH 5008 (MCG 5308)	Experimental Methods in Fluid Mechanics
MECH 5202 (MCG 5122)	Smart Structures
MECH 5204 (MCG 5483)	Fundamentals of Combustion
MECH 5304 (MCG 5334)	Computational Fluid Dynamics of Compressible Flows
MECH 5400 (MCG 5344)	Gas Turbine Combustion
MECH 5401 (MCG 5341)	Turbomachinery
MECH 5402 (MCG 5342)	Gas Turbines
MECH 5403 (MCG 5343)	Advanced Thermodynamics
MECH 5501 (MCG 5125)	Advanced Dynamics
MECH 5502 (MCG 5352)	Optimal Control Systems
MECH 5503 (MCG 5353)	Robotics
MECH 5504 (MCG 5354)	Guidance, Navigation and Control
MECH 5505 (MCG 5355)	Stability Theory and Applications
MECH 5506 (MCG 5356)	Neuro and Fuzzy Control
MECH 5507 (MCG 5124)	Advanced Kinematics
MECH 5705 (MCG 5375)	CAD/CAM

With the approval of the Department, the following courses can be placed in one of the above categories:

MAAJ 5308 (MCG 5138)	Advanced Topics in Advanced Materials and Manufacturing Engineering
MECH 5800 (MCG 5480)	Special Topics in Mechanical and Aerospace Engineering
MECH 5801 (MCG 5489)	Special Topics in Mechanical and Aerospace Engineering
MECH 5802 (MCG 5483)	Special Topics in Mechanical and Aerospace Engineering
MECH 5803 (MCG 5488)	Special Topics in Mechanical and Aerospace Engineering
MECH 5804 (MCG 5384)	Special Topics in Mechanical and Aerospace Engineering
MECH 5805 (MCG 5482)	Special Topics in Mechanical and Aerospace Engineering
MECH 5806 (MCG 5486)	Special Topics in Mechanical and Aerospace Engineering
MECH 5807 (MCG 5387I)	Special Topics in Mechanical and Aerospace Engineering
MECH 5808 (MCG 5376)	Special Topics in Mechanical and Aerospace Engineering
MECH 5809 (MCG 5382)	Special Topics in Mechanical and Aerospace Engineering

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Materials Restricted List

MAAJ 5003 (MCG 5103)	Theory Perfectly Plastic Solid
MAAJ 5100 (MCG 5110)	Micromechanics of Solids
MAAJ 5107 (MCG 5117)	Intro to Composite Materials
MAAJ 5108 (MCG 5118)	Introduction to Plasticity
MAAJ 5206 (MCG 5126)	Deformation of Materials
MAAJ 5209 (MCG 5129)	Hot Working of Metals
MAAJ 5307 (MCG 5137)	Special Studies in Solid Mechanics and Materials

Unrestricted List

MAAJ 5004 (MCG 5104)	Theory of Plates and Shells
MAAJ 5104 (MCG 5114)	Analy and Des: Pressure Vessels
MAAJ 5509 (MCG 5159)	Production Planning and Control
MAAJ 5608 (MCG 5168)	Industrial Organization
MAAJ 5609 (MCG 5169)	Topics in Reliability Engineer
MAAJ 5701 (MCG 5171)	Applied Reliability Theory
MAAJ 5703 (MCG 5173)	Systems Engineer and Integration
MAAJ 5707 (MCG 5177)	Robot Mechanics
MAAJ 5709 (MCG 5179)	Manufacturing System Analysis
MAAJ 5804 (MCG 5184)	Mechatronics

MAAJ 5001 (MCG 5101)	Theory of Elasticity
MAAJ 5002 (MCG 5102)	Advanced Stress Analysis
MAAJ 5006 (MCG 5106)	Advanced Topics in Elasticity
MAAJ 5008 (MCG 5108)	Finite Element Analysis
MAAJ 5009 (MCG 5109)	Topics:Finite Element Analysis
MAAJ 5109 (MCG 5119)	Fracture Mechanics
MAAJ 5301 (MCG 5131)	Heat Transfer by Conduction
MAAJ 5302 (MCG 5132)	Heat Transfer by Convection
MAAJ 5303 (MCG 5133)	Heat Transfer by Radiation
MAAJ 5304 (MCG 5134)	Heat Transfer w/Phase Change
MAAJ 5306 (MCG 5136)	Fluid Mech and Heat Transfer
MAAJ 5802 (MCG 5182)	Theory of Elastic Instability
MAAJ 5005 (MCG 5105)	Continuum Mechanics
MAAJ 5007 (MCG 5107)	Adv. Dynamics w/Applications
MAAJ 5101 (MCG 5111)	Gas Dynamics
MAAJ 5105 (MCG 5115)	Non-Linear Optimization
MAAJ 5401 (MCG 5141)	Statistical Thermodynamics
MAAJ 5408 (MCG 5551)	Theorie d'Ecoulement Visqueux
MAAJ 5409 (MCG 5552)	Theorie de Turbulence
MAAJ 5500 (MCG 5557)	Mecanique de Fluides
MAAJ 5501 (MCG 5151)	Laminar Flow Theory
MAAJ 5502 (MCG 5152)	Theory of Turbulance
MAAJ 5505 (MCG 5155)	Inviscid Flow Theory
MAAJ 5506 (MCG 5156)	Measurement of Fluid Mech
MAAJ 5507 (MCG 5157)	Num Comp:Fluid Dyn and Heat Tran
MAAJ 5700 (MCG 5170)	CAD/CAM
MAAJ 5805 (MCG 5185)	Multivariate Digital Control
MAAJ 5806 (MCG 5186)	Non-Linear Disc Dyn and Control
MAAJ 5901 (MCG 5191)	Combustion in Premixed Systems
MAAJ 5902 (MCG 5192)	Combustion in Diffusion System

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes in the programs listed below, the summer term (May to August) is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

- M.Eng. Aerospace (coursework and research pathways only)
- M.Eng. Materials (coursework and research pathways only)
- M.Eng. Mechanical (coursework and research pathways only)

Admission

The normal requirement for admission to the master's program is a bachelor's degree with at least high honours standing in mechanical or aerospace engineering or a related discipline.

Admission

The normal requirement for admission to the Ph.D. program is a master's degree in mechanical or aerospace engineering or a related discipline.

Students who are in the master's program may be admitted to the Ph.D. program if they show outstanding academic performance and demonstrate significant promise for advanced research, upon recommendation of the department. In addition, graduate courses offered by departments in other disciplines may be taken for credit with approval by the department in which the student is registered.

Mechanical Engineering (MECH) Courses

MECH 5000 [0.5 credit] (MCG 5300)

Fundamentals of Fluid Dynamics

Differential equations of motion. Viscous and inviscid regions. Potential flow: superposition; thin airfoils; finite wings; compressibility corrections. Viscous flow: thin shear layer approximation; laminar layers; transition; turbulence modeling. Convective heat transfer: free versus forced convection; energy and energy integral equations; turbulent diffusion.

Also listed as MAAJ 5050.

Also offered at the undergraduate level, with different requirements, as AERO 4302, for which additional credit is precluded.

MECH 5001 [0.5 credit] (MCG 5301)

Theory of Viscous Flows

Navier-Stokes and boundary layer equations; mean flow equations for turbulent kinetic energy; integral formulations. Stability, transition, turbulence, Reynolds stresses; separation. Calculation methods, closure schemes. Compressibility, heat transfer, and three-dimensional effects.

Includes: Experiential Learning Activity

MECH 5003 [0.5 credit] (MCG 5303)

Incompressible Non-Viscous Flow

The fundamental equations and theorems for non-viscous fluid flow; solution of two-dimensional and axisymmetric potential flows; low-speed airfoil and cascade theory; wing lifting-line theory; panel methods.

MECH 5004 [0.5 credit] (MCG 5304)

Compressible Non-Viscous Flow

Steady isentropic, frictional, and diabatic flow; shock waves; irrotational compressible flow, small perturbation theory and similarity rules; second-order theory and unsteady, one-dimensional flow.

MECH 5008 [0.5 credit] (MCG 5308)

Experimental Methods in Fluid Mechanics

Fundamentals of techniques of simulation of fluid dynamic phenomena. Theoretical basis, principles of design, performance and instrumentation of ground test facilities. Applications to aerodynamic testing. Includes: Experiential Learning Activity

MECH 5009 [0.5 credit] (MCG 5309)

Environmental Fluid Mechanics Relating to Energy Utilization

Characteristics of energy sources and emissions into the environment. The atmosphere; stratification and stability, equations of motion, simple winds, mean flow, turbulence structure and dispersion near the ground. Flow and dispersion in groundwater, rivers, lakes and oceans. Physical and analytical modeling of environmental flows. Includes: Experiential Learning Activity
Also listed as MAAJ 5059.

MECH 5100 [0.5 credit] (MCG 5310)

Performance and Economics of Aircraft

Aircraft performance analysis with emphasis on factors affecting take-off, landing and economic performance; high lift schemes; operating economics.

MECH 5101 [0.5 credit] (MCG 5311)

Dynamics and Aerodynamics of Flight

Static stability theory. Euler's equations for rigid body motion; the linearized equations of motion; stability derivatives and their estimation. Longitudinal and lateral dynamic response of an aircraft to control and disturbance. Includes: Experiential Learning Activity
Also listed as MAAJ 5151.

Also offered at the undergraduate level, with different requirements, as AERO 4308, for which additional credit is precluded.

MECH 5103 [0.5 credit] (MCG 5328)

3D Machine Vision: From Robots to the Space Station

Through lectures and project work, this course introduces fundamental 3D machine vision methods (triangulation and time-of-flight), presents cutting-edge neural network approaches, and explores major engineering applications (e.g. robotics, autonomous vehicles, space navigation) where perception of the 3D environment is essential.

MECH 5104 [0.5 credit] (MCG 5314)**Ground Transportation Systems and Vehicles**

Performance characteristics, handling and directional stability, ride comfort and safety of various types of ground vehicle systems including road vehicles, terrain-vehicle systems, guided transport systems, and advanced ground transport technology.

MECH 5105 [0.5 credit] (MCG 5315)**Orbital Mechanics and Space Control**

Orbital dynamics and perturbations due to the Earth's figure, the sun, and the moon with emphasis on mission planning and analysis. Rigid body dynamics applied to transfer orbit and on-orbit momentum management and control of spacecraft. Effects of flexible structures on a spacecraft control system.

Includes: Experiential Learning Activity

Also listed as MAAJ 5155.

MECH 5106 [0.5 credit] (MCG 5121)**Space Mission Analysis and Design**

Review of solar system and space exploration. Space mission design and geometry. Analysis of orbit design, transfers, interplanetary trajectories. Effect of environment on spacecraft design. Space propulsion and launch vehicle design. Launch sequence, windows, cost. Reusable launch systems.

Precludes additional credit for MAAE 4906 (Section B) if taken between 1994-1995 and 2003-2004 inclusive, MECH 5805 taken between 2002-2003 and 2003-2004 inclusive, MAAE 5700 (Section L) taken between 1994-1995 and 1996-1997 inclusive, and MAAE 5805 taken between 1999-2000 and 2001-2002 inclusive. Also offered at the undergraduate level, with different requirements, as AERO 4802., for which additional credit is precluded.

MECH 5107 [0.5 credit] (MCG 5317)**Experimental Stress Analysis**

Introduction to theory of elasticity. Photo-elasticity: types of polariscopes, two- and three-dimensional stress fields, frozen patterns. Photoelastic coatings. Strain gauges; gauge factors, sensitivity, calibration, and temperature compensation. Moire fringes, brittle lacquers, mechanical strain gauges.

MECH 5201 [0.5 credit] (MCG 5321)**Methods of Energy Conversion**

Technical, economic and environmental aspects of present and proposed large-scale systems of energy conversion.

MECH 5202 [0.5 credit] (MCG 5122)**Smart Structures**

Structural dynamics principles: modal analysis and wave propagation. Linear time invariant systems: feedback, feedforward, SISO, MIMO, digital and adaptive filters.

'Smart' Structures: multifunctional materials, collocation principles, geometric filtering, and control authority.

Applications in aero-acoustics and aeroelasticity.

Precludes additional credit for MECH 5807 (if taken 2001-2002 to 2003-2004).

MECH 5203 [0.5 credit] (MCG 5322)**Nuclear Engineering**

Reactor design and safety requirement overview; reactor physics, chemistry and engineering, CANDU reactor design and operation; CANDU reactor fuel channels, thermalhydraulics and fuel; reactor safety design and analysis; IAEA and Canadian safety analysis requirements; reactor accidents; nuclear energy policy.

MECH 5204 [0.5 credit] (MCG 5483)**Fundamentals of Combustion**

Emphasis on gas phase reacting flows. Background of combustion thermodynamics, diffusion mass transfer, and chemical kinetics. Detonations and deflagrations. Chemical and dynamic structure of flames. Gaseous flame propagation under laminar and turbulent conditions. Flame stabilization and extinction. Introduction to burning rate theory.

Also listed as MAAJ 5254.

MECH 5205 [0.5 credit] (MCG 5324)**Building Performance Simulation**

During this course students will develop an understanding of the methodologies and theory employed historically and contemporarily in the Building Performance Simulation (BPS) field, develop capabilities for extending the functionality of BPS tools, and establish skills in applying BPS tools in research, analysis, and design.

Includes: Experiential Learning Activity

Also listed as MAAJ 5255.

MECH 5206 [0.5 credit] (MCG 5325)**Wind Engineering**

Theoretical and practical areas pertinent to the operation of wind turbines. World energy needs, wind farms versus traditional power plants, global wind characteristics, efficient turbine design, electrical components, modes of turbine operation and control, mechanical design, economic and environmental concerns.

MECH 5300 [0.5 credit] (MCG 5330)**Engineering Acoustics**

Review of acoustic waves in compressible fluids; acoustic pressure, intensity and impedance; physical interpretation and measurement; transmission through media; layers, in-homogeneous media, solids; acoustic systems; rooms, ducts, resonators, mufflers, properties of transducers; microphones, loudspeakers, computational acoustics.

MECH 5301 [0.5 credit] (MCG 5331)**Aeroacoustics**

The convected wave equation; theory of subsonic and supersonic jet noise; propeller and helicopter noise; fan and compressor noise; boundary layer noise, interior noise; propagation in the atmosphere; sonic boom; impact on environment.

Includes: Experiential Learning Activity

MECH 5302 [0.5 credit] (MCG 5332)**Instrumentation Techniques**

An introduction for the non-specialists to the concepts of digital and analog electronics with emphasis on data acquisition, processing and analysis. Topics covered include operational amplifiers, signal processing, digital logic systems, computer interfacing, noise in electronic systems. Hands-on sessions illustrate theory and practice. Also listed as MAAJ 5352.

MECH 5304 [0.5 credit] (MCG 5334)**Computational Fluid Dynamics of Compressible Flows**

Solution techniques for parabolic, elliptic and hyperbolic equations developed for problems of interest to fluid dynamics with appropriate stability considerations. A staged approach to solution of full Euler and Navier-Stokes equations is used. Grid generation techniques appropriate for compressible flows are introduced. Also listed as MAAJ 5354.

MECH 5400 [0.5 credit] (MCG 5344)**Gas Turbine Combustion**

Combustion fundamentals and gas turbine combustor design. Combustion fundamentals include fuel evaporation, chemistry of combustion, chemical kinetics and emissions formation and introduction to computational combustion modelling. Combustor design addresses the interrelationship between operational requirements and combustion fundamentals.

Precludes additional credit for MECH 5800 (MCG 5480) when MECH 5800 was offered with this topic.

MECH 5401 [0.5 credit] (MCG 5341)**Turbomachinery**

Types of machines. Similarity: performance parameters; characteristics; cavitation. Velocity triangles. Euler equation: impulse and reaction. Radial pumps and compressors: analysis, design and operation. Axial pumps and compressors: cascade and blade-element methods; staging; off-design performance; stall and surge. Axial turbines. Current design practice.

Includes: Experiential Learning Activity

Also listed as MAAJ 5451.

MECH 5402 [0.5 credit] (MCG 5342)**Gas Turbines**

Interrelationship among thermodynamic, aerodynamic, and mechanical design. Ideal and real cycle calculations. Cycle optimization; turbo-shaft, turbojet, turbofan. Component performance. Off-design performance; matching of compressor, turbine, nozzle. Twin-spool matching.

MECH 5403 [0.5 credit] (MCG 5343)**Advanced Thermodynamics**

The course covers three major topics: review of fundamentals from a consistent viewpoint, properties and equations of state, and applications and special topics. The third topic includes an introduction to statistical thermodynamics.

MECH 5407 [0.5 credit] (MCG 5347)**Conductive and Radiative Heat Transfer**

Analytical, numerical and analog solutions to steady-state and transient conduction heat transfer in multi-dimensional systems. Radiative heat exchange between black, grey, non-grey diffusive and specular surfaces, including effects of athermanous media.

Also listed as MAAJ 5457.

MECH 5408 [0.5 credit] (MCG 5348)**Convective Heat and Mass Transfer**

Analogies between heat, mass and momentum transfer. Forced and free convection relations for laminar and turbulent flows analytically developed where possible and otherwise deduced from experimental results, for simple shapes and in heat exchangers. Mass transfer theory and applications.

MECH 5500 [0.5 credit] (MCG 5350)**Advanced Vibration Analysis**

General theory of continuous and discrete multi-degree-of-freedom vibrating systems. Emphasis on numerical techniques of solving complex vibrating systems, with selected applications from aerospace, civil, and mechanical engineering.

Includes: Experiential Learning Activity

Also listed as MAAJ 5550.

MECH 5501 [0.5 credit] (MCG 5125)**Advanced Dynamics**

Developing and applying the governing equations of motion for discrete and continuous mechanical systems. Includes Newton-Euler and Lagrangian formulations; classical and finite element approaches for continuous systems; and linear stability, frequency response, and propagation solution methods.

Includes: Experiential Learning Activity

Precludes additional credit for MECH 5500 (if taken 2001-2002, 2002-2003).

MECH 5502 [0.5 credit] (MCG 5352)**Optimal Control Systems**

Review of transfer function and state-space system descriptions. Elements of the optimal control problem. Variational calculus. Optimal state feedback control. Riccati equations. Optimal observers and Kalman-Bucy Filters. Extension to discrete time systems including an introduction to dynamic programming. Practical applications are emphasized throughout the course.

MECH 5503 [0.5 credit] (MCG 5353)**Robotics**

The history of and introduction to robotics methodology. Robots and manipulators; homogeneous transformation, kinematic equations, solving kinematic equations, differential relationships, motion trajectories, dynamics. Control; feedback control, compliance, servomotors, actuators, external and internal sensors, grippers and vision systems. Microprocessors and their application to robot control. Programming.

MECH 5504 [0.5 credit] (MCG 5354)**Guidance, Navigation and Control**

Guidance system classification, flight control systems, targeting, target tracking, sensing. Modern multivariable control analysis; design requirements, sensitivity, robustness, perturbations, performance analysis. Modern filtering and estimation techniques. Terrestrial navigation; tactical air navigation (TACAN), star trackers Guidance mission and performance. Aircraft, missile and spacecraft guidance and control.

MECH 5505 [0.5 credit] (MCG 5355)**Stability Theory and Applications**

Fundamental concepts and characteristics of modern stability definitions. Sensitivity and variational equations; linear variational equations; phase space analysis; Lyapunov's direct method. Autonomous and nonautonomous systems; stability in first approximation; the effect of force type on stability; frequency method. Also listed as MAAJ 5555.

MECH 5506 [0.5 credit] (MCG 5356)**Neuro and Fuzzy Control**

Knowledge-based controllers. Fuzzy control: mathematics, relations, operations, approximate reasoning. Fuzzy knowledge base control and structure. Fuzzification, inference engine, defuzzification. Nonlinear, adaptive fuzzy control systems. Stability, Neuro-control: processing, learning. Adaptation of artificial neural systems: associative memories, algorithms, applications, and network implementation. Neurofuzzy systems: industrial applications.

Precludes additional credit for EACJ 5709 (ELG 5196).

MECH 5507 [0.5 credit] (MCG 5124)**Advanced Kinematics**

Algebraic-geometry applications: kinematic calibration of serial and in-parallel robots; kinematic synthesis of planar, spherical, spatial mechanisms. Various DH-parametrisations, Jacobian formulations. Topics in: projective geometry; Cayley-Klein geometries; Plücker line coordinates; Gröbner bases; Grassmannians; kinematic mapping; Burmester theory. Emphasis on practical applications.

Includes: Experiential Learning Activity

Also listed as MAAJ 5557.

MECH 5508 [0.5 credit] (MCG 5326)**System Modelling, Dynamics and Control**

The course provides an understanding of system modelling and the connection between energy domains. Within the temporal and/or frequency domains, system identification techniques and control aspects are explored for discrete and continuous systems along with lumped and distributed parameter models.

MECH 5509 [0.5 credit] (MCG 5327)**Nonlinear Systems Analysis & Controls**

Introduction to nonlinear systems, stability of periodic solutions and limit cycles. Second-order nonlinear systems. Mathematical foundations for stability analysis, Lyapunov and LaSalle's methods. Autonomous and non-autonomous systems. Input-Output stability formalisms. Basics of nonlinear control techniques based on Lyapunov methods.

MECH 5601 [0.5 credit] (MCG 5361)**Creative Problem Solving and Design**

Problem-solving processes and how they can be applied in engineering design. Emphasis on learning methodologies rather than accumulating information. Techniques can be successfully applied in any engineering specialty.

Also listed as IDES 5301 (no longer offered), MAAJ 5657.

MECH 5602 [0.5 credit] (MCG 5362)**Failure Prevention (Fracture Mechanics and Fatigue)**

Design of engineering structures to ensure against failure due to fatigue or brittle fracture. Nature of fatigue and brittle fracture; selection of suitable material, geometry, and inspection procedures for the load and environmental conditions.

MECH 5603 [0.5 credit] (MCG 5381)**Lightweight Structures**

Structural behaviour. Fundamentals of basic elasticity. Energy methods of structural analysis. Bending, shear, and torsion of open and closed multicell structures. Bending of plates. Structural idealization and its effects on open and closed sections. Structural stability.

MECH 5604 [0.5 credit] (MCG 5364)**Computational Metallurgy**

Development of microstructure in alloys in solidification processes and post-solidification processing. Nucleation and growth of solid phase. Formation of a dendrite structure, macro and micro segregations. Pore formation in castings. Thermodynamic and kinetics of phase transformations and structure evolution in solid alloys.

MECH 5605 [0.5 credit] (MCG 5365)**Finite Element Analysis I**

An introduction to the finite element methodology, with emphasis on applications to heat transfer, fluid flow and stress analysis. The basic concepts of Galerkin's method, interpolation, numerical integration, and isoparametric elements are taught using simple examples.

Also listed as MAAJ 5655.

MECH 5606 [0.5 credit] (MCG 5366)**Finite Element Analysis II**

Time marching heat flow problems with linear and nonlinear analysis. Static plasticity. Time-dependent deformation problems; viscoplasticity, viscoelasticity, and dynamic analysis. Isoparametric elements and numerical integration are used throughout.

MECH 5607 [0.5 credit] (MCG 5367)**The Boundary Element Method (BEM)**

Integral equations. The BIE for potential theory and for elastostatics in two-dimensions. Boundary elements and numerical integration schemes. Practical applications.

Includes: Experiential Learning Activity

Also listed as MAAJ 5656.

MECH 5609 [0.5 credit] (AMM 5123)**Microstructure and Properties of Materials**

Essential microstructural features of metals and alloys: crystal structure, dislocations, grain boundaries. The importance of these features in controlling mechanical properties is emphasized. Analytical techniques observing microstructure in metals and other materials: TEM, SEM, electron diffraction, spectrometry.

Also listed as MAAJ 5659.

Precludes additional credit for MECH 5804 (if taken 2002-2003, 2003-2004).

MECH 5700 [0.5 credit] (MCG 5345)**Surfaces and Coatings**

Surface characteristics of solid materials and surface degradation/failure mechanisms including wear, fretting, oxidation, corrosion, and erosion are introduced. Coating methods including PVD, CVD, laser, thermal spray and electrochemical deposition are discussed in the context of failure prevention measures.

Also listed as MAAJ 5750.

MECH 5701 [0.5 credit] (MCG 5369)**Metallic Phases and Transformations**

Thermodynamics of crystals, phase diagrams, principles of alloy phases, thermal analysis. Transformation rate and mechanisms. Short and long range diffusional transformations, diffusionless transformations. Phase transformations in engineering systems.

Precludes additional credit for MECH 5608 if taken during 2001-2002 or during 2005-2006.

Prerequisite(s): MECH 2700 or the equivalent.

MECH 5704 [0.5 credit] (MCG 5374)**Integrated Manufacturing Systems (CIMS)**

Topics essential to CIMS including computer graphics, geometric modeling, numerically controlled machining, and flexible manufacturing. The fundamental data structures and procedures for computerization of engineering design, analysis and production.

Also offered at the undergraduate level, with different requirements, as MECH 4704, for which additional credit is precluded.

MECH 5705 [0.5 credit] (MCG 5375)**CAD/CAM**

Computer aided design and manufacturing methodology through hands-on experience and state-of-the-art software. Topics include mathematical representation, solid modeling, drafting, mechanical assembly, mechanism design and CNC machining. CAD data exchange standards, rapid prototyping, concurrent engineering and design for X are also discussed.

MECH 5800 [0.5 credit] (MCG 5480)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5850.

MECH 5801 [0.5 credit] (MCG 5489)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

MECH 5802 [0.5 credit] (MCG 5483)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5852.

MECH 5803 [0.5 credit] (MCG 5488)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5853.

MECH 5804 [0.5 credit] (MCG 5384)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5854.

MECH 5805 [0.5 credit] (MCG 5482)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5855.

MECH 5806 [0.5 credit] (MCG 5486)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

MECH 5807 [0.5 credit] (MCG 5387I)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5857.

MECH 5808 [0.5 credit] (MCG 5376)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5858.

MECH 5809 [0.5 credit] (MCG 5382)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

MECH 5906 [0.5 credit]**Directed Studies**

MECH 5908 [1.5 credit] (MCG 5398)**Independent Engineering Study**

Students pursuing a master's degree by course work carry out an independent study, analysis, and solution of an engineering problem or design project. The results are given in the form of a written report and presented at a departmental seminar. Carried out under the general. Includes: Experiential Learning Activity

MECH 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

MECH 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Migration and Diaspora Studies

This section presents the requirements for programs in:

- M.A. Migration and Diaspora Studies
- Graduate Diploma in Migration and Diaspora Studies

M.A. Migration and Diaspora Studies (5.0 credits)**Requirements - Coursework pathway****1. 1.0 credit in:** 1.0

MGDS 5001 [0.5] MA Core Seminar: Migration and Diaspora Studies

MGDS 5003 [0.5] Research Seminar in Migration and Diaspora Studies

2. 0.5 credit in MGDS at the 5000 level. May not include MGDS 5101. 0.5**3. 3.5 credits from** Migration and Diaspora Studies electives (see below). Up to 1.0 credit in Migration and Diaspora Studies practicum placements (MGDS 5101) may count toward this requirement. 3.5**Total Credits** 5.0**Requirements - Research essay pathway****1. 1.0 credit in:** 1.0

MGDS 5001 [0.5] MA Core Seminar: Migration and Diaspora Studies

MGDS 5003 [0.5] Research Seminar in Migration and Diaspora Studies

2. 0.5 credit in MGDS at the 5000 level. May not include MGDS 5101. 0.5**3. 2.5 credits from** Migration and Diaspora Studies electives (see below). Up to 1.0 credit in Migration and Diaspora Studies practicum placements (MGDS 5101) may count toward this requirement. 2.5**4. 1.0 credit in:** 1.0

MGDS 5908 [1.0] Research Essay

Note: a minimum of 9.0 CGPA is required in the first 3.0 credits of coursework for students to continue in the Research essay Pathway.

Total Credits 5.0**Requirements - Thesis pathway****1. 1.0 credit in:** 1.0

MGDS 5001 [0.5] MA Core Seminar: Migration and Diaspora Studies

MGDS 5003 [0.5] Research Seminar in Migration and Diaspora Studies

2. 0.5 credit in MGDS at the 5000 level. May not include MGDS 5101. 0.5**3. 1.5 credits from** Migration and Diaspora Studies electives (see below). Up to 1.0 credit in Migration and Diaspora Studies practicum placements (MGDS 5101) may count towards this requirement. 1.5**4. 2.0 credits in:** 2.0

MGDS 5909 [2.0] M.A. Thesis

Note: a minimum of 10.0 CGPA is required in the first 3.0 credits of coursework for students to continue in the Thesis pathway.

Total Credits 5.0**Graduate Diploma in Migration and Diaspora Studies (2.5 credits)****Requirements (Type 2 and Type 3 Graduate Diploma):****1. 1.0 credit from** MGDS at the 5000 level. May not include MGDS 5101. 1.0**2. 1.5 credits from** Migration and Diaspora Studies Electives (see below). Only 0.5 credit in MGDS 5101 Practicum in Migration and Diaspora Studies may count toward this requirement. 1.5

Note: for Type 2 (concurrent) Graduate Diploma students, with approval from both units up to 1.0 credit may be counted toward both the diploma and the degree

Total Credits 2.5**Migration and Diaspora Studies Electives List****Anthropology**

ANTH 5109 [0.5] Ethnography, Gender and Globalization

Art History

ARTH 5112 [0.5] Topics in Historiography, Methodology and Criticism (only with approved topics in Migration and Diaspora Studies)

ARTH 5115 [0.5] Topics in Modern and Contemporary Art (only with approved topics in Migration and Diaspora Studies)

ARTH 5117 [0.5] Community/Identity

ARTH 5210 [0.5] Topics in Indigenous Art

Business

BUSI 5781 [0.5] Seminar in International Business II: Managing in a Global Environment

Canadian Studies

CDNS 5101 [0.5] Indigenous Peoples, Canada and the North

CDNS 5102 [0.5] Indigenous Politics and Resurgence in Canada

CDNS 5501 [0.5] Decolonizing Canada: Cultural Politics and Collective Identities

CDNS 5601 [0.5] Constructing Canada: The Politics of National Identity

Communication Studies

COMS 5207 [0.5] Communication and Racialization

COMS 5222 [0.5] Cultural Intersections

COMS 5214 [0.5] The Local and the Global

Cultural Mediations

CLMD 6102 [0.5] Issues in Transnationalism

English

ENGL 5004 [0.5] Studies in Transnational Literatures

ENGL 5008 [0.5] Studies in African Literature

ENGL 5009 [0.5] Studies in South Asian Literature

ENGL 5010 [0.5] Studies in Caribbean Literature

European, Russian and Eurasian Studies

EURR 5304 [0.5] Europe and International Migration

Film Studies

FILM 5203 [0.5] Issues in World Cinema

FILM 5506 [0.5] Topics in Culture, Identity and Representation

French

FREN 5100 [0.5] Le monde francophone: linguistique et littérature

Geography

GEOG 5005 [0.5] Global Environmental Change: Human Implications

GEOG 5201 [0.5] Special Topics in the Geography of Development

GEOG 5400 [0.5] Territory and Territoriality

GEOG 5502 [0.5] Special Topics in Geography of Globalization

GEOG 5600 [0.5] Empire and Colonialism

History

HIST 5314 [0.5] Colonialism and Postcolonialism in Canada

HIST 5710 [0.5] Race and Empire

HIST 5712 [0.5] African History Special Topics

HIST 5713 [0.5] Latin America and Caribbean History Special Topics

International Affairs

INAF 5499 [0.5] Selected Topics in Health, Displacement and Humanitarian Policy

INAF 5707 [0.5] Complex Humanitarian Emergencies

INAF 5708 [0.5] Humanitarian Assistance: Policies and Issues

INAF 5710 [0.5] Global Governance of Displacement

INAF 5711 [0.5] International Labour Migration

Law

LAWS 5007 [0.5] Race, Ethnicity and the Law

LAWS 5663 [0.5] Human Rights, Citizenship and Global Justice

Migration and Diaspora Studies

MGDS 5002 [0.5] Key Issues in Migration and Diaspora Studies

MGDS 5101 [0.5] Practicum in Migration and Diaspora Studies

MGDS 5900 [0.5] Special Topics in Migration and Diaspora Studies

MGDS 5901 [0.5] Directed Readings in Migration and Diaspora Studies

Music

MUSI 5017 [0.5] Music and Globalization

Political Science

PSCI 5100 [0.5] Indigenous Politics of North America

PSCI 5107 [0.5] Globalization, Adjustment and Democracy in Africa

PSCI 5200 [0.5] Nationalism

PSCI 5201 [0.5] Politics in Plural Societies

PSCI 5209 [0.5] Forced Migration and Global Politics

PSCI 5211 [0.5] Migration, Globalization and Governance

PSCI 5410 [0.5] Postcolonial Theories and Practices

Public Administration

PADM 5422 [0.5] Urban and Local Government

Religion

RELI 5850 [0.5] Seminar in the Study of Religion

Social Work

SOWK 5011 [0.5] Social Work and Social Justice

SOWK 5015 [0.5] Indigenous Knowledge and Theory for Social Work

SOWK 5021 [0.5] Advanced Social Work Practice with Groups and Communities

SOWK 5702 [0.5] Special Topics in Social Work (only with approved topics in Migration and Diaspora Studies)

Sociology

SOC1 5404 [0.5] Race, Ethnicity and Class in Contemporary Societies

SOC1 5406 [0.5] Citizenship and Globalization

Note: With approval of the program director, up to 1.0 credit in courses that are not in Migration and Diaspora Studies but which are relevant to the student's program or research interests may be counted towards the MDS electives requirement.

Regulations

See the General Regulations section of this Calendar.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.A. Migration and Diaspora Studies, including all concentrations and specializations, is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Admission Requirements**M.A. Migration and Diaspora Studies**

The normal requirement for admission to the Master's program is an Honours Bachelor's degree (or equivalent), with at least a B+ average.

For admission to the program, applicants should normally possess a four-year undergraduate degree (or equivalent) in a humanities or social sciences discipline or interdisciplinary program. Previous coursework in Migration and Diaspora Studies is an asset. Practical experience working with migrant or diaspora issues will also be taken into consideration.

Accelerated Pathway

The accelerated pathway in Migration and Diaspora Studies is a flexible and individualized plan of graduate study for students in their final year of a Carleton University undergraduate degree.

Students in their third year of study in a Carleton University undergraduate degree should consult with both the Undergraduate Advisor in their program of study and the Migration and Diaspora Studies Program Director to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated pathway requirements:

1. At least 1.0 credit in Migration and Diaspora Studies elective courses (5000-level or higher);
2. Minimum overall CGPA of A-.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission Requirements for Diploma in Migration and Diaspora Studies (Type 2)

- Enrolment in a Master's or Doctoral degree program at Carleton University.
- Letter of support from the student's supervisor or, if no supervisor has been assigned, a faculty member in the home program.
- A 1-2 page statement of interest from the applicant outlining the reasons for wishing to enrol in the Migration and Diaspora Studies Diploma program.

Admissions Requirements for Diploma in Migration and Diaspora Studies (Type 3)

- An Honours Bachelor's degree (or equivalent) in a related discipline, with an average of B+ or higher. University transcripts must be submitted as part of the application.
- A 1-2 page statement of interest from the applicant outlining the reasons for wishing to enrol in the Migration and Diaspora Studies Diploma program.
- An academic letter of recommendation. In addition, students with relevant professional or practical experience may submit a letter from their supervisor/ employer.

Co-op Option

The co-op education program provides students in the MA Program in Migration and Diaspora Studies the opportunity to combine work placements with academic study. The practical experiences obtained in the workplace will reflect and extend knowledge and skills learned in the classroom and will help to develop career interests and marketable expertise. All students in the MA Program in Migration and Diaspora Studies have the opportunity to enroll in the co-op education program.

Co-op Admission Requirements

Students interested in admission into the co-op education option in Migration and Diaspora Studies must apply by the end of the first semester of academic study.

To be eligible for admission to the Co-Operative Education program in Migration and Diaspora Studies, students must:

1. be registered in the MA Program in Migration and Diaspora Studies;
2. have successfully completed by the start date of their first work term 2.0 credits of course requirements for the MA in Migration and Diaspora Studies which must include 0.5 credit in MGDS 5001 and an additional 0.5 credit from MGDS at the 5000 level (not including MGDS 5101).
3. be registered as a full-time student in each academic term prior to work term;
4. be eligible to work in Canada (for off-campus work placements).

Meeting the preceding requirements only establishes eligibility for admission to the co-op option - the prevailing job market may limit enrolment in it. Students should also note that hiring priority is given to Canadian citizens for co-op positions under the auspices of the Public Service Commission. Work terms for Migration and Diaspora Studies co-op students exist in a variety of public and private sector fields. Every effort will be made to ensure that there are appropriate work opportunities available, but there are no assurances that a co-op position will be found. Students with a high CGPA, enthusiasm, and potential, however, will have a competitive edge in securing co-op employment. Students will be assisted by the Carleton University Co-op Office to find work term positions.

Registration

Students who are accepted into the Co-op Education Option in Migration and Diaspora Studies must be registered in MGDS 5913 [0.0] Co-operative Work Term in each work term.

Note: This course does not carry academic course credit, but is noted on academic transcripts. Students are permitted to enroll in one 0.5 credit course during each work term.

Graduation

Students must successfully complete two work terms, in addition to the M.A. in Migration and Diaspora Studies requirements, to successfully graduate and receive a co-op designation on their final transcript and diploma.

Appeals

The Co-op Office administers the regulations and procedures applicable to the co-op option, and will report any situation of a student failing to report to a placement or being required to withdraw from the co-op option for any reason to the Migration and Diaspora Studies Program Director for a final decision. Any decision may be appealed through the normal channels of the University.

Students admitted to the Co-operative Education program must successfully complete two work placements each work term lasting four months, to receive a Co-operative Education designation on their academic transcript. Students register in the 0.0 credit Co-operative Education course MGDS 5913 and are permitted to enrol in one additional 0.5 credit course during each work term.

More information on Co-operative Education regulations can be found in Section 14 of the general regulations section of this Graduate Calendar.

Migration and Diaspora Studies (MGDS) Courses

MGDS 5001 [0.5 credit]

MA Core Seminar: Migration and Diaspora Studies

Advanced overview of major themes in and approaches to both migration studies and diaspora studies, drawing on different disciplinary perspectives.

Prerequisite(s): enrolment in the MGDS MA program or permission of the department.

MGDS 5002 [0.5 credit]

Key Issues in Migration and Diaspora Studies

Social, cultural, economic and political implications of the movement and transnational settlement of people with a multidisciplinary and multiscalar approach to topics such as citizenship, forced migration, diasporic communities, exile, immigration, global identities and transnationalism.

MGDS 5003 [0.5 credit]

Research Seminar in Migration and Diaspora Studies

Research design and methodology in migration and diaspora studies. Coursework students design a research project to be completed during the term. Research essay and thesis pathway students produce a proposal and work on the initial stages of their research project.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in the MGDS MA program or permission of the department.

MGDS 5101 [0.5 credit]

Practicum in Migration and Diaspora Studies

Practicum placement in an organization that works in an area relevant to migration and diaspora studies. Requires written academic assignments. Graded SAT/UNS.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the department.

MGDS 5201 [0.5 credit]

Migration and Diaspora History Special Topics

Seminar on a topic in the history of Migration and Diaspora. Topic varies from year to year.

Also listed as HIST 5711.

MGDS 5202 [0.5 credit]

Topics in Migration and Diaspora: Europe, Russia and Eurasia

Topics in Migration and Diaspora Studies with a regional focus on Europe, Russia and Eurasia.

Also listed as EURR 5307.

MGDS 5900 [0.5 credit]

Special Topics in Migration and Diaspora Studies

Advanced topics in Migration and Diaspora Studies. Topics vary from term to term.

Also offered at the undergraduate level, with different requirements, as MGDS 4900, for which additional credit is precluded.

MGDS 5901 [0.5 credit]

Directed Readings in Migration and Diaspora Studies

Directed readings on a specific topic in Migration and Diaspora Studies.

Prerequisite(s): permission of the department.

MGDS 5908 [1.0 credit]

Research Essay

A research essay on a topic relating to Migration and Diaspora Studies. The topic must be approved by the program supervisor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the department.

MGDS 5909 [2.0 credits]

M.A. Thesis

Includes: Experiential Learning Activity

Prerequisite(s): permission of the department.

MGDS 5913 [0.0 credit]

Co-operative Work Term

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Co-operative Education Program option in the M.A.

Music and Culture

This section presents the requirements for programs in:

- M.A. Music and Culture
- M.A. Music and Culture with Specialization in African Studies
- M.A. Music and Culture with Specialization in Digital Humanities

Program Requirements

M.A. Music and Culture (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 1.5 credits in:		1.5
MUSI 5000 [0.5]	Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5]	Research Methods in Music and Culture	
MUSI 5004 [0.5]	Music and Cultural Theory II: Current Debates	
2. 1.5 credits in	additional course work chosen from available elective courses	1.5
3. 2.0 credits in:		2.0
MUSI 5909 [2.0]	M.A. Thesis	
Total Credits		5.0

Requirements - Research Essay program (5.0 credits)

1. 1.5 credits in:		1.5
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MUSI 5000 [0.5]	Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5]	Research Methods in Music and Culture	
MUSI 5004 [0.5]	Music and Cultural Theory II: Current Debates	
2. 2.5 credits in	additional course work chosen from available elective courses	2.5
Subject to the approval of the graduate supervisor, 0.5 credit may be taken outside the program in a related discipline.		
3. 1.0 credit in:		1.0
MUSI 5908 [1.0]	Research Essay	
Total Credits		5.0

Requirements - Coursework program (5.0 credits)

1. 1.5 credits in:		1.5
MUSI 5000 [0.5]	Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5]	Research Methods in Music and Culture	
MUSI 5004 [0.5]	Music and Cultural Theory II: Current Debates	
2. 3.5 credits in	additional coursework chosen from available elective courses	3.5
Subject to the approval of the graduate supervisor, 1.0 credit may be taken outside the program in a related discipline.		
Total Credits		5.0

M.A. Music and Culture with Specialization in African Studies (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 1.5 credits in:		1.5
MUSI 5000 [0.5]	Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5]	Research Methods in Music and Culture	
MUSI 5004 [0.5]	Music and Cultural Theory II: Current Debates	
2. 1.0 credit in	additional MUSI course work chosen from available electives	1.0
3. 2.0 credits in:		2.0
MUSI 5909 [2.0]	M.A. Thesis	
4. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
Total Credits		5.0

Requirements - Research Essay program (5.0 credits)

1. 1.5 credits in:		1.5
MUSI 5000 [0.5]	Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5]	Research Methods in Music and Culture	
MUSI 5004 [0.5]	Music and Cultural Theory II: Current Debates	
2. 2.0 credits in	additional MUSI course work chosen from available elective courses	2.0

3. 1.0 credit in:		1.0
MUSI 5908 [1.0]	Research Essay	
4. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
Total Credits		5.0

Requirements - Coursework program (5.0 credits)

1. 1.5 credits in:		1.5
MUSI 5000 [0.5]	Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5]	Research Methods in Music and Culture	
MUSI 5004 [0.5]	Music and Cultural Theory II: Current Debates	
2. 2.0 credits in	additional MUSI course work chosen from available elective courses	2.0
3. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
4. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
5. 1.0 credits from:		1.0
AFRI 5050 [0.5]	Selected Topics in African Studies	
AFRI 5100 [0.5]	African Studies Abroad	
AFRI 5700 [0.5]	Directed Readings in African Studies	
AFRI 5900 [0.5]	Placement	
ANTH 5109 [0.5]	Ethnography, Gender and Globalization	
ANTH 5202 [0.5]	The Anthropology of Underdevelopment	
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa	
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment	
ENGL 5008 [0.5]	Studies in African Literature	
ENGL 5010 [0.5]	Studies in Caribbean Literature	
FREN 5212 [0.5]	Littératures francophones	
INAF 5603 [0.5]	Issues in Development in Africa	
LAWS 5007 [0.5]	Race, Ethnicity and the Law	
LAWS 5603 [0.5]	International Law: Theory and Practice	
PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa	
PSCI 5202 [0.5]	Development Theory and Issues	
PSCI 5203 [0.5]	Southern Africa After Apartheid	
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies	
WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II	
Total Credits		5.0

M.A. Music and Culture with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis program (5.0 credits)

1. 1.5 credits in:	1.5
MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5] Research Methods in Music and Culture	
MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates	
2. 0.5 credit in additional MUSI course work chosen from available electives	0.5
3. 2.0 credits in:	2.0
MUSI 5909 [2.0] M.A. Thesis	
4. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
5. 0.5 credit from DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	0.0
Total Credits	5.0

Requirements - Research Essay program (5.0 credits)

1. 1.5 credits in:	1.5
MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5] Research Methods in Music and Culture	
MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates	
2. 1.5 credits additional MUSI course work chosen from available elective courses	1.5
3. 1.0 credit in:	1.0
MUSI 5908 [1.0] Research Essay	
4. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
5. 0.5 credit from DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course)	0.5
6. 0.0 credit in:	0.0
DIGH 5800 [0.0] Digital Humanities: Professional Development	0.0
Total Credits	5.0

Requirements - Coursework program (5.0 credits)

1. 1.5 credits in:	1.5
MUSI 5000 [0.5] Music and Cultural Theory I: Intellectual Histories	
MUSI 5002 [0.5] Research Methods in Music and Culture	
MUSI 5004 [0.5] Music and Cultural Theory II: Current Debates	
2. 2.0 credits in additional MUSI course work chosen from available elective courses	2.0
3. 0.5 credit in:	0.5
DIGH 5000 [0.5] Issues in the Digital Humanities	
4. 1.0 credit from:	1.0
DIGH 5011 [0.5] Graduate Practicum in Digital Humanities	

DIGH 5012 [0.5] Directed Readings and Research in
Digital Humanities

DIGH 5902 [0.5] Special Topics in Digital Humanities
- or annually listed DIGH course [0.5]

5. 0.0 credit in: 0.0

DIGH 5800 [0.0] Digital Humanities: Professional
Development

Total Credits 5.0

Regulations

See the General Regulations section of this Calendar.

A standing of B- or higher must be obtained in each course counted towards the Master's degree.

Deadlines

Thesis Proposal: full-time students normally will submit their thesis (or research essay) topic to the thesis proposal board no later than April 30 of the first year of registration for students enrolled full-time, and no later than the middle of the fifth term of registration for students enrolled part-time.

Regulations governing requirements for the Master's thesis, including deadlines for submission, are outlined in the General Regulations section of this Calendar.

Admission Requirements

The minimum requirement for admission to the Master's program in Music and Culture is either a B.Mus. degree or a B.A. Honours degree in Music with a minimum B+ average.

Applicants with a B.A. Honours in a related discipline (e.g., Mass Communication, Women's Studies, Philosophy, or Cultural Studies), with a minimum average of B+, will also be considered provided the applicant can demonstrate a strong background in some form of music.

Applicants without the requisite background in either cultural/theory or music may be required to take a maximum of two full credits from designated courses at the undergraduate level in addition to their normal M.A. program requirements.

There are no performance requirements for admission to this degree program.

Applicants without a B.Mus. or B.A. Honours degree in Music, or a related discipline, but who have a three-year degree with a minimum average of B+, may be admitted to a qualifying year program. Students who complete the qualifying year requirements with a minimum average of B+ will be considered for admission to the Master's program.

Accelerated Pathway

The accelerated pathway in the M.A. in Music and Culture is a flexible and individualized plan of graduate study.

Students in their final year of a Carleton Bachelor of Music or Bachelor of Arts (Honours, Music Major or Minor) with demonstrated excellent aptitude for research may qualify for this option.

Students in their third-year of study in the B.Mus. or B.A. Honours should consult with both the Undergraduate

Supervisor and the Graduate Supervisor of the Music program to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. Elective MUSI courses at the 5000-level with a grade of B+ or higher.
2. Minimum overall CGPA of A-

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Music (MUSI) Courses

Note: the majority of courses are open to non-Majors; students are advised to consult the Discipline. Priority is given to Music students.

MUSI 5000 [0.5 credit]

Music and Cultural Theory I: Intellectual Histories

Major intellectual trends relevant to cultural theory and their application to the study of music. Topics may include: Marxism and critical theory, anthropological and sociological theory, philosophical aesthetics, psychoanalysis, feminism and gender theory, post-colonial studies, and cultural studies.

Includes: Experiential Learning Activity

Precludes additional credit for MUSI 5001 (no longer offered).

MUSI 5002 [0.5 credit]

Research Methods in Music and Culture

The research process, including the phases of conceptualization, gathering of sources, and writing up the completed research. Topics include: issues related to applying interdisciplinary methodologies to musical objects of study, conducting ethnographic research and writing for scholarly publications, conference presentations, and grant applications.

Includes: Experiential Learning Activity

MUSI 5004 [0.5 credit]

Music and Cultural Theory II: Current Debates

Selected debates within contemporary theory and culture and their relevance to music. The focus will be on a limited range of debates and issues selected by the instructor for in-depth discussion and analysis. Topics will vary from year to year.

Includes: Experiential Learning Activity

Prerequisite(s): MUSI 5000 or permission of the School.

MUSI 5006 [0.5 credit]

Music and Identity

Music as a medium for the construction and maintenance of cultural identities, including the relationship between music and traditional cultures, geography, the nation state, urban subcultures, gender and sexuality, race, class, and ethnicity.

Includes: Experiential Learning Activity

MUSI 5007 [0.5 credit]

Music and Visual Culture

The relationships between musical and visual cultures, including traditional arts, fine art painting, film, television, and digital gaming and interactive media, and the ways in which meanings are dependent upon the various connections between them.

Includes: Experiential Learning Activity

MUSI 5008 [0.5 credit]

Technologies of Music

The role that technologies, including musical instruments, notation, sound recording, and digital media, play in the concepts and practices associated with music. Topics include: technology as material culture, technology and musical practices, and the increasing importance of technology in contemporary music and culture.

MUSI 5009 [0.5 credit]

Music, Meaning and Representation

Theories of meaning and representation as applied to music. Major source traditions and critiques to be considered include: semiotics and structuralism, analytic philosophy, formalism, cognitive theory, and post-structuralism.

Includes: Experiential Learning Activity

MUSI 5010 [0.5 credit]

History of Genres

Theories of genre, including theories derived from literary theory and film studies, and their application to the history of music. Topics may include relationships between genre and musical style, production and reception, social contexts, markets, and the legitimization and organization of knowledge.

MUSI 5011 [0.5 credit]

Music and Social Institutions

Historical relationships between music and society, including that of Western art music to sacred and secular institutions; the rise of the cultural industries (sound recording, radio and film); the relationship of science, the arts, and the academy; and state policies of arts funding and multiculturalism.

Includes: Experiential Learning Activity

MUSI 5012 [0.5 credit]

Music and Nation

How nationhood narratives circulate within and around music and how they are articulated in institutional discourses, media, and state policy; how these narratives have been supported or challenged by musical practices, regionalism, immigration, social and cultural identities.

Includes: Experiential Learning Activity

MUSI 5013 [0.5 credit]**Music and Performance**

Music as a form of social practice rooted in traditions of performance. The variable, multimodal character of music as understood through theories of performance and gesture drawn from the histories and literatures of music, theatre, and dance (in art, popular, and non-Western forms).

Includes: Experiential Learning Activity

MUSI 5015 [0.5 credit]**Ethnomusicology of Canadian Traditions**

Issues of anthropological, sociological, and analytical significance are examined in the context of selected developments in folklore and ethnomusicological research on Canadian traditions.

Includes: Experiential Learning Activity

Precludes additional credit for MUSI 5101 (no longer offered).

Also offered at the undergraduate level, with different requirements, as MUSI 4103, for which additional credit is precluded.

MUSI 5016 [0.5 credit]**First Peoples Music in Canada**

The context and significance of musical expressions of selected Canadian Indigenous groups and the contributions of individuals in the creation of music and meaning in First Peoples' communities.

Includes: Experiential Learning Activity

Precludes additional credit for MUSI 5102 (no longer offered).

Also offered at the undergraduate level, with different requirements, as MUSI 4104, for which additional credit is precluded.

MUSI 5017 [0.5 credit]**Music and Globalization**

Music's role in the multifaceted and complex processes of globalization. Drawing on case studies of "world musics" this course explores how sound and music negotiate histories of post/colonialism, cultural and economic imperialism, and constructions of sameness and difference in "world music" contexts.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as MUSI 4304, for which additional credit is precluded.

MUSI 5018 [0.5 credit]**Music and Social Justice**

This course explores the varied roles that music has played—and continues to play—as an agent of positive social change, offering students innovative opportunities to reflect/act on the relationships between music and human rights and to forge connections between academic work and struggles for social justice.

Includes: Experiential Learning Activity

MUSI 5200 [0.5 credit]**Special Topics in Music and Cultural Theory**

Selected topics focusing on aspects of music and cultural theory not available in regular program offerings. Topic will vary from year to year.

MUSI 5201 [0.5 credit]**Special Topics in Music Genres**

Selected topics focusing on specific genres of music not available in regular program offerings. Topic will vary from year to year.

MUSI 5300 [0.5 credit]**Practicum in Music**

Academically informed practical experience in music-specific projects such as music recording, librarianship, concert management, research, multimedia creation at local institutions. A maximum of 1.0 credit of practicum may be used in fulfilment of M.A. requirements.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

MUSI 5400 [0.5 credit]**Advanced Studies in Performance**

Advanced study for voice or instrument in classical, traditional or popular idioms. The course requires a lecture-recital arranged in consultation with the Graduate Supervisor and the Supervisor of Performance Studies. This course is non-repeatable.

Includes: Experiential Learning Activity

Prerequisite(s): Proposal, audition, enrolment in the MA program and permission of the Graduate Supervisor and Supervisor of Performance Studies.

Individual instruction on a bi-weekly basis. 0.5 credit for full year course.

MUSI 5401 [0.5 credit]**Advanced Studies in Composition**

Advanced study in composition in classical, jazz or popular idioms. The student will be required to assemble a portfolio of work as a final project for the course. This course is non-repeatable.

Includes: Experiential Learning Activity

Prerequisite(s): Proposal, portfolio of compositions, enrolment in the MA program, and permission of the Graduate Supervisor.

Individual instruction on a bi-weekly basis. 0.5 credit for a full year course.

MUSI 5900 [0.5 credit]**Directed Readings and Research**

Course designed to permit students to pursue research on topics in music and culture chosen in consultation with a member of the faculty. A maximum of 1.0 credit of directed studies may be used in fulfilment of M.A. requirements.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

MUSI 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

MUSI 5909 [2.0 credits]

M.A. Thesis

Includes: Experiential Learning Activity

Neuroscience

This section presents the requirements for programs in:

- M.Sc. Neuroscience
- Ph.D. Neuroscience

Program Requirements

M.Sc. Neuroscience (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
NEUR 5100 [1.0] Fundamentals in Neuroscience	
2. 0.5 credit in:	0.5
NEUR 5201 [0.5] Statistics for Neuroscience I	
3. 0.5 credit from:	0.5
NEUR 5202 [0.5] Statistics for Neuroscience II	
NEUR 5800 [0.5] Special Topics in Neuroscience	
NEUR 5801 [0.5] Knowledge Mobilization	
NEUR 5000 [0.5] Foundations in Neuroscience	
4. 3.0 credits in:	3.0
NEUR 5909 [3.0] M.Sc. Thesis	

Total Credits 5.0

Ph.D. Neuroscience (3.0 credits)

Requirements:

1. 1.0 credit in:	1.0
NEUR 6100 [1.0] Advanced Seminar in Neuroscience	
2. 1.0 credit in:	1.0
NEUR 6200 [1.0] Comprehensive Examination (to be completed within the first two years of PhD study)	
3. 0.5 credit in:	0.5
NEUR 5201 [0.5] Statistics for Neuroscience I (unless taken previously, in which case substitute with 0.5 credits of optional courses)	
4. 0.5 credit in:	0.5
NEUR 5202 [0.5] Statistics for Neuroscience II (unless taken previously, in which case substitute with 0.5 credits of optional courses)	
5. 0.0 credits in:	0.0
NEUR 6909 [0.0] Ph.D. Thesis (Candidates must successfully complete a research thesis on a topic in Neuroscience supervised by a faculty member of the Department of Neuroscience)	

Total Credits 3.0

Optional courses

Candidates may choose from the following list of optional courses:

Up to 1.0 credit from:

NEUR 5000 [0.5] Foundations in Neuroscience	
NEUR 5800 [0.5] Special Topics in Neuroscience	
NEUR 5801 [0.5] Knowledge Mobilization	

Up to 1.0 credit from:

NEUR 6301 [0.5] Techniques in Neuroscience I	
NEUR 6302 [0.5] Techniques in Neuroscience II	

Up to 1.0 credit from:

NEUR 6401 [0.5] Independent Research in Neuroscience I	
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NEUR 6402 [0.5] Independent Research in Neuroscience II	
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Up to 1.0 credit from:

NEUR 6501 [0.5] Directed Studies in Neuroscience I	
NEUR 6502 [0.5] Directed Studies in Neuroscience II	

Regulations

See the General Regulations section of this Calendar.

Admission

The minimum requirement for admission to the Master's program in Neuroscience is either a B.Sc. Honours in Neuroscience, Biology, or related field, or a B.A. Honours in Psychology. Applicants with other bachelor's honours degrees in related disciplines will also be considered provided the applicant can demonstrate a strong background that relates to neuroscience.

In addition to transcripts and letters of reference, application packages must include a statement of interest.

Applicants without a background in neuroscience may be required to complete NEUR 5000 as part of their M.Sc. program.

Meeting the minimum requirements does not automatically guarantee acceptance into the program.

Admission

An M.Sc. from an appropriate university is usually required for entry to the Ph.D. program.

Meeting the minimum requirements does not automatically guarantee acceptance into the program. In addition to transcripts and letters of reference, application packages must include a statement of interest.

Students who are already enrolled in the M.Sc. program, and intend to subsequently continue into a Ph.D., may have the option of being fast-tracked into the Ph.D. program. Eligibility will be determined by recommendation from the M.Sc. thesis committee, the Graduate Chair in Neuroscience, and the Dean of Graduate and Postdoctoral Affairs.

Fast Track Option

Students who enroll in the M.Sc. program, and intend to subsequently continue into a Ph.D., may have the option of being fast-tracked into the Ph.D. program. Eligibility will be determined by recommendation from the M.Sc. thesis committee, the Graduate Chair in Neuroscience, and the Dean of Graduate and Postdoctoral Affairs. Advanced standing will be given for NEUR 5201. The decision and required approvals to fast track must be completed by July 31 of the student's third semester.

Regulations governing requirements for the Master's thesis, including deadlines for submission, are outlined in the General Regulations section of this Calendar.

Neuroscience (NEUR) Courses

NEUR 5000 [0.5 credit]

Foundations in Neuroscience

A comprehensive, lecture-based course which will cover the foundational principles of neuroscience for students with a limited background in neuroscience.

Topics include neural signalling, sensation, movement, neurodevelopment, neuroplasticity, neuroendocrinology, learning and memory, and other complex brain functions. Prerequisite(s): permission of the Department.

NEUR 5100 [1.0 credit]

Fundamentals in Neuroscience

A general course covering core neuroscience topics including organization of the nervous system, sensory and motor systems, neuroendocrinology, motivation learning and memory, emotion, attention, and pathology. Course includes attendance of the neuroscience colloquium series.

Also listed as BIOL 5304.

Precludes additional credit for PSYC 5200.

NEUR 5201 [0.5 credit]

Statistics for Neuroscience I

Concepts and applications of basic statistical methods. Power determinations, t-tests, analysis of variance designs, including factorial, within groups, and hierarchical designs, analysis of covariance, and follow-up tests. Extensive use of statistical software.

Precludes additional credit for PSYC 5410.

NEUR 5202 [0.5 credit]

Statistics for Neuroscience II

Concepts and applications of advanced regression analyses, including multiple regression, hierarchical and polynomial techniques, factor analysis and cluster analysis. Extensive use of statistical software.

Precludes additional credit for PSYC 5411.

NEUR 5203 [0.5 credit]

Systematic Reviews and Meta-Analysis

Introduces the methodology for conducting systematic reviews and meta-analysis. Topics include: conducting literature searches, extracting relevant literature, assessing quality of studies, and synthesizing findings across studies. Students will be expected to identify a research question, identify relevant literature, and carry out the statistical software.

Prerequisite(s): NEUR 5201.

NEUR 5800 [0.5 credit]

Special Topics in Neuroscience

An in depth study of current topics in neuroscience and health. Course content varies yearly and has recently included cognitive neuroscience, neuropharmacology, neurodegeneration, neuroimmunology, behavioural medicine, neurobiology of learning and memory, brain mechanisms of ingestive behaviour and energy balance, and molecular neuroscience.

Also listed as BIOL 6203.

NEUR 5801 [0.5 credit]

Knowledge Mobilization

Knowledge mobilization concepts, tools, and frameworks, the challenges and value of translational research, and processes involved in integrated knowledge mobilization. Skills to maximize research impacts will be developed.

Includes: Experiential Learning Activity

Precludes additional credit for HLTH 5300.

NEUR 5909 [3.0 credits]

M.Sc. Thesis

Includes: Experiential Learning Activity

NEUR 6100 [1.0 credit]

Advanced Seminar in Neuroscience

A comprehensive pro-seminar series, covering issues ranging from cellular and molecular processes through to neural systems and behaviours as well as psychopathology. Students will also be required to attend the Neuroscience colloquia series as part of this course. Also listed as BIOL 6305.

Precludes additional credit for PSYC 6200, PSYC 6202, PSYC 6203, BIOL 6303, BIOL 6306.

Prerequisite(s): NEUR5100 or equivalent.

NEUR 6200 [1.0 credit]

Comprehensive Examination

The comprehensive examination will consist of either a grant proposal or a review paper, to be decided by the student in consultation with their supervisor.

The topic of the comprehensive examination must be outside of the candidate's primary area of specialization and must be completed within the first two years of PhD study.

NEUR 6301 [0.5 credit]

Techniques in Neuroscience I

Completion of a research project carried out under the supervision of a neuroscience faculty member, normally not the current supervisor. The student will learn a new neuroscience technique and apply it to a research objective. Students must obtain prior approval from the graduate committee.

Precludes additional credit for PSYC 6204.

NEUR 6302 [0.5 credit]

Techniques in Neuroscience II

Completion of a research project carried out under the supervision of a neuroscience faculty member, normally not the current supervisor. The student will learn a new neuroscience technique and apply it to a research objective. Students must obtain prior approval from the graduate committee.

Precludes additional credit for PSYC 6204.

NEUR 6401 [0.5 credit]**Independent Research in Neuroscience I**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade.

Includes: Experiential Learning Activity

Precludes additional credit for PSYC 5901 and PSYC 6901.

NEUR 6402 [0.5 credit]**Independent Research in Neuroscience II**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade.

Includes: Experiential Learning Activity

Precludes additional credit for PSYC 5901 and PSYC 6901.

NEUR 6501 [0.5 credit]**Directed Studies in Neuroscience I**

In-depth investigation of selected topics in neuroscience by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade.

Precludes additional credit for PSYC 5900 and PSYC 6900.

NEUR 6502 [0.5 credit]**Directed Studies in Neuroscience II**

In-depth investigation of selected topics in neuroscience by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade.

Precludes additional credit for PSYC 5900 or PSYC 6900.

NEUR 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Northern Studies

This section presents the requirements for programs in:

- M.A. Northern Studies
- M.Sc. Northern Studies
- Graduate Diploma in Northern Studies

M.A. Northern Studies (5.0 credits)**Requirements:**

1. 2.0 credits in:	2.0
NRTH 5000 [1.0] Core Seminar: Northern Environments, Northern Societies, Northern Policy	
NRTH 5001 [1.0] Core Seminar: Northern and Arctic Issues	
2. 0.0 credit in:	0.0
NRTH 5008 [0.0] Introductory Northern Field Course	
3. 0.5 credit in:	0.5
NRTH 5009 [0.5] Field Course in Can. North	

4. 1.0 credit in:	1.0
NRTH 5901 [0.5] Practicum in Northern Studies	
NRTH 5905 [0.5] Comprehensive Examination	
5. 0.5 credit from:	0.5
GEOG 5003 [0.5] Critical Approaches to Qualitative Inquiry	
PECO 5001 [0.5] The Methodology of Political Economy	
SOCI 5105 [0.5] Selected Topics in Social Research	
6. 1.0 credit in additional course work chosen from the following list, or as approved by the program supervisor.	1.0
ANTH 4610 [0.5] Advanced Studies in Indigenous Peoples	
ANTH 5004 [0.5] Ecological Anthropology	
ANTH 5106 [0.5] North American Indigenous Peoples	
ANTH 5208 [0.5] Anthropology of Indigeneity	
CDNS 5101 [0.5] Indigenous Peoples, Canada and the North	
CDNS 5700 [0.5] Arctic Passages: The Changing Dynamics of Canada's North	
GEOG 5600 [0.5] Empire and Colonialism	
PADM 5224 [0.5] Indigenous Policy	
PADM 5614 [0.5] Natural Resource Management	
Total Credits	5.0

Notes:

1. Advanced standing may be granted for up to 1.0 credit for GEOG 5003, SOCI 5105, PECO 5001, GEOG 5001 or an approved course in research methods, and for other elective courses.
2. Up to 1.0 credit at the 4000-level may be selected, with the approval of the program.

M.Sc. Northern Studies (5.0 credits)**Requirements:**

1. 2.0 credits in:	2.0
NRTH 5000 [1.0] Core Seminar: Northern Environments, Northern Societies, Northern Policy	
NRTH 5001 [1.0] Core Seminar: Northern and Arctic Issues	
2. 0.0 credit in:	0.0
NRTH 5008 [0.0] Introductory Northern Field Course	
3. 0.5 credit in:	0.5
NRTH 5009 [0.5] Field Course in Can. North	
4. 1.0 credit in:	1.0
NRTH 5901 [0.5] Practicum in Northern Studies	
NRTH 5905 [0.5] Comprehensive Examination	
5. 0.5 credit in:	0.5
GEOG 5001 [0.5] Modeling Environmental Systems	
6. 1.0 credit in additional courses as listed below, or as approved by the program supervisor.	1.0
GEOG 4013 [0.5] Cold Region Hydrology	
GEOG 4017 [0.5] Global Biogeochemical Cycles	
GEOG 4108 [0.5] Permafrost	
GEOG 5303 [0.5] Geocryology	
GEOG 5804 [0.5] Geographic Information Systems	
Total Credits	5.0

Notes:

1. Advanced standing may be granted for up to 1.0 credit for GEOG 5003, SOCI 5105, PECO 5001, GEOG 5001 or an approved course in research methods, and for other elective courses.
2. Up to 1.0 credit at the 4000-level may be selected, with the approval of the program.

Graduate Diploma in Northern Studies (3.0 credits)

Requirements (Type 2 and Type 3 Diplomas):

1. 2.0 credits in:		2.0
NRTH 5000 [1.0]	Core Seminar: Northern Environments, Northern Societies, Northern Policy	
NRTH 5001 [1.0]	Core Seminar: Northern and Arctic Issues	
2. 0.0 credit in:		0.0
NRTH 5008 [0.0]	Introductory Northern Field Course	
3. 0.5 credit from:		0.5
GEOG 5003 [0.5]	Critical Approaches to Qualitative Inquiry	
PECO 5001 [0.5]	The Methodology of Political Economy	
SOCI 5105 [0.5]	Selected Topics in Social Research	
GEOG 5001 [0.5]	Modeling Environmental Systems	
or another course in research methods approved by the Program Supervisor		
4. 0.5 credit from:		0.5
ANTH 4610 [0.5]	Advanced Studies in Indigenous Peoples	
ANTH 5004 [0.5]	Ecological Anthropology	
ANTH 5106 [0.5]	North American Indigenous Peoples	
ANTH 5208 [0.5]	Anthropology of Indigeneity	
CDNS 5101 [0.5]	Indigenous Peoples, Canada and the North	
CDNS 5700 [0.5]	Arctic Passages: The Changing Dynamics of Canada's North	
GEOG 4013 [0.5]	Cold Region Hydrology	
GEOG 4017 [0.5]	Global Biogeochemical Cycles	
GEOG 4108 [0.5]	Permafrost	
GEOG 5303 [0.5]	Geocryology	
GEOG 5600 [0.5]	Empire and Colonialism	
GEOG 5804 [0.5]	Geographic Information Systems	
NRTH 5009 [0.5]	Field Course in Canada's North	
PADM 5224 [0.5]	Indigenous Policy	
PADM 5614 [0.5]	Natural Resource Management	

A maximum of 1.0 credit may be taken at the 4000-level. No more than 0.5 credit may be taken as a Directed Study or Graduate Tutorial. Courses must be taken from at least three disciplines (as indicated by course prefixes).

Total Credits	3.0
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Note: advanced standing may be granted for up to 1.0 credit for GEOG 5003, SOCI 5105, PECO 5001, GEOG 5001 or an approved course in research methods, and for other elective courses.

Regulations

See the General Regulations section of this Calendar.

Academic standing of B- or higher must be obtained in each course counted toward the fulfilment of the degree or diploma requirements.

Admission

M.A. and M.Sc. Northern Studies

The minimum requirement for admission to the M.A. or M.Sc. program in Northern Studies is normally an Honours degree (or four-year degree) with B+ standing. Customarily, applicants will have degrees in the environmental sciences, sociology, anthropology, political science, economics, geography, or a related field. Applicants with degrees in other disciplines, or without an honours degree, must demonstrate equivalent experience that may have prepared them for the program. Applicants must present a succinct 500-word statement indicating why they anticipate academic success in an interdisciplinary environment and outlining their motivation for taking this program.

Diploma in Northern Studies (Type 2)

- Enrolment in a master's or doctoral degree program.
- Letter of support from the student's supervisor.
- A 500-word letter from the applicant outlining the reasons for wishing to enrol in the Diploma program, including comments on why they desire an interdisciplinary academic experience, why they expect to succeed in an interdisciplinary environment, and a proposed course schedule that will enable timely completion.

Diploma in Northern Studies (Type 3)

- Honours or four-year degree with B+ standing. Customarily, applicants will have degrees in the environmental sciences, sociology, anthropology, political science, economics, geography, or a related field.
- Two letters of reference that indicate why the applicant is likely to succeed in the program. The referees must have a university degree, and preferably a graduate qualification.
- Applicants with degrees in other disciplines may present professional experience to supplement their academic record. In such cases, additional references may be requested as well as an interview with the applicant. Referees must have a university degree, and preferably a graduate qualification.
- A 500-word letter from the applicant outlining the reasons for wishing to enrol in the Diploma program, including comment on why they desire an interdisciplinary academic experience, why they expect to succeed in an interdisciplinary environment, and a proposed course schedule that will enable timely completion.

Northern Studies (NRTH) Courses

NRTH 5000 [1.0 credit]

Core Seminar: Northern Environments, Northern Societies, Northern Policy

Disciplinary perspectives on the biophysical, social, and policy environments of northern Canada. Resource development, devolution, local governance and sovereignty in a time of rapid environmental change.

Prerequisite(s): NRTH 5008 or permission of the Northern Studies program supervisor.

NRTH 5001 [1.0 credit]

Core Seminar: Northern and Arctic Issues

Research and evaluation using interdisciplinary perspectives on biophysical and social issues faced by northern Canadians. Topics will vary from year to year. Research activities may be in collaboration with northern agencies.

Includes: Experiential Learning Activity

Prerequisite(s): NRTH 5000 (may be taken concurrently).

NRTH 5008 [0.0 credit]

Introductory Northern Field Course

Overland field excursion to a northern community in the first week of the fall term or the week before the fall term. The course may last six days. Graded SAT/UNS.

Includes: Experiential Learning Activity

Prerequisite(s): Enrolment in the first year of a Northern Studies program.

NRTH 5009 [0.5 credit]

Field Course in Can. North

Field observation and methods in a selected region of northern Canada on a group basis. A supplementary fee will apply.

Includes: Experiential Learning Activity

Prerequisite(s): NRTH 5000, NRTH 5001, NRTH 5008, NRTH 5905 (NRTH 5905 may be taken concurrently), and permission of the Northern Studies Supervisor.

Field course to take place for two or three weeks in the summer.

NRTH 5901 [0.5 credit]

Practicum in Northern Studies

Research activity under the supervision of professionals in museums, government departments, nongovernmental organizations, embassies, or another professional research setting. The research must be in Northern Studies. Graded SAT/UNS.

Includes: Experiential Learning Activity

Prerequisite(s): NRTH 5000 (may be taken concurrently) and permission of the Northern Studies supervisor.

NRTH 5905 [0.5 credit]

Comprehensive Examination

This examination focuses on interdisciplinary approaches to resolution of biophysical, social, or policy problems with respect to northern Canada. A specific theme will be identified for each candidate. The exam will comprise a research paper, common language summary, interview, and oral presentation.

Prerequisite(s): NRTH 5000, NRTH 5001, or permission of the Northern Studies supervisor.

Philanthropy and Nonprofit Leadership

This section presents the requirements for programs in:

- Master of Philanthropy and Nonprofit Leadership
- Graduate Diploma in Philanthropy and Nonprofit Leadership

Program Requirements

Master of Philanthropy and Nonprofit Leadership (6.5 credits)

Requirements - Standard Admission:

1. 3.5 credits in core courses:	3.5
PANL 5001 [0.5]	Foundations of Philanthropy
PANL 5002 [0.5]	Policy and Legal Environment
PANL 5003 [0.5]	Finances for Philanthropy and the Nonprofit Sector
PANL 5004 [0.5]	Governance and Leadership
PANL 5005 [0.5]	Organizational Development
PANL 5006 [0.5]	Research Methods
PANL 5007 [0.5]	Policy and Program Evaluation
2. 2.0 credits listed under Electives below, with at least 1.0 credit in PANL	2.0
3. 1.0 credit in:	1.0
PANL 5010 [1.0]	Capstone Project
Total Credits	6.5

Master of Philanthropy and Nonprofit Leadership (5.0 credits - Professional Entry)

Requirements - Professional Entry (5.0 credits)

1. 3.5 credits in core courses:	3.5
PANL 5001 [0.5]	Foundations of Philanthropy
PANL 5002 [0.5]	Policy and Legal Environment
PANL 5003 [0.5]	Finances for Philanthropy and the Nonprofit Sector
PANL 5004 [0.5]	Governance and Leadership
PANL 5005 [0.5]	Organizational Development
PANL 5006 [0.5]	Research Methods
PANL 5007 [0.5]	Policy and Program Evaluation
2. 1.5 credits listed under Electives below, with at least 1.0 credit in PANL	1.5
Total Credits	5.0

Electives

PANL 5009 [0.5]	Internship
PANL 5301 [0.5]	Planning and Management of Integrated Fundraising

PANL 5302 [0.5]	Responsible and Impact Investing
PANL 5303 [0.5]	Social Media, Communications and Marketing
PANL 5304 [0.5]	Strategic Philanthropy and Grantmaking for Social Change
PANL 5305 [0.5]	Globalization of Philanthropy
PANL 5306 [0.5]	Advanced Topics in Fundraising
PANL 5307 [0.5]	Community Philanthropy
PANL 5701 [0.5]	Social Innovation
PANL 5702 [0.5]	Social Entrepreneurship
PANL 5703 [0.5]	Public Policy Advocacy
PANL 5704 [0.5]	International Civil Society Organizations
PANL 5772 [0.5]	Special Topics in Philanthropy and Nonprofit Leadership
PANL 5791 [0.5]	Directed Studies in Philanthropy and Nonprofit Leadership

Other courses as approved by the PNL Supervisor

Graduate Diploma in Philanthropy and Nonprofit Leadership (3.0 credits)

Requirements:

Students must complete:

1. 1.0 credit in required courses:	1.0
PANL 5001 [0.5]	Foundations of Philanthropy
PANL 5002 [0.5]	Policy and Legal Environment
2. 2.0 credits in electives from:	2.0
PANL 5003 [0.5]	Finances for Philanthropy and the Nonprofit Sector
PANL 5004 [0.5]	Governance and Leadership
PANL 5005 [0.5]	Organizational Development
PANL 5006 [0.5]	Research Methods
PANL 5007 [0.5]	Policy and Program Evaluation
PANL 5301 [0.5]	Planning and Management of Integrated Fundraising
PANL 5302 [0.5]	Responsible and Impact Investing
PANL 5303 [0.5]	Social Media, Communications and Marketing
PANL 5304 [0.5]	Strategic Philanthropy and Grantmaking for Social Change
PANL 5305 [0.5]	Globalization of Philanthropy
PANL 5306 [0.5]	Advanced Topics in Fundraising
PANL 5307 [0.5]	Community Philanthropy
PANL 5701 [0.5]	Social Innovation
PANL 5702 [0.5]	Social Entrepreneurship
PANL 5703 [0.5]	Public Policy Advocacy
PANL 5704 [0.5]	International Civil Society Organizations
PANL 5772 [0.5]	Special Topics in Philanthropy and Nonprofit Leadership
PANL 5791 [0.5]	Directed Studies in Philanthropy and Nonprofit Leadership

Other courses as approved by PNL Supervisor

Total Credits **3.0**

Regulations

See the General Regulations section of this Calendar.

A grade of B- or higher must normally be obtained in each course credited towards the master's degree. A candidate may, with the recommendation of the MPNL Supervisor and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed a grade of C+ in courses totaling 0.5 credit.

Admission

Master of Philanthropy and Nonprofit Leadership

The School of Public Policy and Administration provides two points of entry into the Master of Philanthropy and Nonprofit Leadership: a standard admission and a professional entry that recognizes significant leadership experience.

Most applicants are considered for the standard admission into the 6.5 credit Master program. They must have an undergraduate or post-graduate degree (or equivalent) with an average of B+ or higher. The level of academic performance and potential as revealed through the degree is more important than the discipline. Students can enter the program from a variety of backgrounds, including the social sciences, humanities, and sciences.

The School also considers mid-career applicants for standard admission who do not satisfy this academic requirement, but who have demonstrated professional excellence over at least five years. Such applicants may use their high achievement in several designated university courses as evidence of their academic potential. These university courses are determined on an individual basis in consultation with the PNL Supervisor. Contact the School for details.

Applicants who have at least seven years of work experience in the philanthropic and nonprofit field over which they have exhibited significant leadership and increasing levels of responsibility are considered for entry into the limited number of spaces in the 5.0 credit professional Master program. In addition to such work experience, they must have an undergraduate degree or post-graduate degree (or equivalent) with an average of B+ or higher.

Students who seek admission to either the 6.5 or 5.0 credit Master program following satisfactory completion of the Diploma of Philanthropy and Nonprofit Leadership may, with permission of the PNL Supervisor, apply 2.0 of the Diploma credits toward the Masters.

All applicants whose first language is not English must demonstrate English proficiency in accordance with Section 3.6 of the General Regulations of this Calendar.

Students who have completed courses equivalent to the PANL courses or taken approved graduate courses on the recommendation of the PNL Graduate Supervisor, and obtained a grade of at least B+, may receive advanced standing with transfer of credit for up to 1.0 credit. This will be determined on an individual basis by consultation with the PNL Supervisor and the Faculty of Graduate and Postdoctoral Affairs, pursuant to Section 6.1 of the General Regulations of this Calendar.

Graduate Diploma in Philanthropy and Nonprofit Leadership

Applicants must have a bachelor's degree (or equivalent). Normally, an average of B+ or higher is required for admission.

All applicants whose first language is not English must demonstrate English proficiency in accordance with Section 3.6 of the Graduate Calendar.

Note: students in the Diploma programs are not eligible to receive university funding.

Philanthropy and Nonprofit Leadership (PANL) Courses

PANL 5001 [0.5 credit]

Foundations of Philanthropy

The motivations, values and ethics, and history of philanthropy, and a critical examination of its role in relation to government, business and society. Trends and emerging challenges in philanthropy and voluntary action over time and in different cultures and regions.

PANL 5002 [0.5 credit]

Policy and Legal Environment

The legal, tax and regulatory context in which philanthropy, charities and nonprofits operate; the processes of policy formation and means of participating in them.

PANL 5003 [0.5 credit]

Finances for Philanthropy and the Nonprofit Sector

Revenue source development, business planning, financial management and accountability covering a range of financing options.

PANL 5004 [0.5 credit]

Governance and Leadership

Theories of leadership, ethical decision making, and the function of governance, boards and strategic planning in directing effective sustainable organizations, building external relationships and managing multiple accountabilities.

PANL 5005 [0.5 credit]

Organizational Development

Theories and application of organizational development for nonprofit and philanthropic organizations; human resource management for staff and volunteers, control systems, and project and risk management.

PANL 5006 [0.5 credit]

Research Methods

Understanding of qualitative and quantitative methods with application to philanthropy and nonprofit research. Topics may include research design, techniques for collecting and managing evidence, an introduction to qualitative and statistical analysis and communication of results. Precludes additional credit for PADM 5113 or 5114.

PANL 5007 [0.5 credit]

Policy and Program Evaluation

Selected concepts, issues and processes in applied planning and evaluation, utilizing both Canadian and comparative experiences.

PANL 5008 [0.5 credit]

Capstone Project

An integrative research project on a topic related to the philanthropic or nonprofit sector.

Includes: Experiential Learning Activity
Prerequisite(s): completion of core courses.

PANL 5009 [0.5 credit]

Internship

This course requires supervised work experience over 10 weeks in an appropriate placement approved by the graduate supervisor. It culminates in a 25-30 page (or equivalent) analytical work graded by the academic supervisor.

Includes: Experiential Learning Activity

PANL 5010 [1.0 credit]

Capstone Project

An integrative research project on a topic related to the philanthropic or nonprofit sector.

Includes: Experiential Learning Activity
Prerequisite(s): completion of core courses.

PANL 5301 [0.5 credit]

Planning and Management of Integrated Fundraising

Strategic and tactical management, oversight and ethical considerations of a diversity of fundraising methods; donor relationships; planning and managing integrated campaigns.

PANL 5302 [0.5 credit]

Responsible and Impact Investing

The financial instruments, organizational implications and measurement of program-related and other investments that lever economic, social and environmental value by organizations in or straddling the nonprofit and for-profit sectors.

PANL 5303 [0.5 credit]

Social Media, Communications and Marketing

The use of social media and other information technologies for brand building, marketing, fundraising, and social/political activism. An overview of marketing and communications theory, principles and techniques, and their application in philanthropic, nonprofit, and social entrepreneurial environments.

PANL 5304 [0.5 credit]

Strategic Philanthropy and Grantmaking for Social Change

Alternative approaches to effective grantmaking and funding practices, including managing the associated accountabilities for both grantmaking bodies and recipient organizations.

PANL 5305 [0.5 credit]**Globalization of Philanthropy**

Understanding global civil society and the effects that globalization has on giving and organizing. The legal, regulatory and cultural considerations for philanthropy, volunteerism, and civil society organizations that work transnationally.

PANL 5306 [0.5 credit]**Advanced Topics in Fundraising**

Specialized aspects and advanced methods of fundraising including planned giving, major campaigns, new technologies, ethical issues and leadership skills.

Prerequisite(s): PANL 5301 or permission of the Philanthropy and Nonprofit Leadership graduate supervisor.

Online course.

PANL 5307 [0.5 credit]**Community Philanthropy**

Formal and informal mechanisms communities use to mobilize their assets for public benefit and social change; analysis of major innovations and trends in community philanthropy from a global perspective.

Online

PANL 5701 [0.5 credit]**Social Innovation**

The processes, business models and leadership of 'social innovation' – system changing approaches to dealing with social, cultural, economic and environmental challenges. Use of case studies and prototypes to test assumptions and alternatives.

Includes: Experiential Learning Activity

PANL 5702 [0.5 credit]**Social Entrepreneurship**

The theory, leadership and management of social entrepreneurship, from evaluating the opportunity through implementation. Includes assessment of startup strategies, raising funds, assessing risks, legal aspects, marketing ideas, managing resources and growth, and creation of socially responsible models.

PANL 5703 [0.5 credit]**Public Policy Advocacy**

Examination of how nonprofit organizations and voluntary action can affect social change and influence public policy processes in both national and international contexts.

Practical development of advocacy and public education strategies.

PANL 5704 [0.5 credit]**International Civil Society Organizations**

Understanding the role of international non-governmental organizations in a global civil society, and how they strategically plan and manage key functions including regime creation, humanitarian and development assistance and internal governance and operations.

PANL 5772 [0.5 credit]**Special Topics in Philanthropy and Nonprofit Leadership**

One or more specialized or advanced aspects of philanthropy and nonprofit leadership such as the ethics, history, cross-cultural dimensions and management of particular types of organizations. The topics will change each year.

PANL 5791 [0.5 credit]**Directed Studies in Philanthropy and Nonprofit Leadership**

A directed reading course on selected subjects related to philanthropy and nonprofit leadership, as arranged with a faculty supervisor.

Prerequisite(s): PANL 5001 and PANL 5002, at least an A- average in PANL courses, and permission of the Philanthropy and Nonprofit Leadership supervisor.

Philosophy

This section presents the requirements for programs in:

- M.A. Philosophy
- M.A. Philosophy with Specialization in Digital Humanities

Program Requirements**M.A. Philosophy (5.0 credits)****Requirements - Thesis pathway (5.0 credits)**

1. 1.0 credit in:		1.0
PHIL 5850 [0.5]	Proseminar	
PHIL 5900 [0.5]	Research Seminar	
2. 2.0 credits in:		2.0
PHIL 5909 [2.0]	M.A. Thesis (must be defended at an oral examination)	
3. 2.0 credits in courses, subject to the following limitations:		2.0
They may include one, but not both of the following:		
PHIL 5701 [0.5]	Fall Colloquium	
or		
PHIL 5751 [0.5]	Winter Colloquium	
They may include up to 1.0 credit from:		
PHIL 5000 [0.5]	Special Topic in Philosophy	
PHIL 5200 [0.5]	Topics in Philosophy of Mind or Philosophy of Language	
PHIL 5250 [0.5]	Topics in Logic, Epistemology, Metaphysics or Philosophy of Science	
PHIL 5300 [0.5]	Topics in Value Theory	
PHIL 5350 [0.5]	Topics in Ethics or Political Philosophy	
PHIL 5500 [0.5]	Topics in Contemporary Philosophy	
PHIL 5600 [0.5]	Topics in the History of Philosophy	
PHIL 5650 [0.5]	Semantics	
PHIL 5660 [0.5]	Lexical Semantics	
or, with permission of the department other approved courses at the graduate or 4000-level at Carleton or other universities		

They may include up to 1.0 credit in tutorials or, with permission of the department, approved graduate-only courses at the graduate level in other departments or at other universities

They must include at least 0.5 credit in two of the following areas of study:

History of Philosophy

Philosophy of mind, philosophy of language, logic, epistemology, or metaphysics

Moral, social, or political philosophy

Total Credits **5.0**

Requirements - Research Essay pathway (5.0 credits)

1. 1.0 credit in: 1.0

PHIL 5850 [0.5] Proseminar

PHIL 5900 [0.5] Research Seminar

2. 1.0 credit in: 1.0

PHIL 5908 [1.0] Research Essay

3. 1.0 credit from: 1.0

PHIL 5701 [0.5] Fall Colloquium

PHIL 5751 [0.5] Winter Colloquium

or, with the permission of the department, approved graduate-level courses in other departments or at other universities

4. Up to 1.0 credit from: 1.0

PHIL 5000 [0.5] Special Topic in Philosophy

PHIL 5200 [0.5] Topics in Philosophy of Mind or Philosophy of Language

PHIL 5250 [0.5] Topics in Logic, Epistemology, Metaphysics or Philosophy of Science

PHIL 5300 [0.5] Topics in Value Theory

PHIL 5350 [0.5] Topics in Ethics or Political Philosophy

PHIL 5500 [0.5] Topics in Contemporary Philosophy

PHIL 5600 [0.5] Topics in the History of Philosophy

PHIL 5650 [0.5] Semantics

PHIL 5660 [0.5] Lexical Semantics

or, with permission of the department, approved courses at graduate or 4000-level at Carleton or other universities

5. Up to 1.0 credit in tutorials, or, with permission of the department, approved graduate-level courses in other departments or at other universities 1.0

Courses chosen must include at least 0.5 credit in two of the following areas of study:

History and philosophy

Philosophy of mind, philosophy of language, logic, epistemology, or metaphysics

Moral, social, or political philosophy

Total Credits **5.0**

M.A. Philosophy with Specialization in Digital Humanities (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in: 1.0

PHIL 5850 [0.5] Proseminar

PHIL 5900 [0.5] Research Seminar

2. 2.0 credits in: 2.0

PHIL 5909 [2.0] M.A. Thesis

3. 1.0 credits in courses, subject to the following limitations: 1.0

- They may include PHIL 5701 or PHIL 5751 but not both

- They may include up to 0.5 credit from PHIL 5000, PHIL 5200, PHIL 5250, PHIL 5300, PHIL 5350, PHIL 5500, PHIL 5600, PHIL 5650, PHIL 5660, or, with permission of the department, other approved courses at the graduate or 4000-level at Carleton or other universities

- They may include up to 0.5 credit in tutorials, or, with permission of the department, approved graduate-only courses at the graduate level in other departments or at other universities

- They must include at least 0.5 credit in two of the following areas of study: history of philosophy, philosophy of mind, philosophy of language, logic, epistemology, or metaphysics, moral, social, or political philosophy

4. 0.5 credit in: 0.5

DIGH 5000 [0.5] Issues in the Digital Humanities

5. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course) 0.5

6. 0.0 credit in: 0.0

DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits **5.0**

Requirements - Research Essay pathway (5.0 credits)

1. 1.0 credit in: 1.0

PHIL 5850 [0.5] Proseminar

PHIL 5900 [0.5] Research Seminar

2. 1.0 credit in: 1.0

PHIL 5908 [1.0] Research Essay

3. 1.0 credit from: 1.0

PHIL 5701 [0.5] Fall Colloquium

PHIL 5751 [0.5] Winter Colloquium

Or, with permission of the department, approved graduate-level courses in other departments or at other universities

4. 1.0 credit from: 1.0

PHIL 5000 [0.5] Special Topic in Philosophy

PHIL 5200 [0.5] Topics in Philosophy of Mind or Philosophy of Language

PHIL 5250 [0.5] Topics in Logic, Epistemology, Metaphysics or Philosophy of Science

PHIL 5300 [0.5] Topics in Value Theory

PHIL 5350 [0.5] Topics in Ethics or Political Philosophy

PHIL 5500 [0.5] Topics in Contemporary Philosophy

PHIL 5600 [0.5] Topics in the History of Philosophy

PHIL 5650 [0.5] Semantics

PHIL 5660 [0.5] Lexical Semantics

Or, with permission of the department, approved courses at graduate or 4000-level at Carleton or other universities

5. 0.5 credit in DIGH 5000 0.5

6. 0.5 credit in DIGH (DIGH 5011, DIGH 5012, or annually listed DIGH course) 0.5

7. 0.0 credit in:

DIGH 5800 [0.0] Digital Humanities: Professional Development

Total Credits **5.0**

Course Selection

Special Topics

PHIL 5000 [0.5] Special Topic in Philosophy

Tutorials

PHIL 5004 [0.5] Tutorial in the History of Philosophy I

PHIL 5005 [0.5] Tutorial in the History of Philosophy II

PHIL 5104 [0.5] Tutorial in the Work of an Individual Philosopher I

PHIL 5105 [0.5] Tutorial in the Work of an Individual Philosopher II

PHIL 5204 [0.5] Tutorial in Logic, Epistemology, or Metaphysics I

PHIL 5205 [0.5] Tutorial in Logic, Epistemology, or Metaphysics II

PHIL 5304 [0.5] Tutorial in Selected Problems of Philosophy I

PHIL 5305 [0.5] Tutorial in Selected Problems of Philosophy II

Colloquia

PHIL 5701 [0.5] Fall Colloquium

PHIL 5751 [0.5] Winter Colloquium

Seminars

PHIL 5200 [0.5] Topics in Philosophy of Mind or Philosophy of Language

PHIL 5250 [0.5] Topics in Logic, Epistemology, Metaphysics or Philosophy of Science

PHIL 5300 [0.5] Topics in Value Theory

PHIL 5350 [0.5] Topics in Ethics or Political Philosophy

PHIL 5500 [0.5] Topics in Contemporary Philosophy

PHIL 5600 [0.5] Topics in the History of Philosophy

PHIL 5650 [0.5] Semantics

PHIL 5660 [0.5] Lexical Semantics

PHIL 5850 [0.5] Proseminar

PHIL 5900 [0.5] Research Seminar

PHIL 5908 [1.0] Research Essay

PHIL 5909 [2.0] M.A. Thesis

Regulations

See the General Regulations section of this Calendar.

Guidelines for Completion of Master's Degree

Full-time students enrolled in the 5.0-credit M.A. program are expected to complete PHIL 5850, PHIL 5900 and 2.0 further credits by the end of the second term of study.

The thesis or research essay approval form should be submitted by the end of the fourth week of the third term of study. All full-time students are expected to submit the thesis or research essay by the end of the fourth term of study.

Part-time students enrolled in the 5.0 credit M.A. program are expected to complete PHIL 5850, PHIL 5900 and 2.0 further credits by the end of the third year of study.

The thesis or research essay approval form should be submitted by the end of the second month of the fourth year of study. All part-time students are expected to submit the thesis or research essay by the end of the fifth year of study.

Admission

The minimum requirement for admission to the master's program is a B.A. Honours degree (or the equivalent) in Philosophy, with at least B+ standing (or the equivalent).

Students who have not successfully completed an introductory logic course in philosophy (equivalent to Carleton's PHIL 2001) at the time of their application will be required to complete PHIL 2001 (or an equivalent) successfully prior to registration or as part of their first year of study. If required, completion of a logic course is extra to the degree requirements.

Qualifying-year and M.A. applicants from an institution other than Carleton University must submit two papers.

Qualifying Year

Applicants who do not hold an Honours degree (or the equivalent) will be required to register in a qualifying-year program before proceeding to the master's program. Regulations governing the qualifying year are outlined in the General Regulations section of this Calendar.

Philosophy (PHIL) Courses

PHIL 5000 [0.5 credit]

Special Topic in Philosophy

A detailed study of a special topic in philosophy. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4100, for which additional credit is precluded.

PHIL 5004 [0.5 credit]

Tutorial in the History of Philosophy I

Detailed study of a period or issue in the history of philosophy.

PHIL 5005 [0.5 credit]

Tutorial in the History of Philosophy II

Detailed study of a period or issue in the history of philosophy.

PHIL 5104 [0.5 credit]

Tutorial in the Work of an Individual Philosopher I

A critical and systematic study of the work of an individual philosopher.

PHIL 5105 [0.5 credit]

Tutorial in the Work of an Individual Philosopher II

A critical and systematic study of the work of an individual philosopher.

PHIL 5200 [0.5 credit]**Topics in Philosophy of Mind or Philosophy of Language**

A detailed study of an issue or the work of selected philosophers in the general area of philosophy of mind and/or philosophy of language. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4210 or PHIL 4220, for which additional credit is precluded.

PHIL 5204 [0.5 credit]**Tutorial in Logic, Epistemology, or Metaphysics I**

An attempt to find a solution to a specific problem in logic, epistemology, or metaphysics.

PHIL 5205 [0.5 credit]**Tutorial in Logic, Epistemology, or Metaphysics II**

An attempt to find a solution to a specific problem in logic, epistemology, or metaphysics.

PHIL 5250 [0.5 credit]**Topics in Logic, Epistemology, Metaphysics or Philosophy of Science**

A detailed study of an issue or the work of selected philosophers in the general areas of logic, epistemology, metaphysics or philosophy of science. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4230, for which additional credit is precluded.

PHIL 5300 [0.5 credit]**Topics in Value Theory**

A detailed study of an issue or the work of selected philosophers in the general area of value theory. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4300, for which additional credit is precluded.

PHIL 5304 [0.5 credit]**Tutorial in Selected Problems of Philosophy I**

An attempt to find a solution to a specific problem in some area other than logic, epistemology, or metaphysics.

PHIL 5305 [0.5 credit]**Tutorial in Selected Problems of Philosophy II**

An attempt to find a solution to a specific problem in some area other than logic, epistemology, or metaphysics.

PHIL 5350 [0.5 credit]**Topics in Ethics or Political Philosophy**

A detailed study of an issue or the work of selected philosophers in the general areas of ethics or political philosophy. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4320 or PHIL 4330, for which additional credit is precluded.

PHIL 5500 [0.5 credit]**Topics in Contemporary Philosophy**

A detailed study of an issue or the work of selected philosophers in contemporary philosophy. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4007 or PHIL 4008, for which additional credit is precluded.

PHIL 5600 [0.5 credit]**Topics in the History of Philosophy**

A detailed study within the history of philosophy: a period, an issue or the work of selected philosophers. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4003, PHIL 4004, PHIL 4005, or PHIL 4006, for which additional credit is precluded.

PHIL 5650 [0.5 credit]**Semantics**

A graduate seminar in contemporary semantics.

Also listed as LING 5505.

PHIL 5660 [0.5 credit]**Lexical Semantics**

Study of the meaning of words. Topics may include lexical decomposition, meaning variation, lexical relations, and lexical aspect.

Also listed as LING 5510.

Also offered at the undergraduate level, with different requirements, as LING 4510 and PHIL 4055, for which additional credit is precluded.

PHIL 5701 [0.5 credit]**Fall Colloquium**

Students attend each talk in the departmental colloquium series, preparing by doing mandatory background readings, and submit in writing a critical analysis of some aspect of the presentation.

Precludes additional credit for PHIL 5700 (no longer offered).

PHIL 5751 [0.5 credit]**Winter Colloquium**

Students attend each talk in the departmental colloquium series, preparing by doing mandatory background readings, and submit in writing a critical analysis of some aspect of the presentation.

Precludes additional credit for PHIL 5750 (no longer offered).

PHIL 5850 [0.5 credit]**Proseminar**

Students in this seminar will engage with contemporary philosophical research by exploring relations and interactions between two broad fields: philosophy of mind, language, and knowledge; and moral, social, and political philosophy. Specific topics will vary from year to year.

PHIL 5900 [0.5 credit]**Research Seminar**

Students select a contemporary philosophical position or historical interpretation and the surrounding debate in the philosophical or scholarly literature upon which to base a thesis proposal using literature review and an essay.

Includes: Experiential Learning Activity

PHIL 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

PHIL 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Physics

This section presents the requirements for programs in:

- M.Sc. Physics - Particle Physics Stream
- M.Sc. Physics - Medical Physics Stream
- M.Sc. Physics - Physics in Modern Technology Stream
- M.Sc. Physics Medical Physics Stream with Specialization in Data Science
- M.Sc. Physics Particle Physics Stream with Specialization in Data Science
- Ph.D. Physics

Program Requirements**M.Sc. Physics - Particle Physics Stream (5.0 credits):****Requirements - Particle Physics Stream:**

1. 2.0 credits in:	2.0
PHYS 5601 [0.5]	Experimental Techniques of Nuclear and Elementary Particle Physics
PHYS 5602 [0.5]	Physics of Elementary Particles
PHYS 5701 [0.5]	Intermediate Quantum Mechanics with Applications
PHYS 5702 [0.5]	Relativistic Quantum Mechanics
2. 0.5 credit in:	0.5
PHYS 5002 [0.5]	Statistical Data Analysis Techniques for Physics (or equivalent course in computing physics)
3. 2.5 credits in:	2.5
PHYS 5909 [2.5]	M.Sc. Thesis (defended at an oral examination)
4. Participation in the seminar series of the Ottawa-Carleton Institute of Physics	
Total Credits	5.0

Notes:

1. Of the 2.5 credits of course work, no more than 1.5 credits may be fulfilled by Selected Topics such as PHYS 5900 [1.0], PHYS 5901 [0.5]. In special cases, the requirements may also be met by taking 5.0 credits of course work. 1.0 credit must be the Selected Topics course PHYS 5900

M.Sc. Physics - Medical Physics Stream (5.0 credits):**Requirements - Medical Physics Stream:**

1. 0.5 credit in:	0.5
PHYS 5203 [0.5]	Medical Radiation Physics
2. 0.5 credit in:	0.5
PHYS 5002 [0.5]	Statistical Data Analysis Techniques for Physics (or equivalent course in computing physics)
3. 0.5 credit from:	0.5
PHYS 5204 [0.5]	Physics of Medical Imaging (for imaging)
PHYS 5206 [0.5]	Medical Radiotherapy Physics (for therapy)
PHYS 5207 [0.5]	Radiobiology (for biophysics)
4. 0.5 credit in	0.5
PHYS 5208 or an appropriate physics course from an area of physics outside medical physics, chosen from PHYS or PHYJ.	
5. 0.5 additional credit in PHYS or PHYJ	0.5
6. 2.5 credits in:	2.5
PHYS 5909 [2.5]	M.Sc. Thesis (defended at an oral examination)
7. Participation in the seminar series of the Ottawa-Carleton Institute for Physics	
Total Credits	5.0

Notes:

1. Of the 2.5 credits of course work, no more than 1.5 credits may be fulfilled by Selected Topics such as PHYS 5900 [1.0], PHYS 5901 [0.5]. In special cases, the requirements may also be met by taking 5.0 credits of course work. 1.0 credit must be the Selected Topics course PHYS 5900 [1.0].

M.Sc. Physics - Physics in Modern Technology Stream (4.0 credits):**Requirements - Physics in Modern Technology Stream:**

1. 1.0 credit from:	1.0
PHYS 5002 [0.5]	Statistical Data Analysis Techniques for Physics
PHYJ 5003 [0.5]	Computer Simulations in Physics
PHYJ 5004 [0.5]	Computational Physics: Deterministic Methods
PHYJ 5005 [0.5]	Computational Physics: Stochastic Methods
2. 2.0 additional credits in PHYS or PHYJ	2.0
3. 1.0 credit in:	1.0
PHYS 5905 [1.0]	Physics in Modern Technology Work Term
Total Credits	4.0

Note:

Students enrolled in the physics in modern technology stream are required to complete a work term rather than a research thesis. Students in this stream who wish to pursue a research degree should consult with the graduate supervisor. Although every effort is made to find a work term position for every student enrolled in the physics in modern technology stream, no guarantee of

employment can be made. To minimize the likelihood of a work term position not being found, enrollment will be limited to reflect the availability of work term placements. In the event that a work term placement cannot be found, students may fulfill the M.Sc. requirements with 4.0 credits of course work.

Guidelines for Completion of Master's Degree

With the exception of those students in the physics in modern technology stream, full-time master's candidates are expected to complete all requirements in six terms of registered full-time study. Part-time master's candidates are expected to complete their degree requirements within an elapsed period of three to four calendar years after the date of initial registration.

Students in the physics in modern technology stream are normally expected to complete all their requirements in three successive terms of registered full-time study.

M.Sc. Physics

Medical Physics Stream with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 0.5 credit in:	0.5
PHYS 5002 [0.5] Statistical Data Analysis Techniques for Physics (or equivalent course in computing physics)	
3. 0.5 credit in:	0.5
PHYS 5203 [0.5] Medical Radiation Physics	
4. 0.5 credits from:	0.5
PHYS 5204 [0.5] Physics of Medical Imaging (for imaging)	
PHYS 5206 [0.5] Medical Radiotherapy Physics (for therapy)	
PHYS 5207 [0.5] Radiobiology (for biophysics)	
5. 0.5 additional credit in PHYS or PHYJ. With approval, an appropriate graduate-level course in engineering, computer science, business or law can be used.	0.5
6. 2.5 credits in	2.5
PHYS 5909 [2.5] M.Sc. Thesis (on a data science topic approved by the Data Science governance committee and defended at an oral examination)	
7. Participation in the seminar series of the Ottawa-Carleton Institute for Physics	
Total Credits	5.0

M.Sc. Physics

Particle Physics Stream with Specialization in Data Science (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
DATA 5000 [0.5] Data Science Seminar	
2. 0.5 credit in:	0.5
PHYS 5002 [0.5] Statistical Data Analysis Techniques for Physics (or equivalent course in computing physics)	

3. 1.5 credit in:	1.5
PHYS 5602 [0.5] Physics of Elementary Particles	
PHYS 5701 [0.5] Intermediate Quantum Mechanics with Applications	
PHYS 5702 [0.5] Relativistic Quantum Mechanics	
4. 2.5 credits in:	2.5
PHYS 5909 [2.5] M.Sc. Thesis (on a data science topic approved by the Data Science governance committee and defended at an oral examination)	
5. Participation in the seminar series of the Ottawa-Carleton Institute of Physics	
Total Credits	5.0

Ph.D. Physics (2.0 credits)

Requirements:

1. 2.0 credits course work at the graduate level	2.0
2. Comprehensive examination designed to demonstrate overall ability in physics and in the candidate's research area, normally within the first year of study. This takes the form of a written examination followed, if necessary, by an oral examination	
3. Participation in the seminar series of the Ottawa-Carleton Institute for Physics	
4. 0.0 credits in:	0.0
PHYS 6909 [0.0] Ph.D. Thesis (which will be defended at an oral examination. The examining board for all theses will include members of the Ottawa-Carleton Institute for Physics from both Departments of Physics. The external examiner of the thesis will be external to both Departments of Physics.)	
Total Credits	2.0

Notes

- Students in experimental or theoretical particle physics who lack any of the relevant courses recommended for the M.Sc. program must complete them (or the equivalents) by the end of their Ph.D. program. In addition they should complete PHYS 6601 and PHYS 6602
 - Students in medical physics must have completed, either within this degree (as part of the minimum 2.0 course credits) or in prior graduate studies:

PHYS 5203 [0.5]	Medical Radiation Physics (or equivalent)
PHYS 5204 [0.5]	Physics of Medical Imaging (or equivalent)
PHYS 5206 [0.5]	Medical Radiotherapy Physics (or equivalent)
PHYS 5207 [0.5]	Radiobiology (or equivalent)
PHYS 5209 [0.5]	Medical Physics Practical Measurements (or equivalent)
PHYS 5210 [0.0]	Anatomy and Physiology for Medical Physicists (or equivalent)
- 0.5 credit in PHYS 5208 (unless a similar course has been taken previously), or an appropriate physics course from an area of physics outside medical physics, chosen from PHYS or PHYJ.

- In addition it is also strongly recommended to have completed 0.5 credit in a computational physics course, such as PHYS 5002, within the minimum 2.0 credits of this degree or in prior graduate studies.

- Irrespective of courses taken previously at another institution, students may be required to complete one or more of PHYS 5204, PHYS 5206, or PHYS 5207 as preparation for their thesis research.

- Students must satisfy Physics Department requirements for extent and breadth of participation in workshops on professionalism and ethics as a medical physicist.

Guidelines for Completion of Doctoral Degree

Full-time Ph.D. candidates admitted on the basis of an M.Sc. are expected to complete all requirements within an elapsed period of four to five years after the date of initial registration. Part-time Ph.D. candidates are expected to complete all requirements within an elapsed period of six years after the date of initial registration.

Residence Requirements

For the Ph.D. degree (from B.Sc.): at least three years of full-time study (or equivalent).

For the Ph.D. degree (from M.Sc.): at least two years of full-time study (or equivalent).

Admission

An Honours B.Sc. in Physics or a closely related field at a standard acceptable to the two universities is normally required for admission to the M.Sc. program.

The admissions committee may require students to take an orientation examination during the first weeks of residence. The results of this examination may indicate the need for a student to register in undergraduate courses to fill gaps in his/her knowledge.

It is strongly recommended that all students have had at least one course in computing.

Candidates admitted to the M.Sc. program with more than the minimum course requirements may be permitted to credit towards the degree a maximum of 1.0 credit at the senior undergraduate level. This maximum does not apply to qualifying-year students.

For the M.Sc. Physics – Medical Physics Stream, students with a medical/health physics background may have the selection of required courses adjusted to reflect their preparation and may receive advanced standing for equivalent courses.

Accelerated Pathway

The accelerated pathway in the Department of Physics is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.Sc. Honours degree in Physics with demonstrated excellent aptitude for research may qualify for this option.

Students in their third-year of study in the B.Sc. Honours degree in Physics should consult with both the Undergraduate Advisor and the Graduate Advisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses

and Honours project supervisor for their final year of undergraduate studies.

Particle physics accelerated pathway: students must complete PHYS 5002 Computational Physics and PHYS 5602 Physics of Elementary Particles with a grade of B+ or higher in each.

Medical physics accelerated pathway: students must complete PHYS 5002 Computational Physics and PHYS 5313 Physical Applications of Fourier Analysis with a grade of B+ or higher in each.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which will reduce their time to completion.

Admission

An M.Sc. in Physics or a closely related field is normally required for admission into the Ph.D. program.

Students who have been admitted to the M.Sc. program may be permitted to transfer into the Ph.D. program if they demonstrate academic abilities for advanced research in their field.

In exceptional cases, an outstanding student who has completed the honours B.Sc. will be considered.

Physics (PHYS) Courses

With the exception of PHYS 5701 Intermediate Quantum Mechanics with Applications and PHYS 5302 Classical Electrodynamics, which may be offered at either Carleton or the University of Ottawa, all PHYS courses are offered only at Carleton, and all PHYJ courses are offered only at the University of Ottawa.

PHYS 5002 [0.5 credit] (PHY 5344)

Statistical Data Analysis Techniques for Physics

Computational methods used in analysis of experimental data. Introduction to probability and random variables. Monte Carlo methods for simulation of random processes. Statistical methods for parameter estimation and hypothesis tests. Confidence intervals. Multivariate data classification. Unfolding methods. Examples taken primarily from particle and medical physics.

Includes: Experiential Learning Activity
Prerequisite(s): an ability to program in Python, Java, C, or C++, and permission of the Department.

Also offered at the undergraduate level, with different requirements, as PHYS 4807, for which additional credit is precluded.

PHYS 5101 [0.5 credit] (PHY 8111)

Classical Mechanics and Theory of Fields

Hamilton's principle; conservation laws; canonical transformations; Hamilton-Jacobi theory; Lagrangian formulation of classical field theory.

Prerequisite(s): permission of the Department.

PHYS 5201 [0.5 credit]**Introduction to Medical Imaging Principles and Technology**

Basic principles and technological implementation of x-ray, nuclear medicine, magnetic resonance imaging (MRI), and other imaging modalities used in medicine. Contrast, resolution, storage requirements for digital images. Applications outside of medicine, future trends. Precludes additional credit for BIOM 5201. Prerequisite(s): permission of the Physics Department.

PHYS 5202 [0.5 credit] (PHY 8122)**Special Topics in Molecular Spectroscopy**

Topics may include: electronic spectra of diatomic and triatomic molecules and their interpretation using molecular orbital diagrams; Raman and resonance Raman spectroscopy; symmetry aspects of vibrational and electronic levels of ions and molecules in solids; the presence of weak and strong resonant laser radiation. Also listed as CHEM 5009/CHM 8150. Prerequisite(s): permission of the Department.

PHYS 5203 [0.5 credit] (PHY 5161)**Medical Radiation Physics**

Interaction of electromagnetic radiation with matter. Sources: X-ray, accelerators, radionuclide. Charged particle interaction mechanisms, stopping powers, kerma, dose. Introduction to dosimetry. Units, measurements, dosimetry devices. Prerequisite(s): permission of the Department.

PHYS 5204 [0.5 credit] (PHY 5112)**Physics of Medical Imaging**

Physical foundation of and recent developments in transmission X-ray imaging, computerized tomography, nuclear medicine, magnetic resonance imaging, and ultrasound, for the specialist imaging physicist. Image quality, contrast, resolution, SNR, MTF, DQE. Introduction to image processing, system performance assessment. Includes: Experiential Learning Activity Prerequisite(s): PHYS 5203 and one of PHYS 4203 or PHYS 5313, or permission of the Department.

PHYS 5206 [0.5 credit] (PHY 5164)**Medical Radiotherapy Physics**

Radiation therapy process and physics. Ion chamber dosimetry, Monte Carlo techniques of radiation transport, cavity theories, external beam therapy, brachytherapy, dosimetry protocols, detectors used in radiation therapy. Treatment planning, monitor unit calculations, intensity-modulated radiation therapy. Novel and alternate techniques. Includes: Experiential Learning Activity Prerequisite(s): PHYS 5203 or permission of the Department.

PHYS 5207 [0.5 credit] (PHY 5165)**Radiobiology**

Physics and chemistry of radiation interactions. Cell biology, DNA damage and repair, survival curves and models, radiosensitivity, oxygen effect. Linear energy transfer, relative biological effectiveness. Whole body radiation effects, radioprotectors, radiosensitizers. Hyperthermia. Molecular techniques in radiobiology. Model tumour systems. Includes: Experiential Learning Activity Prerequisite(s): PHYS 5203 must have been taken, or be taken concurrently, or permission of the Department.

PHYS 5208 [0.5 credit] (PHY 5163)**Radiation Protection**

Dose quantities, effects of radiation exposure, fetal risks, scientific basis for protection, dose limits. Background radiation, dose from internal radionuclides. Doses in radiology, incidents in radiation therapy. Shielding design, working with radioactive materials. Instruments and measurement. Radiation protection organizations. Includes: Experiential Learning Activity Prerequisite(s): PHYS 5203 or permission of the Department.

PHYS 5209 [0.5 credit] (PHY 5166)**Medical Physics Practical Measurements**

Experience with current clinical medical imaging and cancer therapy equipment, and dosimetry and biophysics instrumentation. The course requires completion of experimental projects on medical imaging, radiotherapy, dosimetry, and biophysics, conducted at local clinics and NRC laboratories. Includes: Experiential Learning Activity Prerequisite(s): PHYS 5203, and two of PHYS 5204, PHYS 5206, PHYS 5207, and enrollment in the medical physics graduate program, or permission of the Department.

PHYS 5210 [0.0 credit] (PHY 5168)**Anatomy and Physiology for Medical Physicists**

An overview of human anatomy and physiology as background for the application of physics to cancer therapy and medical imaging. Anatomy as depicted by imaging technologies such as CT, MRI, and radiography will be emphasized. Graded Sat/Uns. Prerequisite(s): enrollment in the graduate program in medical physics or permission of the Department.

PHYS 5291 [0.5 credit] (PHY 5167)**Advanced Topics in Medical Physics**

Topics may include medical imaging physics, cancer therapy physics, medical biophysics, or radiation protection and health physics. Prerequisite(s): PHYS 5203 plus, as appropriate to the particular advanced topic offered, at least one of PHYS 5204, PHYS 5206, PHYS 5207; or permission of the Department.

PHYS 5302 [0.5 credit] (PHY 8132)**Classical Electrodynamics**

Covariant formulation of electrodynamics; Liénard-Wiechert potentials; radiation reaction; plasma physics; dispersion relations.

Prerequisite(s): PHYS 3308, PHYS 3802, and PHYS 3807, or equivalent courses, or permission of the Department.

PHYS 5313 [0.5 credit]**Physical Applications of Fourier Analysis**

Fourier transform, convolution. Sampling theorem. Applications to imaging: descriptors of spatial resolution, filtering. Correlation, noise power. Discrete Fourier transform, FFT. Filtering of noisy signals. Image reconstruction in computed tomography and magnetic resonance. Laplace transform. Integral transforms, application to boundary value problems.

Also offered at the undergraduate level, with different requirements, as PHYS 4203, for which additional credit is precluded.

Lectures three hours a week.

PHYS 5318 [0.5 credit] (PHY 5318)**Modern Optics**

Electromagnetic wave propagation; reflection, refraction; Gaussian beams; guided waves. Laser theory: stimulated emission, cavity optics, gain and bandwidth, atomic and molecular lasers. Mode locking, Q switching. Diffraction theory, coherence, Fourier optics, holography, laser applications. Optical communication systems, nonlinear effects: devices, fibre sensors, integrated optics.

Prerequisite(s): permission of the Department.

Also offered at the undergraduate level, with different requirements, as PHYS 4208, for which additional credit is precluded.

PHYS 5401 [0.5 credit]**Astrophysics**

Stellar evolution, including stellar modeling, main sequence stars, red giants and the end states of stars such as neutron stars and black holes. Galactic structure and dynamics. Neutrino astrophysics.

Also offered at the undergraduate level, with different requirements, as PHYS 4201, for which additional credit is precluded.

PHYS 5402 [0.5 credit]**Cosmology**

Observational evidence for the Big Bang. Cosmological space-time, expansion dynamics and contents of the universe. Physical processes in the expanding universe, inflation, nucleosynthesis, the cosmic microwave background, dark matter, and dark energy.

Also offered at the undergraduate level, with different requirements, as PHYS 4202, for which additional credit is precluded.

PHYS 5601 [0.5 credit] (PHY 5966)**Experimental Techniques of Nuclear and Elementary Particle Physics**

The interaction of radiation and high energy particles with matter; experimental methods of detection and acceleration of particles; use of relativistic kinematics; counting statistics.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 4307 or equivalent, and PHYS 4707; or permission of the Department.

PHYS 5602 [0.5 credit] (PHY 5967)**Physics of Elementary Particles**

Standard Model. Properties of leptons, quarks, hadrons. Fundamental interactions: photon, gluons, W/Z bosons. Higgs bosons. Conservation laws, invariance principles, quantum numbers. Decay rates and scattering cross-sections. Quantum electrodynamics and chromodynamics. Resonances. Weak interactions, CKM matrix, parity and CP violation. Neutrino masses and oscillations. Future directions.

Prerequisite(s): PHYS 4707 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PHYS 4602, for which additional credit is precluded.

PHYS 5604 [0.5 credit] (PHY 8164)**Intermediate Nuclear Physics**

Properties of the deuteron and the neutron-proton force. Nucleon-nucleon forces, isospin and charge independence. Nuclear models. Scattering theory. Interpretation of n-p and p-p scattering experiments. Interaction of nucleons with electrons. Interaction of nuclei with radiation.

Prerequisite(s): PHYS 4608 or permission of the Department.

PHYS 5701 [0.5 credit] (PHY 5170)**Intermediate Quantum Mechanics with Applications**

Angular momentum and rotation operations; Wigner and Racah coefficients; several and many electron problem in atoms; variational and Hartree-Fock formalism; introduction to second quantized field theory; scattering theory.

Prerequisite(s): PHYS 4707 and PHYS 4708 or permission of the Department.

PHYS 5702 [0.5 credit] (PHY 8172)**Relativistic Quantum Mechanics**

Relativistic wave equations. Expansion of S matrix in Feynman perturbation series. Feynman rules. An introduction to quantum electro-dynamics with some second quantization. Gauge theories. May include introduction to Standard Model.

Prerequisite(s): PHYS 5701 and permission of the Department.

PHYS 5801 [0.5 credit] (PHY 5140)
Methods of Theoretical Physics I

This course and PHYS 5802 are designed for students who wish to acquire a wide background of mathematical techniques. Topics can include complex variables, evaluation of integrals, approximation techniques, dispersion relations, Pade approximants, boundary value problems, Green's functions, integral equations.

PHYS 5802 [0.5 credit] (PHY 5141)
Methods of Theoretical Physics II

This course complements PHYS 5801. Topics include group theory, discussion of SU2, SU3, and other symmetry groups. Lorentz group.

PHYS 5804 [0.5 credit]
Introduction to General Relativity

Special relativity using tensor analysis. Curved spacetime with physics applications which may include the solar system, stars, black holes, and gravitational waves. Introduction to differential geometry and Einstein's field equations.

Also offered at the undergraduate level, with different requirements, as PHYS 4804., for which additional credit is precluded.

PHYS 5900 [1.0 credit] (PHY 8290)
Selected Topics in Physics (M.Sc.)

A student may, with the permission of the Department, take more than one selected topic, in which case each full course is counted for credit.

Prerequisite(s): permission of the Department.

PHYS 5901 [0.5 credit] (PHY 8191)
Selected Topics in Physics (M.Sc.)

Prerequisite(s): permission of the Department.

PHYS 5905 [1.0 credit] (PHY 5495)
Physics in Modern Technology Work Term

Experience for students enrolled in the physics in modern technology stream. To receive course credit, students must receive satisfactory evaluations for their work term employment. Written and oral reports describing the work term project are required.

Includes: Experiential Learning Activity

Prerequisite(s): Registration in the physics in modern technology stream of the M.Sc. program and permission of the Department.

PHYS 5909 [2.5 credits] (PHY 7999)
M.Sc. Thesis

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PHYS 6601 [0.5 credit] (PHY 8165)
Particle Physics Phenomenology

This course covers much of the required knowledge for research in particle physics from both the experimental and theoretical points of view. Topics may include: standard model, parton model, quark model, hadron spectroscopy, and tests of QCD.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5602 and PHYS 5702 or permission of the Department.

PHYS 6602 [0.5 credit] (PHY 8166)
Advanced Topics in Particle Physics

Phenomenology. This course will consist of a variety of seminars and short lecture courses, and will cover topics of immediate interest to the research program of the department.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 6601 or permission of the Department.

PHYS 6701 [0.5 credit] (PHY 8173)
Quantum Field Theory

Relativistic quantum field theory; second quantization of Bose and Fermi fields; reduction and LSZ formalism; perturbation expansion and proof of renormalizability of quantum field theories; calculations of radiative corrections and applications.

Prerequisite(s): PHYS 5701 and PHYS 5702, or permission of the Department.

PHYS 6900 [0.5 credit] (PHY 8490)
Selected Topics in Physics (Ph.D.)

Prerequisite(s): permission of the Department.

PHYS 6901 [0.5 credit] (PHY 8391)
Selected Topics in Physics (Ph.D.)

Prerequisite(s): permission of the Department.

PHYS 6909 [0.0 credit] (PHY 9999)
Ph.D. Thesis

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

Political Economy

This section presents the requirements for programs in:

- M.A. Political Economy
- M.A. Political Economy with Concentration in Work and Labour
- M.A. Political Economy with Specialization in African Studies
- M.A. Political Economy with Specialization in Latin American and Caribbean Studies
- Ph.D. Anthropology with Specialization in Political Economy
- Ph.D. Canadian Studies with Specialization in Political Economy
- Ph.D. Geography with Specialization in Political Economy
- Ph.D. History with Specialization in Political Economy

- Ph.D. Communication with Specialization in Political Economy
- Ph.D. Legal Studies with Specialization in Political Economy
- Ph.D. Political Science with Specialization in Political Economy
- Ph.D. Public Policy with Specialization in Political Economy
- Ph.D. Social Work with Specialization in Political Economy
- Ph.D. Sociology with Specialization in Political Economy

Program Requirements

M.A. Political Economy (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 1.0 credit in:	1.0
PECO 5000 [0.5] Theories of Political Economy	
PECO 5001 [0.5] The Methodology of Political Economy	
2. 2.0 credits in thesis (and an oral examination of the thesis)	2.0
3. 2.0 credits in approved graduate level electives (see Selection of Courses, below) ¹	2.0
Total Credits	5.0

Requirements - Research essay option (5.0 credits)

1. 1.0 credit in:	1.0
PECO 5000 [0.5] Theories of Political Economy	
PECO 5001 [0.5] The Methodology of Political Economy	
2. 1.0 credit in research essay	1.0
3. 3.0 credits in approved graduate level electives (see Selection of Courses, below) ¹	3.0
Total Credits	5.0

¹ Up to one (1.0) credit may be taken at the 4000 (honours undergraduate) level.

M.A. Political Economy with Concentration in Work and Labour (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in:	1.0
PECO 5000 [0.5] Theories of Political Economy	
PECO 5001 [0.5] The Methodology of Political Economy	
2. 0.5 credit in:	0.5
PECO 5002 [0.5] Political Economy of Work and Labour	
3. 0.5 credit from:	0.5
PECO 5503 [0.5] Selected Issues in Work and Labour I	
or PECO 5504 [0] Selected Issues in Work and Labour II	
4. 0.5 credit in:	0.5
PECO 5906 [0.5] Reflective Practice on Work and Labour	
or PECO 5907 [0] Placement in Political Economy	
5. 0.5 credit in approved elective	0.5
6. 2.0 credits in:	2.0

PECO 5909 [2.0] M.A. Thesis (on a Work and Labour topic)

Total Credits **5.0**

Requirements - Research essay pathway (5.0 credits)

1. 1.0 credit in:	1.0
PECO 5000 [0.5] Theories of Political Economy	
PECO 5001 [0.5] The Methodology of Political Economy	
2. 0.5 credit in:	0.5
PECO 5002 [0.5] Political Economy of Work and Labour	
3. 0.5 credit from:	0.5
PECO 5503 [0.5] Selected Issues in Work and Labour I	
or PECO 5504 [0] Selected Issues in Work and Labour II	
4. 0.5 credit in:	0.5
PECO 5906 [0.5] Reflective Practice on Work and Labour	
or PECO 5907 [0] Placement in Political Economy	
5. 1.5 credits in approved electives	1.5
6. 1.0 credit in:	1.0
PECO 5908 [1.0] Research Essay	
Total Credits	5.0

M.A. Political Economy with Specialization in African Studies (5.0 credits)

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 1.0 credit in:	1.0
PECO 5000 [0.5] Theories of Political Economy	
PECO 5001 [0.5] The Methodology of Political Economy	
4. 2.0 credits in thesis (and an oral examination of the thesis)	2.0
5. 1.5 credits in approved graduate level electives (see Selection of Courses, below) ¹	1.5
Total Credits	5.0

Requirements - Research essay option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 1.0 credit in:	1.0
PECO 5000 [0.5] Theories of Political Economy	
PECO 5001 [0.5] The Methodology of Political Economy	
4. 1.0 credit in research essay	1.0

5. **2.5 credits** in approved graduate level electives (see Selection of Courses, below)¹ 2.5

Total Credits 5.0

¹ Up to one (1.0) credit may be taken at the 4000 (honours undergraduate) level.

M.A. Political Economy with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. **0.5 credit in:** 0.5

LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies

2. **0.0 credit in:**

LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies

3. **1.0 credit in:** 1.0

PECO 5000 [0.5] Theories of Political Economy

PECO 5001 [0.5] The Methodology of Political Economy

4. **2.0 credits in:** 2.0

PECO 5909 [2.0] M.A. Thesis (in the specialization)

5. **1.5 credits** in approved graduate level electives (see Selection of Courses, below)¹ 1.5

Total Credits 5.0

Requirements - Research essay pathway (5.0 credits)

1. **0.5 credit in:** 0.5

LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies

2. **0.0 credit in:**

LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies

3. **1.0 credit in:** 1.0

PECO 5000 [0.5] Theories of Political Economy

PECO 5001 [0.5] The Methodology of Political Economy

4. **1.0 credits in:** 1.0

PECO 5908 [1.0] Research Essay (in the specialization)

5. **2.5 credits** in approved graduate level electives (see Selection of Courses, below)¹ 2.5

Total Credits 5.0

¹ Up to one (1.0) credit may be taken at the 4000 (honours undergraduate) level.

Ph.D. Anthropology with Specialization in Political Economy (3.0 credits)

Requirements:

1. **0.5 credit in:** 0.5

PECO 6000 [0.5] Political Economy: Core Concepts

2. **0.5 credit** in relevant political economy course from the approved list 0.5

3. **1.0 credit in:** 1.0

ANTH 6000 [1.0] Doctoral Seminar: Theory and Method in Contemporary Anthropology

4. **0.5 credit in:** 0.5

ANTH 6002 [0.5] Research Design

ANTH 6100 [0.0] Thesis Writing Seminar

5. **0.0 credit in** (two terms satisfactory participation in): 0.0

ANTH 6100 [0.0] Thesis Writing Seminar

3. **0.5 credits** in SOCI or ANTH courses at the 5000 or 6000 level. 0.5

4. A satisfactory research preparation portfolio

5. A satisfactory thesis proposal and (when required) Research Ethics Board clearance to undertake thesis research

6. Satisfactory thesis research

7. **0.0 credit in:** 0.0

ANTH 6909 [0.0] Ph.D. Thesis (including successful oral defence)

Total Credits 3.0

Ph.D. Canadian Studies with Specialization in Political Economy (3.0 credits)

Requirements:

1. **0.5 credit in:** 0.5

PECO 6000 [0.5] Political Economy: Core Concepts

2. **0.5 credit** in a relevant political economy course from the approved list or the comprehensive in the major field of Policy, Economy and Society. 0.5

3. **1.0 credit in:** 1.0

CDNS 6900 [1.0] Ph.D. Core Seminar: Interdisciplinarity in Canadian Studies: Concepts, Theories and Methods

4. **1.0 credit** in the successful completion of two 0.5-credit written comprehensive examinations. Students will be examined in two areas of research. (See note) 1.0

5. Language requirement: satisfactory demonstration of an understanding of a language other than English. Although French is the preferred second language, students may be permitted to substitute an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interests.

6. A public defence, in English, of a written thesis proposal. Following the completion of their comprehensives, students will be expected to defend a proposal of the research and analysis they plan to undertake in completing their Ph.D. thesis. The thesis proposal defence should normally occur within six months after completion of a student's comprehensive examinations and within the first 27 months of registration in the program. The thesis committee will be composed of three faculty members, always including one from each university.

7. **0.0 credits** in a Thesis (in the specialization which must be successfully defended in English at an oral examination): 0.0

CDNS 6909 [0.0] Ph.D. Thesis

Total Credits 3.0

Note - Comprehensive Examinations: full-time students are expected to complete their comprehensive

examinations within 24 months of their initial registration in the Ph.D. program. Part-time Ph.D. students should finish their comprehensive examinations within 36 months of completing course work. Both full-time and part-time students should complete their comprehensive examinations before defending their dissertation proposal.

Candidates are required to take an oral examination after each written examination.

Language Requirement

All doctoral students are required to pass the Ph.D. program's language test. The language test entails the translation into English of a French text (or a text in another approved language such as an Aboriginal language indigenous to Canada or another language if it is demonstrably relevant to their research interest). The language test is two hours long, and students are permitted to use a dictionary. Grades for the language test are Pass or Fail.

Students who have taken a language test as a requirement for their M.A. cannot use it to meet the Ph.D. language requirement. In order to establish equal treatment of all students, all doctoral candidates will be required to pass the Ph.D. language test.

Ph.D. Geography with Specialization in Political Economy (2.0 credits)

Requirements:

1. 1.0 credit in:	1.0
GEOG 6000 [0.5] Doctoral Core Seminar: Geography, Society and the Environment	
GEOG 6001 [0.5] Doctoral Core Seminar: Geography, Society and the Environment	
2. 0.5 credit in:	0.5
PECO 6000 [0.5] Political Economy: Core Concepts	
3. 0.5 credit from:	0.5
GEOG 6003 [0.5] Field Seminar: Geography of Societal Change	
GEOG 6004 [0.5] Field Seminar: Geography of Societal Change	
4. 0.0 credit in:	0.0
GEOG 6906 [0.0] Comprehensive Examination: The - Geography of Societal Change	
5. Presentation and oral defence of the thesis proposal as outlined below	
6. 0.0 credits in Thesis which must be defended at an oral examination	0.0
GEOG 6909 [0.0] Ph.D. Thesis	
7. In addition to the formal requirements, Ph.D. students are required to attend the Departmental Seminar series and the Graduate Field Camp.	
Total Credits	2.0

Ph.D. History with Specialization in Political Economy (5.0 credits)

Requirements:

1. 0.5 credit in:	0.5
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PECO 6000 [0.5] Political Economy: Core Concepts	
2. 0.5 credit in:	0.5
HIST 6701 [0.5] History and Political Economy	
Or 0.5 credit in a relevant political economy course from the approved list.	
3. 1.0 credit in:	1.0
HIST 6808 [1.0] Doctoral Seminar in Historical Theory and Method	
4. 1.5 credits in:	1.5
HIST 6906 [0.5] Ph.D. Tutorials (in the candidate's field; taken three times)	
5. 0.5 credits in:	0.5
HIST 6907 [0.5] Ph.D. Comprehensive Examination	
6. 1.0 credit in Professional Development courses:	1.0
HIST 6805 [0.5] Professional Development Project I	
HIST 6806 [0.5] Professional Development Project II	
Or another approved course.	
7. 0.0 credits in:	
HIST 6909 [0.0] Ph.D. Thesis	
Total Credits	5.0

Ph.D. Communication with Specialization in Political Economy (5.0 credits)

Requirements:

1. 1.0 credit in:	1.0
COMS 6000 [1.0] Doctoral Seminar in Communication Studies	
2. 1.0 additional credit from the list of optional courses below: up to 0.5 credit may be taken in a relevant discipline outside of the School; students in the Ph.D. program are restricted to 0.5 credit in directed studies: COMS 6010 Directed Studies	1.0
3. 2.0 credits in:	2.0
COMS 6900 [1.0] Comprehensive Examination I	
COMS 6901 [1.0] Comprehensive Examination II	
4. 0.5 credit in:	0.5
PECO 6000 [0.5] Political Economy: Core Concepts	
5. 0.5 credit in:	0.5
A relevant political economy course from the approved list.	
6. 0.0 credits in:	0.0
COMS 6909 [0.0] Ph.D. Thesis (In the Specialization. Must be successfully defended at an oral examination.)	
Total Credits	5.0

Ph.D. Legal Studies with Specialization in Political Economy (4.5 credits)

Requirements:

1. 0.5 credit in:	0.5
LAWS 6000 [0.5] Doctoral Seminar in Legal Studies	
2. 0.5 credit in:	0.5
LAWS 6001 [0.5] Proseminar in Legal Studies	
4. 2.0 credits in:	2.0
LAWS 6095 [1.0] Field Comprehensive	
LAWS 6096 [1.0] Thesis Proposal	
5. 0.5 credit from:	0.5

LAWS 6002 [0.5]	Law, Regulation and Governance	
LAWS 6003 [0.5]	Human Rights, Citizenship and Global Justice	
LAWS 6004 [0.5]	Crime, Law, and Security	
6. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
7. 0.5 credit in:		0.5
A relevant political economy course from the approved list		
8. 0.0 credits in:		0.0
LAWS 6909 [0.0]	Ph. D. Thesis (must be successfully defended at an oral examination.)	
Total Credits		4.5

Ph.D. Political Science with Specialization in Political Economy (5.0 credits)

Requirements:

1. 2.0 credits in	courses at the 6000 level in each of the candidate's two major fields of study	2.0
2. 1.0 credit in:		1.0
PSCI 6900 [0.5]	Ph.D. Field Examination I	
PSCI 6905 [0.5]	Ph.D. Field Examination II	
Field examinations normally take place once per year, in August. At the discretion of the Department, candidates may be required to take an oral examination following the written examination. Full-time students are normally required to complete the comprehensive examinations within 24 months of entering the program.		
3. Proficiency in a research skill, as outlined below under Research Skill Requirement		
4. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
5. 0.5 credit in:		0.5
A relevant political economy course from the approved list		
6. 1.0 credit in:		1.0
PSCI 6907 [0.5]	Thesis Proposal Workshop I	
PSCI 6908 [0.5]	Thesis Proposal Workshop II	
7. A public defence of a written dissertation proposal. Full-time students must normally complete the public defence of the proposal, preceded by its formal acceptance by the supervisory committee, in the third year of their doctoral program.		
8. 0.0 credits in:		0.0
PSCI 6909 [0.0]	Ph.D. Thesis	
Total Credits		5.0

Ph.D. Public Policy with Specialization in Political Economy (4.5 credits)

Requirements:

1. 2.0 credits in:		2.0
PADM 6010 [0.5]	Current Issues in Public Policy	
PADM 6011 [0.5]	Theoretical Foundations of Public Policy	
PADM 6012 [0.5]	Policy Process and Institutions	
PADM 6013 [0.5]	Research Design for Public Policy	
2. 0.5 credit in	research methods, such as PADM 5218 or another research methods course at the 5000 or 6000 level (See Note 1, below)	0.5

3. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
4. 0.5 credit in:		0.5
A relevant political economy course from the approved list.		
5. 0.5 credit in:		0.5
PADM 6900 [0.5]	Ph.D. Comprehensive Examination (See Note 2, below)	
6. 0.5 credit in:		0.5
PADM 6201 [0.5]	Doctoral Research Seminar (See Note 3, below)	
7. Public defence of a written thesis proposal		
8. 0.0 credits in:		0.0
PADM 6909 [0.0]	Ph.D. Thesis	
9. Language requirement (See Note 5, below)		
Total Credits		4.5

Notes

- Course components:** The four required courses PADM 6010 Current Issues in Public Policy, PADM 6011 Theoretical Foundations of Public Policy, PADM 6012 Policy Process and Institutions, and PADM 6013 Research Design for Public Policy will normally be taken in the first year of full-time study. The research methods course and specialization courses must be chosen by the student after consultation with, and approval by, the student's thesis supervisor and the Ph.D. Program Supervisor. Graduate courses offered by the School or by other university departments may be approved. When necessary, students must arrange formal permission from the relevant department for admission to courses.
- Comprehensive Examination:** Students will write a Comprehensive Examination, normally in the summer term of the first year, after they have successfully completed each of the four required courses PADM 6010 Current Issues in Public Policy, PADM 6011 Theoretical Foundations of Public Policy, PADM 6012 Policy Process and Institutions, and PADM 6013 Research Design for Public Policy with a grade of B- or higher, and with an overall GPA of 9.0 (B+) or higher. The examination will focus on the material presented in the required courses. At the discretion of the examining board, a candidate whose performance is not satisfactory may be asked to take a second written examination.
- Doctoral Research Seminar:** Full-time students will normally register in PADM 6201 Doctoral Research Seminar over two terms in their second year of study. As part of the seminar, a research project will be prepared under the direction of the thesis supervisor and be preliminary to and supportive of the Ph.D. Thesis. Possible formats – to be approved by the supervisor – include a comprehensive and critical literature survey, or a self-contained study applying the principles of research design and research methods to an area of inquiry related to the specialization courses.
- Thesis:** Following the successful completion of the Comprehensive Examination, students will prepare a formal thesis proposal under a thesis advisory

committee. The thesis supervisor will normally be a faculty member from the School of Public Policy and Administration. The proposal will normally be submitted by the end of the summer term of the second year of full-time registration and defended early in the fall term of the third year. The thesis must demonstrate an advanced ability to integrate multiple disciplines into the analysis of public policy. The thesis must be defended at an oral examination.

5. **Language Requirement:** Students will be required to demonstrate a reading knowledge of French. Another language may be substituted for French, if it is relevant to the thesis.

Ph.D. Social Work with Specialization in Political Economy (5.5 credits)

Ph.D. Social Work with Specialization in Political Economy (5.5 credits)

1. 1.0 credit in:	1.0
SOWK 6101 [0.5] Theoretical Foundations	
SOWK 6102 [0.5] Ethical Foundations	
2. 0.5 credit in:	0.5
PECO 6000 [0.5] Political Economy: Core Concepts	
3. 0.5 credit in a relevant political economy course from the approved list	0.5
4. 1.0 credit in:	1.0
SOWK 6201 [0.5] Theory and Methods	
SOWK 6202 [0.5] Research Design	
5. 0.5 credit in:	0.5
SOWK 6401 [0.5] Critical Pedagogy	
6. 1.0 credit in:	1.0
SOWK 6301 [0.25] Ph.D. Seminar	
SOWK 6302 [0.25] Ph.D. Seminar	
SOWK 6303 [0.25] Ph.D. Seminar	
SOWK 6304 [0.25] Ph.D. Seminar	
7. 0.5 credit in:	0.5
SOWK 6600 [0.5] Advocacy Practicum	
8. 0.5 credit in:	0.5
SOWK 6800 [0.5] Qualifying Examination	
9. 0.0 credits in:	0.0
SOWK 6909 [0.0] PhD Dissertation	
Total Credits	5.5

Ph.D. Sociology with Specialization in Political Economy (3.0 credits)

Requirements:

1. 1.0 credit in:	1.0
SOCI 6002 [0.5] Doctoral Seminar Year 1	
SOCI 6003 [0.5] Doctoral Seminar Year 2	
2. 0.0 credits in:	0.0
SOCI 6909 [0.0] Ph.D. Thesis	
3. Written and oral comprehensive examinations in two areas of specialization	
4. Presentation of a thesis proposal	
5. 0.5 credit in:	0.5
PECO 6000 [0.5] Political Economy: Core Concepts	

6. 0.5 credit in:	0.5
A relevant political economy course from the approved list or part of comprehensive preparation in the subfield of political economy	
7. 1.0 credit in SOCI courses at the 5000- or 6000-level or, with the permission of the graduate supervisor, up to 1.0 credit of graduate level courses from another unit at Carleton	1.0
8. An oral defence of the thesis	
Total Credits	3.0

Selection of Courses - Political Economy

In addition to the graduate courses offered by, or associated with, the Institute of Political Economy, the courses listed below are relevant to students of political economy and would, with the prior approval of the Institute, be used to design a coherent and internally complementary set of courses to fulfill degree requirements. The list is not exclusive and is subject to change.

Master's students may select 1.0 credit in political economy at the 4000-level.

Anthropology

ANTH 5106 [0.5]	North American Indigenous Peoples
ANTH 5107 [0.5]	Issues in North American Ethnohistory
ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5208 [0.5]	Anthropology of Indigeneity
ANTH 5210 [0.5]	Special Topics in Indigenous Studies
ANTH 5560 [0.5]	Economic Anthropology
ANTH 5704 [0.5]	Anthropology of the Body, Health, Illness and Healing
ANTH 5808 [0.5]	Selected Topics in North American Native Studies
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment

Canadian Studies

CDNS 5101 [0.5]	Indigenous Peoples, Canada and the North
CDNS 5102 [0.5]	Indigenous Politics and Resurgence in Canada
CDNS 5201 [0.5]	Critical Perspectives on Canadian Feminism
CDNS 5202 [0.5]	Gendering Canada: Selected Contemporary Debates
CDNS 5501 [0.5]	Decolonizing Canada: Cultural Politics and Collective Identities
CDNS 5601 [0.5]	Constructing Canada: The Politics of National Identity

Communication and Media Studies

COMS 5200 [0.5]	Civic Media
COMS 5206 [0.5]	Communication, Culture, Regulation

COMS 5214 [0.5]	The Local and the Global
COMS 5219 [0.5]	Regional Studies of Media
COMS 5224 [0.5]	Internet, Infrastructure, Materialities
COMS 5225 [0.5]	Critical Data Studies

Geography

GEOG 5005 [0.5]	Global Environmental Change: Human Implications
GEOG 5400 [0.5]	Territory and Territoriality
GEOG 5500 [0.5]	Special Topics in the Study of Cities and Urbanization
GEOG 5502 [0.5]	Special Topics in Geography of Globalization
GEOG 5600 [0.5]	Empire and Colonialism

History

HIST 5210 [0.5]	Power
HIST 5211 [0.5]	Consumption
HIST 5314 [0.5]	Colonialism and Postcolonialism in Canada
HIST 5315 [0.5]	State and Society in Canadian History
HIST 5803 [0.5]	History of Women, Gender and Sexuality: Foundations

Law

LAWS 5002 [0.5]	Law and Gender Relations
LAWS 5003 [0.5]	Law, Economy and Society
LAWS 5004 [0.5]	Law, Crime and Social Order
LAWS 5005 [0.5]	Law, State and Politics
LAWS 5006 [0.5]	Historical Perspectives on Law and Society
LAWS 5007 [0.5]	Race, Ethnicity and the Law
LAWS 5200 [0.5]	International Economic Law: Regulation of Trade and Investment
LAWS 5302 [0.5]	Feminism, Law and Social Transformation
LAWS 5306 [0.5]	Police and Capital

Political Economy

PECO 5501 [0.5]	Selected Problems in Political Economy I
PECO 5502 [0.5]	Selected Problems in Political Economy II

Political Science

PSCI 5003 [0.5]	Political Parties in Canada
PSCI 5008 [0.5]	The Politics of Climate Change
PSCI 5009 [0.5]	Canadian Political Economy
PSCI 5100 [0.5]	Indigenous Politics of North America
PSCI 5105 [0.5]	Post-Communist Politics in East Central Europe
PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5207 [0.5]	International Political Sociology
PSCI 5208 [0.5]	Global Social Policy
PSCI 5209 [0.5]	Forced Migration and Global Politics

PSCI 5303 [0.5]	Governmentality and Politics
PSCI 5410 [0.5]	Postcolonial Theories and Practices
PSCI 5509 [0.5]	Governing in the Global Economy
PSCI 5607 [0.5]	Politics of North America
PSCI 5802 [0.5]	Political Economy of Global Money and Finance
PSCI 5808 [0.5]	International Political Economy
PSCI 5810 [0.5]	Approaches to Environmental Politics

Public Administration

PADM 5213 [0.5]	Gender and Public Policy
PADM 5220 [0.5]	Regulation and Public Policy
PADM 5224 [0.5]	Indigenous Policy
PADM 5228 [0.5]	Social Policy
PADM 5811 [0.5]	The International Policy Framework
PADM 5813 [0.5]	The Evolution of World Bank/IMF Policy Conditionality
PADM 5814 [0.5]	Program and Project Management

Sociology

SOCI 5000 [0.5]	Classical Sociological Theory
SOCI 5002 [0.5]	Contemporary Sociological Theory
SOCI 5007 [0.5]	Social Change and Economic Development
SOCI 5204 [0.5]	Consuming Passions: The Regulation of Consumption, Appearance and Sexuality
SOCI 5205 [1.0]	Canadian Society
SOCI 5209 [0.5]	Sociology of Science and Technology
SOCI 5305 [0.5]	Police and Capital
SOCI 5308 [0.5]	Feminist Analyses
SOCI 5400 [0.5]	Political Sociology
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
SOCI 5405 [0.5]	Power and Stratification
SOCI 5407 [0.5]	Governmentality and Politics
SOCI 5408 [0.5]	Feminism and Materialism
SOCI 5409 [0.5]	The Politics of Social Movements and the State
SOCI 5504 [0.5]	Selected Problems in Political Economy I
SOCI 5607 [0.5]	Contemporary Theories of Crime and Social Regulation
SOCI 5804 [0.5]	Modern Marxist Theory
SOCI 5806 [0.5]	Selected Topics in Sociology

Regulations

See the General Regulations section of this Calendar.

All master's candidates must maintain B standing or better (GPA of 8.0). A candidate may, with the recommendation of the Institute and the approval of the Dean of the Faculty of Graduate Studies and Research, be allowed a grade of C+ in 0.5 credit.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the:

- M.A. Political Economy including all concentrations and specializations, and
- Graduate Diploma in Work and Labour

is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Academic Regulations

See the General Regulations section of this Calendar.

Admission

The normal requirement for admission to the master's program is B.A. Honours, with at least high honours standing, in one of the disciplines represented in the Institute. Prospective applicants without such qualifications may be considered for admission if they have both a strong academic record and relevant work experience.

Admission

Students who are enrolled in a doctoral program in one of the participating units may apply to the Institute of Political Economy for admission to the Collaborative Specialization. Admission to the specialization is determined by the Specialization Committee and will normally take place before the end of the first year of registration in one of the participating doctoral programs. Admission requirements to the Collaborative Ph.D. with a Specialization in Political Economy are:

- Registration in the Ph.D. program of one of the participating units;
- Registration in, or successful completion of, at least one course or comprehensive field with political economy content. This will normally be a course offered by the student's home unit but could also be selected from appropriate courses in other units. See Selection of Courses for a list of acceptable courses;
- Selection of a thesis topic with political economy content. The Specialization Committee will determine, in consultation with the supervisor, if the political economy content of the thesis meets the requirements of the Collaborative Specialization.

Political Economy (PECO) Courses

PECO 5000 [0.5 credit]

Theories of Political Economy

A survey of the core concepts and ideas proposed by both the founders and modern practitioners of political economy. Particular attention will be paid to contemporary theorists and classical theorists such as Smith, Ricardo, Marx, Mill, Schumpeter, Keynes, Veblen, and Innis.

PECO 5001 [0.5 credit]

The Methodology of Political Economy

An examination of the methods, procedures, and rules for developing theory and guiding inquiry in political economy research, including topics such as logic of inquiry, conceptualization, research design, dialectics, level of analysis, comparison, evidence and statistics.

PECO 5002 [0.5 credit]

Political Economy of Work and Labour

Interdisciplinary survey of core concepts, contexts, and debates in the study of work and labour; critical and historical approach addressing inequalities of class, race, and disabilities; relational perspective on labour including technological change, care, political action, and the environment.

PECO 5501 [0.5 credit]

Selected Problems in Political Economy I

Also listed as SOCI 5504, PSCI 5501.

PECO 5502 [0.5 credit]

Selected Problems in Political Economy II

Also listed as SOCI 5505, PSCI 5502.

PECO 5503 [0.5 credit]

Selected Issues in Work and Labour I

Topics and emphasis vary from term to term according to current policies and events influencing the distribution and benefits of work and labour including migration, technological and environmental change, privatization, austerity, and transnational legislation.

PECO 5504 [0.5 credit]

Selected Issues in Work and Labour II

Topics and emphasis vary from term to term according to current policies and events influencing the distribution and benefits of work and labour including migration, technological and environmental change, privatization, austerity, and transnational legislation.

PECO 5900 [0.5 credit]

Tutorial in Political Economy

Directed readings on selected aspects of political economy, involving preparation of papers as the basis for discussion with the tutor. Offered when no regular course offering meets a candidate's specific needs. Prerequisite(s): permission of the Director.

PECO 5906 [0.5 credit]

Reflective Practice on Work and Labour

Through a reflection on their current work environment, it is expected that students that are working would apply the knowledge received to enrich their work place. Students will provide relevant reflections and proposals to enrich their work-practices over the period of one-semester. Includes: Experiential Learning Activity Prerequisite(s): PECO 5002 and permission of the department.

PECO 5907 [0.5 credit]

Placement in Political Economy

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in the community. Placement possibilities may be initiated by the student or arranged through community contacts established by the Institute of Political Economy.

Includes: Experiential Learning Activity Prerequisite(s): permission of the Director.

PECO 5908 [1.0 credit]

Research Essay

Directly linked to the student's course work, the research essay must be interdisciplinary in approach.

Includes: Experiential Learning Activity

PECO 5909 [2.0 credits]

M.A. Thesis

The thesis is an alternative to the research essay. It must also be interdisciplinary in approach, and requires greater substance and originality than the Research Essay.

Normally, a student's thesis committee will be composed of members from more than one discipline.

Includes: Experiential Learning Activity

PECO 6000 [0.5 credit]

Political Economy: Core Concepts

Core concepts in political economy, drawn from classical and contemporary writings. Topics will be selected in consultation with participating units, taking into account the potential number of students, their research interests and those of the participating units.

Political Management

This section presents the requirements for programs in:

- Master of Political Management

Program Requirements

Master of Political Management (5.0 credits)

Requirements:

1. 1.0 credit in core courses:	1.0
POLM 5007 [0.25] Writing in a Political Context	
POLM 5008 [0.25] Ethics in Political Management	
POLM 5009 [0.25] Media Relations	
POLM 5018 [0.25] Strategic Communications	
2. 0.5 credit from:	0.5
POLM 5001 [0.5] Parliament and Parties in Canada	
POLM 5002 [0.5] The Core Executive in Canada	
POLM 5017 [0.5] Political Institutions in a Comparative Context	
3. 1.0 credit in practicum placement arranged through the program, combined with an integrative analytical work:	1.0
POLM 5099 [1.0] Practicum Placement	
4. 2.5 credits in POLM at the 5000 level or other courses as approved by the Graduate Supervisor.	2.5
Total Credits	5.0

The accelerated pathway to the Master of Political Management (MPM) degree is a flexible and individualized plan of graduate study. Students may qualify if they have demonstrated academic excellence and are in their final year of a relevant Carleton undergraduate degree, such as the BPAPM degree or a BA degree in political science, communication and media studies, or other discipline related to political management.

Students in their third-year of study in the undergraduate program should consult with both their academic supervisor and the political management program supervisor to determine if the accelerated pathway is

appropriate for them and to confirm their selection of courses for their final year of undergraduate study.

To be eligible to participate in the accelerated pathway, students must have a minimum overall CGPA of A- in undergraduate courses and must complete POLM 3000, PSCI 3410 or COMS 3100.

Students may receive advanced standing with transfer of credit of up to 1.0 credit in POLM courses at the 5000 level, with grade of B+ or higher, which can reduce their time to completion.

Please note that:

1. POLM courses eligible for advanced standing cannot include the core requirements of the program.
2. Participation in the accelerated pathway does not guarantee entry into the MPM program. To be considered for admission to the MPM program, students must submit a formal application for consideration by the program's admissions committee.

Regulations

See the General Regulations section of this Calendar.

A standing of B- or higher must be obtained in each course or component counted towards the degree.

Admission

Applicants must:

- hold an honours baccalaureate or equivalent with at least high honours standing; and
- demonstrate a commitment to and aptitude for political management through prior involvement in party or campus politics, grassroots organization, political advocacy, or similar experience.

Although there is no formal second language requirement for the degree, individuals preparing for political professions in Canada should have or develop a facility in French.

Applicants whose first language is not English, or who have not completed a previous degree at an English-language university must demonstrate fluency in English via any one of the criteria outlined in the general regulations of the Graduate calendar.

Political Management (POLM) Courses

POLM 5001 [0.5 credit]

Parliament and Parties in Canada

A critical introduction to the development of public policy and the exercise of political power in Canada, concentrating on political management in the context of Parliament and political parties.

Includes: Experiential Learning Activity

POLM 5002 [0.5 credit]

The Core Executive in Canada

An examination of how public policy originates, and how its development is managed within the executive branch, with particular emphasis on the Cabinet process and the relationship between political actors and the public service.

Includes: Experiential Learning Activity

POLM 5004 [0.5 credit]**Advanced Strategic Communications**

An exploration of how to understand an issue environment, develop positive and productive social media and mainstream media approaches, create a crisis communications strategy, and ensure a strong reputation management capacity.

Includes: Experiential Learning Activity

Prerequisite(s): POLM 5018.

POLM 5005 [0.5 credit]**Political Offices**

A critical examination of the diverse roles of political staffers working in the offices of elected officials in Canada, with a focus on federal executive and parliamentary offices but also including work in the context of election campaigns, political parties, municipal and provincial governments.

Includes: Experiential Learning Activity

POLM 5007 [0.25 credit]**Writing in a Political Context**

The craft of effective political writing, focusing on how to optimize messages in speeches, press releases, policy papers and other written products.

POLM 5008 [0.25 credit]**Ethics in Political Management**

An examination of the ethical codes that should guide activities and professional relationships of individuals working in the political system.

Includes: Experiential Learning Activity

POLM 5009 [0.25 credit]**Media Relations**

The theory and practice of media relations in a political environment.

Includes: Experiential Learning Activity

POLM 5010 [0.5 credit]**Polling and Opinion Research**

Exploring theory, design, and execution of public opinion research to support campaign and advocacy strategies. Overview of ways to incorporate research in strategy development, methodologies used, and how to use opinion research to make better decisions. No statistical or mathematical background required.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as POLM 4010, for which additional credit is precluded.

POLM 5011 [0.5 credit]**Political Campaigns**

A strategic approach to developing and executing political campaigns (national, regional, local and issue-based), including: campaign ethics; campaign organization; use of new technology and social media; fundraising and budget; development and delivery of messages; GOTV efforts; policy and platform; issue management; tour; innovations and trends.

Includes: Experiential Learning Activity

POLM 5012 [0.5 credit]**Advocacy and Government Relations in Canada**

Through applied exercises, case studies and a project with an external organization, students will build knowledge and skills required for advocacy and government relations in the private and voluntary sectors.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as POLM 4012, for which additional credit is precluded.

POLM 5013 [0.5 credit]**Political Management and the Media**

An examination of the organization and practices of major media. Coverage of public officials, public policy issues and legislative battles, paying particular attention to the current and seismic changes in the media as agencies of public address, and the consequences for politics and governance.

Includes: Experiential Learning Activity

POLM 5014 [0.5 credit]**Political Marketing**

Using case studies and simulation exercises, the course will provide students with an understanding of political marketing strategy, market intelligence, consultation and participation, political product development and branding, and marketing practices in government.

Includes: Experiential Learning Activity

POLM 5015 [0.5 credit]**Public Policy for Political Advisors**

An introduction to policy analysis and policy process for political advisors. Topics include agenda setting, instrument choice, policy arguments, and communicating policy ideas and decisions.

Includes: Experiential Learning Activity

POLM 5016 [0.5 credit]**Applied Policy Analysis**

A critical examination of one or more current policy debates from a political management perspective.

Includes: Experiential Learning Activity

Prerequisite(s): POLM 5015 or permission of the instructor.

POLM 5017 [0.5 credit]**Political Institutions in a Comparative Context**

A comparative study of the political institutions of several nations or sub-national jurisdictions, including both formal structures and accepted practices.

POLM 5018 [0.25 credit]**Strategic Communications**

An introduction to the range of issues involved in formulating and implementing a political strategic communications strategy.

Includes: Experiential Learning Activity

POLM 5019 [0.5 credit]**Comparative Ethics Regimes**

Examination and critique of ethics regulations including conflict of interest, lobbying, and post-employment at the federal, provincial and municipal levels in Canada with comparison to select other jurisdictions such as the United States, United Kingdom and the European Union.

Includes: Experiential Learning Activity

POLM 5020 [0.5 credit]**Political Office Management**

A focused examination of particular activities conducted by Canadian political staffers in ministerial and parliamentary offices and development of applied skills in areas such as human resource management, office budget management, opposition research, issues management.

Includes: Experiential Learning Activity

POLM 5021 [0.25 credit]**Political Speechwriting**

The development of effective speechwriting techniques.

Includes: Experiential Learning Activity

Prerequisite(s): POLM 5007.

POLM 5022 [0.5 credit]**Prime Ministerial Leadership in Canada**

The application of a political management perspective to the exercise of prime ministerial power in Canada. Using several theories and case studies, examining which styles of leadership are most successful in a variety of political contexts.

POLM 5099 [1.0 credit]**Practicum Placement**

375 hours of supervised full-time work experience in an appropriate ten-week placement relevant to political management and approved by the practicum graduate supervisor. Graded SAT/UNS.

Includes: Experiential Learning Activity

POLM 5900 [0.5 credit]**Directed Study**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar may be arranged with permission of the Department.

POLM 5905 [0.5 credit]**Special Topics in Political Management**

Topics vary from year to year. Students should check with the Department regarding the topic offered.

POLM 5906 [0.25 credit]**Selected Topics in Political Management**

Topics vary from year to year. Students should check with the program regarding the topic.

Political Science

This section presents the requirements for programs in:

- M.A. Political Science
- M.A. Political Science with Specialization in African Studies
- M.A. Political Science with Specialization in Latin American and Caribbean Studies
- Ph.D. Political Science
- Ph.D. Political Science with Specialization in Political Economy

Program Requirements

M.A. Political Science (5.0 credits)

Details on all program requirements are provided in the departmental Guidelines for M.A. Candidates.

All master's candidates will fulfill a 5.0-credit program requiring departmental approval. A maximum of 1.0 credit may be taken at the 4000-level. The student may choose to take a maximum of 1.0 credit outside the Department of Political Science.

Requirements - Coursework option (5.0 credits)

1. 5.0 credits in approved courses	5.0
Total Credits	5.0

Requirements - Research Essay option (5.0 credits)

1. 1.0 credit in:	1.0
PSCI 5908 [1.0] M.A. Research Essay	
2. 4.0 credits in approved courses	4.0
Total Credits	5.0

Requirements - Thesis option (5.0 credits)

1. 2.0 credits in:	2.0
PSCI 5909 [2.0] M.A. Thesis	
2. 3.0 credits in approved courses	3.0
Total Credits	5.0

M.A. Political Science with Specialization in African Studies (5.0 credits)

Requirements - Coursework option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 0.5 credit from:	0.5
PSCI 5107 [0.5] Globalization, Adjustment and Democracy in Africa	
PSCI 5203 [0.5] Southern Africa After Apartheid	
4. 0.5 credit in course designated as having sufficient African Studies content, approved by both the Graduate Supervisor in Political Science and the Graduate Coordinator of the Institute of African Studies	0.5
5. 3.5 credits in approved courses	3.5
Total Credits	5.0

Requirements - Research Essay option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	

2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 0.5 credit from:	0.5
PSCI 5107 [0.5] Globalization, Adjustment and Democracy in Africa	
PSCI 5203 [0.5] Southern Africa After Apartheid	
4. 0.5 credit in course designated as having sufficient African Studies content, approved by both the Graduate Supervisor in Political Science and the Graduate Coordinator of the Institute of African Studies	0.5
5. 1.0 credit in:	1.0
PSCI 5908 [1.0] M.A. Research Essay	
6. 2.5 credits in approved courses	2.5
Total Credits	5.0

Requirements - Thesis option (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5] African Studies as a Discipline: Historical and Current Perspectives	
2. 0.0 credit in:	0.0
AFRI 5800 [0.0] Scholarly Preparation in African Studies	
3. 0.5 credit from:	0.5
PSCI 5107 [0.5] Globalization, Adjustment and Democracy in Africa	
PSCI 5203 [0.5] Southern Africa After Apartheid	
4. 0.5 credit in course designated as having sufficient African Studies content, approved by both the Graduate Supervisor in Political Science and the Graduate Coordinator of the Institute of African Studies	0.5
5. 2.0 credits in:	2.0
PSCI 5909 [2.0] M.A. Thesis	
6. 1.5 credits in approved courses	1.5
Total Credits	5.0

M.A. Political Science with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Political Science Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.0
4. 2.0 credits in:	2.0
PSCI 5909 [2.0] M.A. Thesis (in the specialization)	
5. 1.5 credits in approved courses	1.5
Total Credits	5.0

Requirements - Research essay pathway (5.0 credits)

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	

2. 0.0 credit in:	0.0
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Political Science Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.0
4. 1.0 credit in:	1.0
PSCI 5908 [1.0] M.A. Research Essay (in the specialization)	
5. 2.5 credits in approved courses	2.5
Total Credits	5.0

Defences

In the case of the student choosing a thesis, the thesis will be evaluated by three people: the student's thesis supervisor from the Department, a second reader from the Department, and an internal third reader who is generally from another Carleton Department but may sometimes come from outside the University. A thesis must be defended orally before the three evaluators. No letter grade is assigned, but notations of Pass with Distinction, Satisfactory, and Unsatisfactory are assigned.

In the case of the student choosing a research essay, that essay will be evaluated by two of the Department's faculty members including the supervisor and a second reader, and a letter grade will be assigned. An oral defence of the essay is not required but may be requested by the supervisor or second reader.

Co-op Option

A co-op option is available to full-time students in the M.A. program. Students are eligible to apply for co-op after passing or receiving advanced standing for five half credits (2.5 credits), and completing one academic term of full-time studies in the Political Science program. Students admitted to this option must satisfactorily complete two work terms in order to graduate with a co-op designation on their transcripts. These work terms are four months in duration and locate students in government departments or other organizations in order to work at a junior officer level. The coordination of the work terms is done by the University's Co-op office. While on a work term, the Co-op Office will register students in PSCI 5913.

Washington Center Internship Program

The Washington Center Internship Program is open to full time master's students who have completed at least two terms of study at Carleton. Admission is open to students with at least a 9.5 GPA in Political Science graduate courses. Successful completion of the program satisfies the requirements for one term of full-time study (1.5 credits). Students spend one term (fall, winter or summer) in Washington, D.C. They serve four days a week as an intern in Washington, D.C. and also take two seminar courses offered by faculty of The Washington Center. The normal 1.5 credit course load for participants in the program is: PSCI 5904 Washington Center Internship, PSCI 5906 Washington Center Seminar II, PSCI 5906 Washington Center Seminar II. Full information on the program and application forms can be obtained from the Department of Political Science.

Course Selection

Within the scope of the regulations, 4000-level undergraduate courses may be taken by M.A. students.

Students are also encouraged to look for graduate courses at Carleton in the Departments of Economics, Geography, History, Law, Philosophy, and Sociology and Anthropology; the Schools of Business, Journalism and Communication, Public Administration, and the Norman Paterson School of International Affairs; and in the Institutes of European and Russian Studies, and Political Economy. Students may also look for courses in the Graduate School of Public Policy and International Affairs and the School of Political Science at the University of Ottawa.

All courses selected will be subject to the approval of the Department, on grounds of appropriateness to the program of study and the avoidance of excessive overlap between courses.

Ph.D. Political Science (5.0 credits)

Details on all program requirements are provided in the departmental Guidelines for Ph.D. Candidates. The student may choose to take a maximum of 0.5 credit outside the Department of Political Science.

Requirements:

1. 2.0 credits in courses at the 6000 level in each of the candidate's two major fields of study. A GPA of 9.0 or higher must be obtained in these courses for students to be allowed to proceed to the comprehensive examinations. **2.0**

2. 1.0 credit in: **1.0**
 PSCI 6900 [0.5] Ph.D. Field Examination I
 PSCI 6905 [0.5] Ph.D. Field Examination II

Field examinations normally take place once per year, in August. At the discretion of the Department, candidates may be required to take an oral examination following the written examination. Full-time students are normally required to complete the comprehensive examinations within 24 months of entering the program.

3. Proficiency in a research skill, as outlined below under Research Skill Requirement

4. 1.0 credit in electives at the graduate level, normally taken during the first or second year of the program, in fields allied to the major topics of the thesis. This credit will normally be fulfilled through regular course work rather than tutorials. A maximum of .5 credits can be fulfilled by tutorials. **1.0**

5. 1.0 credit in: **1.0**
 PSCI 6907 [0.5] Thesis Proposal Workshop I
 PSCI 6908 [0.5] Thesis Proposal Workshop II

6. A public defence of a written dissertation proposal. Full-time students must normally complete the public defence of the proposal, preceded by its formal acceptance by the supervisory committee, in the third year of their doctoral program.

7. 0.0 credits in: **0.0**
 PSCI 6909 [0.0] Ph.D. Thesis

Total Credits **5.0**

Ph.D. Political Science with Specialization in Political Economy (5.0 credits)

Requirements:

1. 2.0 credits in courses at the 6000 level in each of the candidate's two major fields of study **2.0**

2. 1.0 credit in: **1.0**
 PSCI 6900 [0.5] Ph.D. Field Examination I
 PSCI 6905 [0.5] Ph.D. Field Examination II

Field examinations normally take place once per year, in August. At the discretion of the Department, candidates may be required to take an oral examination following the written examination. Full-time students are normally required to complete the comprehensive examinations within 24 months of entering the program.

3. Proficiency in a research skill, as outlined below under Research Skill Requirement

4. 0.5 credit in: **0.5**
 PECO 6000 [0.5] Political Economy: Core Concepts

5. 0.5 credit in: **0.5**
 A relevant political economy course from the approved list

6. 1.0 credit in: **1.0**
 PSCI 6907 [0.5] Thesis Proposal Workshop I
 PSCI 6908 [0.5] Thesis Proposal Workshop II

7. A public defence of a written dissertation proposal. Full-time students must normally complete the public defence of the proposal, preceded by its formal acceptance by the supervisory committee, in the third year of their doctoral program.

8. 0.0 credits in: **0.0**
 PSCI 6909 [0.0] Ph.D. Thesis

Total Credits **5.0**

Research Skill Requirement

Ph.D. candidates must demonstrate the ability to use a research skill appropriate to their program. The research skill requirement will normally be satisfied before the defence of the thesis proposal, and will take one of the following forms:

- An ability to read and translate French or another language appropriate to their course of study; or the ability to speak a language other than English sufficient to conduct interviews in that language. The other language must be one which is incorporated into the final thesis and has the approval and acknowledgement of the supervisor; or
- An approved graduate level social science methods course equivalent to 0.5 credit. This may be any one of the following courses (or an approved alternative):
- PSCI 5700 [0.5] Basic Research Methods
- PSCI 5701 [0.5] Intermediate Polimetrics for Micro Data
- PSCI 5702 [0.5] Intermediate Research Methods for Applied Political Science
- PSCI 5705 [0.5] Approaches to the Study of Political Theory

Regulations

See the General Regulations section of this Calendar.

All master's candidates must obtain a B standing or higher (GPA 8.0). One grade of C+ may be allowed.

Regulations

See the General Regulations section of this Calendar.

Details on all program requirements are provided in the departmental Guidelines for Ph.D. Candidates.

All Ph.D. candidates will fulfill a 10.0-credit program requiring departmental approval. The student may choose to take a maximum of 0.5 credit outside the Department of Political Science.

Admission

The normal requirement for admission to the master's program is B.A.(Honours) (or the equivalent) in Political Science, with at least high honours standing.

The Faculty of Graduate and Postdoctoral Affairs requires applicants whose native language is not English to be tested for proficiency in English. Applicants to the Political Science graduate program must meet the General Regulations requirements.

It is anticipated that candidates will enter having taken some political theory at the undergraduate level. Those who have not will be required to take PSCI 5310 History of Political Thought. This 0.5 credit counts toward the normal MA program requirements of 5.0 credits.

Honours graduates in fields other than political science will be considered on the basis of their academic background and standing, and will be judged on a case-by-case basis. Those with only minor deficiencies may be required to take certain specified courses, while others whose degrees are less closely related to political science may be required to register in the qualifying year, at the discretion of the Department. Graduates of three-year programs in political science will be required either to complete the fourth year of an honours degree and reapply, or register in the qualifying year, depending on work completed to date and academic standing. The qualifying year is intended only for those students (with at least an 8.0 grade point average) whose universities do not offer an Honours degree or for graduates in other fields who did not major in political science. The qualifying year program is not intended to be a method for improving a student's undergraduate record. Admission to the qualifying-year program does not imply automatic admission to the master's program.

Accelerated Pathway

The accelerated pathway in the Department of Political Science is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.A. Honours degree in Political Science with demonstrated academic excellence and aptitude for research may qualify for this option.

Students in their third#year of study in the B.A. Honours degree in Political Science should consult with both the Undergraduate Supervisor and the Graduate Supervisor to determine if the accelerated pathway is appropriate for

them and to discuss the selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. At least 0.5 credit in PSCI courses at the 5000#level with a grade of B+ or higher.
2. Minimum overall CGPA of 10.5.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission

The Ph.D. program in political science normally will be undertaken on a full-time basis. However, in cases of exceptional merit, the Department may accept a few candidates for the degree on a part-time basis.

The normal requirement for admission to the Ph.D. program is a master's degree (or its equivalent) in political science with high honours standing or better.

It is anticipated that Ph.D. candidates will enter having taken some political theory at the undergraduate level, regardless of their desired field of specialization. Those who have not will be required to take PSCI 5310 History of Political Thought. This 0.5 credit counts toward the normal Ph.D. program requirements of 10.0 credits.

The Faculty of Graduate Studies and Postdoctoral Affairs requires applicants whose native language is not English to be tested for proficiency in English. Applicants to the Political Science graduate program must meet the General Regulations requirements.

Upon entry to the program, each Ph.D. candidate will be assigned a faculty member to advise them on their studies. Students' programs, including the choice of supervisor and the thesis committee, must be approved by the Department. The thesis supervisor will normally be chosen from among faculty members in the Department of Political Science. Upon approval of the thesis supervisor and the Department, committee members may be chosen from elsewhere within the University.

Political Science (PSCI) Courses

PSCI 5003 [0.5 credit]

Political Parties in Canada

A seminar on political parties and party systems in Canadian federal politics, including an examination of patterns of historical development, party organization and finance, relationships with social movements, and the impact of Canadian federalism.

PSCI 5006 [0.5 credit]

Legislatures and Representation in Canada

The role of Parliament and of the individual M.P. in terms of policy making, party discipline, and differing conceptions of representation.

Also offered at the undergraduate level, with different requirements, as PSCI 4006, for which additional credit is precluded.

PSCI 5008 [0.5 credit]**The Politics of Climate Change**

The politics and policy of climate change. Development of the climate change issues, international negotiations and agreements, national response strategies, perspectives on social and technological change, and the Canadian policy approach.

PSCI 5009 [0.5 credit]**Canadian Political Economy**

A seminar on political economy as a traditional and contemporary approach to the study of Canadian politics and the Canadian state. Canada's economic development, social relations (including gender and race relations), and position in the international political economy is explored.

PSCI 5010 [0.5 credit]**Executive Power in Canadian Politics**

Consideration of prime ministers, premiers, cabinet ministers and senior public service leadership in Canadian politics and government.

Also listed as PSCI 4010.

PSCI 5100 [0.5 credit]**Indigenous Politics of North America**

Issues of governance regarding the original peoples of Canada, Mexico and the United States before and since the European invasion, including: movement for restoration of cultural, socio-economic, political, land and self-government rights.

Also offered at the undergraduate level, with different requirements, as PSCI 4206, for which additional credit is precluded.

PSCI 5101 [0.5 credit]**Canadian Federalism**

A study of the evolution and contemporary operation of the Canadian federal system, noting particularly the specific social, political, economic, and structural features which underlie its operational performance, its resilience in crisis, and its potential for adaptation.

Also offered at the undergraduate level, with different requirements, as PSCI 4005, for which additional credit is precluded.

PSCI 5103 [0.5 credit]**Canada-EU Relations**

Relations between Canada and Europe in the context of European integration, with attention to policy issues affecting the relationship and/or areas of common policy challenges.

Also listed as EURR 5108.

Prerequisite(s): previous course in European integration or permission of the instructor.

PSCI 5105 [0.5 credit]**Post-Communist Politics in East Central Europe**

A comparative examination of the emergence of post-communist political systems in East Central Europe.

PSCI 5106 [0.5 credit]**The Politics of Post-Soviet Successor States**

A seminar on selected problems of nation-building in Russia, Ukraine, and other Soviet successor states.

PSCI 5107 [0.5 credit]**Globalization, Adjustment and Democracy in Africa**

The nature of global pressures in Africa as states go through a "second wind" of political and economic change. Also offered at the undergraduate level, with different requirements, as PSCI 4207, for which additional credit is precluded.

PSCI 5109 [0.5 credit]**Comparative Public Policy**

A review of approaches to the study of policy, of the impact of political factors on policy, and of the substance of policy choices in such domestic fields as communications, social security, health, industrial and rural development policies in selected countries.

PSCI 5110 [0.5 credit]**Post-Soviet States and Societies**

The relationship between social forces and state structures at both the national and local levels in the USSR and the post-soviet states.

Also listed as EURR 5002.

Also offered at the undergraduate level, with different requirements, as EURR 4002, for which additional credit is precluded.

PSCI 5111 [0.5 credit]**The European Union and its Eastern Neighbours**

The EU's European Neighbourhood Policy and Eastern partnership policy, the Russia-EU "strategic partnership". Policies and reactions of non-EU East European countries toward the EU. The interaction of Member state policies and EU policies. May include attention to historical legacies, cultural factors, public opinion, energy security. Includes: Experiential Learning Activity
Also listed as EURR 5205, INAF 5807.

PSCI 5112 [0.5 credit]**Russian Domestic Politics**

Examination of the evolution of Russian domestic politics and society since the collapse of the Soviet Union. Themes discussed include the transformation of Russia's political system, changes in the behavior of political elites, the evolution of Russia's social structure, and federal-regional relations.
Also listed as EURR 5101.

PSCI 5113 [0.5 credit]**Democracy in the European Union**

Survey of empirical research and normative theorizing about democracy in the EU. Topics include: European Parliament and other channels for democratic input, patterns of citizen participation, impact of European integration on democracy in EU member states, Euroscepticism, theories of EU democracy.
Also listed as EURR 5113.

PSCI 5114 [0.5 credit]**The Politics of Israel/Palestine**

The history and politics of Israel/Palestine. An examination of the interests and identities of Israelis and Palestinians, and the role of external actors and public opinion in shaping regional dynamics.

PSCI 5200 [0.5 credit]**Nationalism**

A seminar on the historical and comparative study of nationalism, with emphasis on its role in the promotion of political change.

Includes: Experiential Learning Activity

PSCI 5201 [0.5 credit]**Politics in Plural Societies**

A seminar on politics in multicultural societies and multi-national states, including settler and post-colonial societies. Topics may include: conflict relating to race, religion, language, regionalism, intra-state nationalism, multicultural policies and theories of pluralism.

PSCI 5202 [0.5 credit]**Development Theory and Issues**

A seminar on historical and current debates in development theory, including the origins, nature, and critiques of development processes in the Global South.

PSCI 5203 [0.5 credit]**Southern Africa After Apartheid**

An exploration of the pathology of apartheid, the reasons for its end, and prospects for democratization and development in southern Africa in the era of globalization. Also offered at the undergraduate level, with different requirements, as PSCI 4203, for which additional credit is precluded.

PSCI 5204 [0.5 credit]**Elections**

The conduct and meaning of elections in contemporary states. Attention to the connection of elections to concepts of representation, policy mandates, and political parties, and to electoral systems and referenda.

Also offered at the undergraduate level, with different requirements, as PSCI 4204, for which additional credit is precluded.

PSCI 5207 [0.5 credit]**International Political Sociology**

A seminar exploring classical and contemporary social and political thought in relation to international, transnational, and global practices and institutions. Topics may include borders, capitalism, citizenship, civil society, constitutionalization, empire, governance, power, public spheres, risk, security, sovereignty, and world society.

PSCI 5208 [0.5 credit]**Global Social Policy**

The seminar explores global initiatives in poverty reduction, inequality, development assistance and internationalization of the provision of social services. The seminar considers theoretical, institutional and policy implications of debates about global justice, policy transfer and global government of social policies.

PSCI 5209 [0.5 credit]**Forced Migration and Global Politics**

Critical examination of the relationship between different aspects of forced migration and debates within global politics. Topics may include borders, global governance, political agency, sovereignty, security, globalization, gender and public policy.

Includes: Experiential Learning Activity

PSCI 5210 [0.5 credit]**Politics and Popular Culture**

A critical examination of the increasingly important intersections of politics and popular culture. Theoretical approaches such as structuralism, semiotics, political economy, feminism, and postmodernism explore such core themes as political power, dissent, globalization, (post)colonialism, gender, race, class, and sexuality in various media.

PSCI 5211 [0.5 credit]**Migration, Globalization and Governance**

Critical examination of the politics of mobility in a globalizing context. Seminar topics may include migration regimes, securitization of migration, temporary and permanent migration streams and patterns of inclusion and exclusion.

PSCI 5212 [0.5 credit]**Advanced International Relations Theory**

Close reading and analysis of theoretical research in the academic discipline of International Relations; may include analysis of methodology, normative and critical theory, and key theoretical concepts such as anarchy, sovereignty, power, inequality, coloniality, security, gender.

PSCI 5302 [0.5 credit]**Democratic Theories**

Analysis of various theories of democracy and community, from classical to modern.

PSCI 5303 [0.5 credit]**Governmentality and Politics**

Examination of Foucault's concept of governmentality and work which has developed this idea, especially the relevance of governmentality for global political studies. Topics may include: sovereignty, biopolitics, technopolitics, neoliberalism and citizenship.

Also listed as SOCI 5407.

Also offered at the undergraduate level, with different requirements, as PSCI 4303, for which additional credit is precluded.

PSCI 5305 [0.5 credit]**Political Thought in the Modern Muslim Middle East**

Contemporary political thought in the Muslim Middle East. Secular and religious responses to the challenges of modernity. Readings may include writings of Arab, Turkish, and Iranian intellectuals.

Also offered at the undergraduate level, with different requirements, as PSCI 4302, for which additional credit is precluded.

PSCI 5308 [0.5 credit]**Concepts of Political Community I**

A critical survey of concepts of political community, including the common good, justice, citizenship, statesmanship, democracy, and legitimacy, from ancient, modern, and contemporary political theory.

Also offered at the undergraduate level, with different requirements, as PSCI 4318, for which additional credit is precluded.

PSCI 5309 [0.5 credit]**Concepts of Political Community II**

A continued critical survey of concepts of political community, including the common good, justice, citizenship, statesmanship, democracy, and legitimacy, from ancient, modern, and contemporary political theory. Prerequisite(s): PSCI 5308 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PSCI 4319, for which additional credit is precluded.

PSCI 5310 [0.5 credit]**History of Political Thought**

Western political thought from classical times to the nineteenth century: may include the study of Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Marx and other thinkers.

PSCI 5405 [0.5 credit]**Public Administration in Developing Countries**

A seminar on the literature and characteristics of development administration; comparison by region, country, and topic.

PSCI 5407 [0.5 credit]**Reproductive Rights Policy in North America**

The interaction between social movements, legislatures and courts in formulating reproductive rights policy in Canada, the U.S. and Mexico.

Also offered at the undergraduate level, with different requirements, as PSCI 4403, for which additional credit is precluded.

PSCI 5410 [0.5 credit]**Postcolonial Theories and Practices**

This seminar familiarizes students with different approaches to postcolonial theory, discussing issues like the decolonization of knowledge and development and examining colonial practices of states and responses by indigenous movements.

PSCI 5501 [0.5 credit]**Selected Issues in Political Economy I**

A research seminar exploring a selected topic of current research having a political economy perspective, such as power and stratification; dynamics of state action; contrasting views on administration as an instrument of political economy; culture, ideology, and social relations; and the labour process.

Also listed as PECO 5501, SOCI 5404.

PSCI 5502 [0.5 credit]**Selected Issues in Political Economy II**

A research seminar exploring a selected topic of current research having a political economy perspective, such as power and stratification; dynamics of state action; contrasting views on administration as an instrument of political economy; culture, ideology, and social relations; and the labour process.

Also listed as PECO 5502, SOCI 5505.

PSCI 5503 [0.5 credit]**Topics in European Politics**

A research seminar dealing with a central theme of current research in European politics.

Precludes additional credit for PSCI 5500.

PSCI 5506 [0.5 credit]**Gender and Politics**

Selected gender dimensions of politics in a comparative perspective. Topics may include: gendered nature of authority, gender regimes and state forms, feminist accounts of citizenship, representation, power and democracy, women's movements and anti-feminist movements, identity politics, gendered accounts of nationalism and multiculturalism.

PSCI 5509 [0.5 credit]**Governing in the Global Economy**

The course examines how national states respond to challenges of governing in an increasingly interdependent global economy. The course will be comparative in its focus, emphasizing advanced industrial societies primarily in western Europe and Canada.

PSCI 5601 [0.5 credit]**Analysis of Canadian Foreign Policy**

A research seminar on contemporary Canadian external policies, with emphasis on the analysis of cases and issues, and comparisons with other national actors.

Includes: Experiential Learning Activity

PSCI 5602 [0.5 credit]**Ethics in International Relations**

Historical and contemporary approaches to normative theory and ethics in international relations, including Kantian, Hegelian, Marxist, postmodern and feminist ethics. Issues may include poverty and justice, human rights and humanitarian intervention.

PSCI 5607 [0.5 credit]**Politics of North America**

Continentalism in Canadian foreign policy during the twentieth century, charting regional, economic, political, and defence relations in North America.

Precludes additional credit for PSCI 4607 if taken before 2006-07.

PSCI 5608 [0.5 credit]**European Integration and European Security**

A seminar focusing on issues related to the formation of supra-national decision-making structures in Europe.

Includes: Experiential Learning Activity

Also listed as EURR 4104/5104.

Also offered at the undergraduate level, with different requirements, as PSCI 4608, for which additional credit is precluded.

PSCI 5609 [0.5 credit]**Selected Topics in European Integration Studies**

A seminar focusing on selected topics related to European integration in the post-World War II period.

Also listed as EURR 5106.

PSCI 5700 [0.5 credit]**Basic Research Methods**

A course in applied research design and methodology, with emphasis on empirical research strategies that are amenable to quantification. Master's students who have not completed PSCI 2700 (or its equivalent) with high honours or better standing may be required to take this course.

PSCI 5701 [0.5 credit]**Intermediate Polimetrics for Micro Data**

Intermediate research designs and statistical techniques primarily used in analyzing survey data. Selected topics may vary from year to year. Students intending to do research based on micro data are advised to take this course.

Prerequisite(s): PSCI 5700 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PSCI 4701, for which additional credit is precluded.

PSCI 5702 [0.5 credit]**Intermediate Research Methods for Applied Political Science**

Applied methods for policy, politics and public affairs. Primarily quantitative but may have qualitative elements. Prerequisite(s): PSCI 5700 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PSCI 4702, for which additional credit is precluded.

PSCI 5704 [0.5 credit]**The Discipline of Political Science**

This course familiarizes students with the discipline of Political Science. Students will gain an understanding of the field's evolution as a precursor to understanding its contemporary configuration, including major debates, main points of contention, and epistemological and methodological divides.

PSCI 5705 [0.5 credit]**Approaches to the Study of Political Theory**

This course explores different methodological approaches to the study of texts in political theory. It examines the essential methodological considerations that are involved in designing and conducting a study in political theory.

PSCI 5802 [0.5 credit]**Political Economy of Global Money and Finance**

An exploration of the organization of the global monetary and financial system. Issues covered include the relationship between global finance and the state, the politics of world money, and the problems associated with regulating internationally-active financial institutions.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as PSCI 4805, for which additional credit is precluded.

PSCI 5803 [0.5 credit]**Transatlantic Security Issues**

NATO as a political and military alliance. NATO and 21st-century threats. Security roles for the European Union. Broader transatlantic security issues.

Precludes additional credit for PSCI 4806 if taken before 2006-07.

PSCI 5805 [0.5 credit]**Foreign Policy Analysis**

A research seminar dealing with selected problems in the study of foreign policy formulations and outcomes.

PSCI 5806 [0.5 credit]**Strategic Thought and Issues in International Security**

A research seminar on the evolution of classical and contemporary strategic thought, and on current issues in international security.

PSCI 5807 [0.5 credit]**Analysis of International Organizations**

A research seminar on process and change in contemporary forms of international organization.

PSCI 5808 [0.5 credit]**International Political Economy**

A seminar on the changing international division of labour, and its consequences for world politics. Topics include differing patterns of industrialization, colonial relations, the role of the state, and current issues in international political economy.

Includes: Experiential Learning Activity

Prerequisite(s): Work at a senior undergraduate level in at least two of the following: international relations, development studies, international trade, or political economy; or permission of the Department.

PSCI 5810 [0.5 credit]**Approaches to Environmental Politics**

Theoretical and methodological approaches to research in the field of environmental politics, including but not limited to public policy research. A variety of institutionalist, political economy, political ecology, and post-modern approaches will be examined.

PSCI 5900 [1.0 credit]**Tutorial in a Selected Field**

Tutorials or reading courses on selected topics may be arranged with the permission of the Department. Students cannot accumulate more than 1.0 credit in tutorials towards their degree requirements.

PSCI 5901 [0.5 credit]**Tutorial in a Selected Field**

Tutorials or reading courses on selected topics may be arranged with the permission of the Department. Students cannot accumulate more than 1.0 credit in tutorials towards their degree requirements.

PSCI 5904 [0.5 credit]**Washington Center Internship**

A one-term internship in the NAFTA Leaders Program of The Washington Center, offered in Washington D.C.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PSCI 5905 [0.5 credit]**Washington Center Seminar I**

A seminar offered by The Washington Center.

Prerequisite(s): permission of the Department.

PSCI 5906 [0.5 credit]**Washington Center Seminar II**

A seminar offered by The Washington Center.

Prerequisite(s): permission of the Department.

PSCI 5908 [1.0 credit]**M.A. Research Essay**

Tutorial for students who write a research essay rather than a thesis.

Includes: Experiential Learning Activity

PSCI 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

PSCI 5913 [0.0 credit]**Co-operative Work Term**

Students may register in the co-op option according to the guidelines listed under Co-op Option in the Calendar of Graduate Studies.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PSCI 5915 [0.5 credit]**Special Topics in Political Science**

A seminar on a selected topic in political science, to be determined by faculty, research, and teaching interests.

PSCI 6000 [0.5 credit]**The Political Process in Canada I**

An analytical study of the democratic political process, with particular reference to political parties and elections, pressure groups, and political leadership in Canada.

PSCI 6001 [0.5 credit]**The Political Process in Canada II**

An analytical study of the democratic political process, with particular reference to political parties and elections, pressure groups, and political leadership in Canada.

PSCI 6105 [0.5 credit]**Comparative Politics I**

A research seminar dealing with theories, methods, and problems of comparison.

PSCI 6106 [0.5 credit]**Comparative Politics II**

A research seminar dealing with particular themes.

PSCI 6200 [0.5 credit]**Theorizing Gender and Diversity**

This course will provide students with the theoretical and methodological approaches necessary to study gender and diversity in the context of politics. The course will include feminist political theories, critical race theory, postcolonial theory, theories from sexuality studies and political economy.

PSCI 6201 [0.5 credit]**Gender and Diversity: Comparative and International Politics**

Topics may include: representation and electoral politics; reproductive rights; social policy and welfare regimes; governance, resistance and transition; citizenship and migration; health and environment; security and violence (including sexual violence), and analysis of reproductive, informal and formal labour.

PSCI 6300 [0.5 credit]**Political Theory I**

An intensive examination of the major questions in classical, medieval, modern, and contemporary political philosophy. This course is historically comprehensive in scope and thematically oriented in depth.

PSCI 6301 [0.5 credit]**Political Theory II**

An intensive examination of the major questions in classical, medieval, modern, and contemporary political philosophy. This course is historically comprehensive in scope and thematically oriented in depth.

PSCI 6407 [0.5 credit]**Public Policy: Theory and Analysis**

Introduction to major theoretical approaches in the study and analysis of public policy and to current topics and debates in the field.

PSCI 6408 [0.5 credit]**Public Affairs Management and Analysis**

A seminar on theories and practice in the management of public affairs, including the environment and administration of the public sector, public opinion, and public communications.

PSCI 6600 [0.5 credit]**Theory and Research in International Politics I**

An examination of the principal problems in contemporary international relations theory and research, emphasizing the state of the field and current directions in it.

PSCI 6601 [0.5 credit]**Theory and Research in International Politics II**

An examination of the principal problems in contemporary international relations theory and research, emphasizing the state of the field and current directions in it.

PSCI 6900 [0.5 credit]**Ph.D. Field Examination I**

Ph.D. preparation for the major field examination I. The grade to be awarded will be that obtained on the field examination.

PSCI 6905 [0.5 credit]**Ph.D. Field Examination II**

Ph.D. preparation for the major field examination II. The grade to be awarded will be that obtained on the field examination.

PSCI 6907 [0.5 credit]**Thesis Proposal Workshop I**

A survey of research methods and approaches to research design designed to assist in the preparation of thesis proposals. Coordinated by one instructor, but faculty from other fields will also participate. The grade for this course will be Satisfactory or Unsatisfactory.

Prerequisite(s): permission of the Department.

PSCI 6908 [0.5 credit]**Thesis Proposal Workshop II**

Student-led workshop focused on the preparation, presentation, and discussion of drafts of students' thesis proposals. The final assignment for the course will be the presentation of a full written draft of the thesis proposal. Graded Satisfactory or Unsatisfactory.

Includes: Experiential Learning Activity

Prerequisite(s): successful completion of comprehensive examinations or permission of the Department.

PSCI 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Psychology

This section presents the requirements for programs in:

- M.A. Psychology
- M.A. Psychology with Concentration in Mental Health and Well-Being
- M.A. Psychology with Specialization in Data Science
- Ph.D. Psychology
- Ph.D. Psychology with Concentration in Quantitative Methodology

Program Requirements**M.A. Psychology (5.0 credits)****Requirements:**

1. 1.0 credit in:		1.0
PSYC 5410 [0.5]	Advanced Analysis of Variance	
PSYC 5411 [0.5]	Advanced Regression	
2. Completion of:		0.0
PSYC 5906 [0.0]	Pro-Seminar in Psychology	
3. 1.0 credit in PSYC at the 5000 level, excluding the professional development courses listed in Item 4 and excluding the elective statistics courses listed below.		1.0
4. 0.5 credit from the following professional development courses:		0.5
PSYC 5002 [0.5]	Ethics in Psychology	
PSYC 5003 [0.5]	Open Science and Methodological Improvements	
PSYC 5004 [0.5]	Knowledge Translation	
PSYC 5802 [0.5]	Special Topics: Professional Development	
PSYC 5903 [0.5]	Practicum in Psychology	
5. 2.5 credits in:		2.5
PSYC 5909 [2.5]	M.A. Thesis (which must be defended at an oral examination)	

Total Credits **5.0**

Note: courses for each research area are listed on the departmental website: carleton.ca/psychology.

M.A. Psychology with Concentration in Mental Health and Well-Being (5.0 credits)

Requirements:

1. 1.0 credit in:		1.0
PSYC 5410 [0.5]	Advanced Analysis of Variance	

PSYC 5411 [0.5]	Advanced Regression	0.5
2. 0.5 credit in:		
PSYC 5209 [0.5]	Topics in Health Psychology or other health-oriented course approved by the Graduate Supervisor	
3. 0.5 credit from:		
PSYC 5107 [0.5]	Psychology of Family Violence	
PSYC 5208 [0.5]	Advances in Positive Psychology	
PSYC 5804 [0.5]	Special Topics in Health Psychology	
PSYC 5900 [0.5]	Directed Studies	
PSYC 5901 [0.5]	Independent Research	
4. 0.5 credit in:		
PSYC 5904 [0.5]	Community Mental Health and Well-Being Practicum	
5. Completion of:		0.0
PSYC 5906 [0.0]	Pro-Seminar in Psychology	
6. 2.5 credits in:		
PSYC 5909 [2.5]	M.A. Thesis (which must be defended at an oral examination)	2.5
Total Credits		5.0

Notes:

- Students must receive a minimum grade of A- in PSYC 5410, PSYC 5411, and PSYC 5209 or its approved replacement in order to complete the concentration.

M.A. Psychology with Specialization in Data Science (5.0 credits)

Requirements:

1. 1.0 credit in:		1.0
PSYC 5410 [0.5]	Advanced Analysis of Variance	
PSYC 5411 [0.5]	Advanced Regression	
2. 0.5 credit in:		0.5
DATA 5000 [0.5]	Data Science Seminar	
3. 0.5 credit in	PSYC at the 5000 level, excluding the professional development courses listed in Item 4 and excluding the elective statistics courses listed below.	0.5
4. 0.5 credit from	the following professional development courses:	0.5
PSYC 5002 [0.5]	Ethics in Psychology	
PSYC 5003 [0.5]	Open Science and Methodological Improvements	
PSYC 5004 [0.5]	Knowledge Translation	
PSYC 5802 [0.5]	Special Topics: Professional Development	
PSYC 5903 [0.5]	Practicum in Psychology	
5. Completion of:		0.0
PSYC 5906 [0.0]	Pro-Seminar in Psychology	
6. 2.5 credits in:		2.5
PSYC 5909 [2.5]	M.A. Thesis (in the area of Data Science, which must be defended at an oral examination)	
Total Credits		5.0

Notes:

- Students must receive a minimum grade of A in each of the courses included in the Specialization.

- Courses for each research area are listed on the departmental website: carleton.ca/psychology.

Ph.D. Psychology (3.0 credits)

Requirements:

1. 1.0 credit in:		1.0
PSYC 5410 [0.5]	Advanced Analysis of Variance	
PSYC 5411 [0.5]	Advanced Regression	
2. 0.5 credit in	Elective Statistics courses (listed below) or other, as approved by the graduate committee.	0.5
3. 1.0 credit in	graduate level PSYC courses, excluding the professional development courses listed in Item 4 and excluding the elective statistics courses listed below.	1.0
4. 0.5 credit from	the following professional development courses:	0.5
PSYC 5002 [0.5]	Ethics in Psychology	
PSYC 5003 [0.5]	Open Science and Methodological Improvements	
PSYC 5004 [0.5]	Knowledge Translation	
PSYC 5802 [0.5]	Special Topics: Professional Development	
PSYC 6104 [0.5]	Seminar in University Teaching	
PSYC 6114 [0.5]	Teaching Practicum	
PSYC 6903 [0.5]	Practicum in Psychology	
5. Completion of:		
PSYC 6906 [0.0]	Pro-Seminar in Psychology I	
PSYC 6907 [0.0]	Pro-Seminar in Psychology II	
6. 0.0 credits in:		0.0
PSYC 6909 [0.0]	Ph.D. Thesis (equivalent to 7.0 of the required 10.0 credits which must be defended at an oral examination)	

- All Ph.D. candidates are required to submit a thesis prospectus. The prospectus examination will normally be successfully completed within seven calendar terms of the student's initial registration for full-time students and ten terms for part-time students

Total Credits **3.0**

Note: courses for each research area are listed at the departmental website: carleton.ca/psychology.

Ph.D. Psychology with Concentration in Quantitative Methodology (3.0 credits)

Requirements:

1. 1.0 credit in:		1.0
PSYC 5410 [0.5]	Advanced Analysis of Variance	
PSYC 5411 [0.5]	Advanced Regression	
2. 1.0 credit in	Elective Statistics courses (listed below) or other as approved by the graduate committee	1.0
3. 0.5 credit in:		0.5
PSYC 6410 [0.5]	Capstone Research Project in Quantitative Methods	
4. 0.5 credit from	the following professional development courses:	0.5
PSYC 5002 [0.5]	Ethics in Psychology	
PSYC 5003 [0.5]	Open Science and Methodological Improvements	
PSYC 5004 [0.5]	Knowledge Translation	

PSYC 5802 [0.5]	Special Topics: Professional Development	
PSYC 6104 [0.5]	Seminar in University Teaching	
PSYC 6114 [0.5]	Teaching Practicum	
PSYC 6903 [0.5]	Practicum in Psychology	
5. Completion of:		
PSYC 6906 [0.0]	Pro-Seminar in Psychology I	
PSYC 6907 [0.0]	Pro-Seminar in Psychology II	
6. 0.0 credits in:		0.0
PSYC 6909 [0.0]	Ph.D. Thesis	

All Ph.D. candidates are required to submit a thesis prospectus. The prospectus examination will normally be successfully completed within seven calendar terms of the student's initial registration for full-time students and ten terms for part-time students.

Total Credits **3.0**

Notes:

1. Students must receive a minimum grade of A in each of the courses included in the Concentration.
2. Registration in PSYC 6410 will occur after the other 2.0 credits have been completed and after a proposed research project has been approved by the Department.
3. Upon completion of the Concentration's requirements, the student will request an in-program change from a PhD in Psychology to a PhD in Psychology with a Concentration in Quantitative Methodology.
4. Courses for each research area are listed on the departmental website: carleton.ca/psychology.

Psychology Elective Statistics Courses

PSYC 5401 [0.5]	Multivariate Techniques
PSYC 5407 [0.5]	Scale Development and Psychometrics
PSYC 5412 [0.5]	Topics in Advanced Statistics and Methods
PSYC 5413 [0.25]	Workshops in Advanced Statistics and Methods
PSYC 5414 [0.5]	Structural Equation Modeling
PSYC 5415 [0.5]	Multilevel Modeling
PSYC 5416 [0.5]	Advanced Survey Methods
PSYC 5417 [0.5]	Categorical Data Analysis
PSYC 5801 [0.5]	Special Topics: Statistics

Regulations

See the General Regulations section of this Calendar.

Regulations

See the General Regulations section of this Calendar.

The minimum program requirements for the Ph.D. degree in Psychology include 10.0 credits with a grade of B- or higher in each course

Admission Requirements

The normal requirement for admission into the master's programs is a B.A. Honours Psychology (or equivalent) with high honours standing, completion of a research thesis, and credit in a breadth of courses in line with the psychology major.

Candidates with particular course deficiencies may be required to register in additional courses at Carleton.

Qualifying Year

Occasionally, candidates with exceptional promise who offer less than Honours B.A. status may be admitted to a qualifying-year program approved by the graduate studies committee and designed to prepare them for master's study. A grade of B- or better must be obtained in each qualifying-year course, and candidates may be required to complete satisfactorily the equivalent of a B.A. (Honours) thesis.

Admission

The requirements for admission to the Ph.D. program are outlined in the General Regulations section of this Calendar. Scores on the Graduate Record Examination are optional.

The Ph.D. program in psychology normally will be undertaken on a full-time basis; however, in cases of exceptional merit, the Department will accept a few candidates for the degree on a part-time basis.

Psychology (PSYC) Courses

PSYC 5001 [0.5 credit]

Qualitative Research Methods in Psychology

Introduction to various non-numerical, interpretive research methods. Attention will be devoted to the philosophical underpinnings of qualitative research, methods collecting and analyzing qualitative data, and issues regarding sampling, reliability, and validity. Includes: Experiential Learning Activity

PSYC 5002 [0.5 credit]

Ethics in Psychology

Ethical concepts and controversies related to research and practice in psychology. Topics may include ethical dilemmas and debates, professional codes of ethics, confidentiality, informed consent, legal rights and responsibilities, use of deception, or guidelines for research with special populations.

PSYC 5003 [0.5 credit]

Open Science and Methodological Improvements

Exploring recent debates around reproducibility and openness in psychology. Practical objectives involving the improvement of research practices, publication strategies, and evaluation of past findings. Topics may include basic issues in measurement, statistical inference, ethics, and philosophy of science.

PSYC 5004 [0.5 credit]

Knowledge Translation

Knowledge translation encompasses a wide variety of activities designed to support the flow of knowledge from creators (e.g., researchers) to users (e.g., policy makers) and back. This course explores theory and practice concerning the creation, synthesis, sharing, and uptake of knowledge, and communication skills.

PSYC 5011 [0.5 credit]**Topics in Social Psychology**

A critical examination of scientific theory and research in social psychology. Topics may include social cognition, social influence, group processes, conflict resolution and social change.

PSYC 5012 [0.5 credit]**Topics in Organizational Psychology**

A critical examination of scientific theory and research in organizational psychology. Topics may include personnel selection, work motivation, morale and productivity, organizational decision making, leadership and social action.

PSYC 5015 [0.5 credit]**Methods in Social and Personality Psychology**

An overview of traditional and emerging research methods in social and personality psychology. Students will learn a variety of experimental and nonexperimental procedures for assessing individual differences, cognitions, emotions, attitudes, and behaviours in the laboratory and the field.

PSYC 5020 [0.5 credit]**Applications of Psychology to Policing and the Courts**

A review of theory and research related to the application of psychology to various components of the criminal justice system, particularly policing and the courts. Topics may include criminal investigations, police use of force, eyewitness testimony and identification, victim rights, and jury decision making.

Includes: Experiential Learning Activity

PSYC 5021 [0.5 credit]**Forensic Assessment**

Theoretical and empirical issues of the biopsychosocial antecedents of criminal behaviour. Classification and assessment of offenders for courts, probation and parole services. Risk assessment, management and service planning are addressed in both correctional and mental health contexts.

Includes: Experiential Learning Activity

PSYC 5022 [0.5 credit]**Adult Offenders**

Theoretical and empirical issues on the use of different types of interventions in modifying adult criminal behaviour. Institutional treatment and community-based approaches are discussed.

PSYC 5024 [0.5 credit]**Juvenile Delinquency**

An examination of the development of delinquency with a focus on etiology, risk factors, assessment, prediction, and developmental trajectories. Individual, group, and family institutional and community treatment approaches are examined.

PSYC 5025 [0.5 credit]**Topics in Forensic Psychology: Theory and Research**

In-depth examination of theories and research in forensic psychology. Police stress, eyewitness memory, and risk assessment; theories and research that inform the assessment, treatment, and management of offenders.

PSYC 5026 [0.5 credit]**Topics in Forensic Psychology: Methodology**

Overview of research methods in forensic psychology. Topics may include research ethics, the use of archival records, observational and interview techniques, questionnaire development, reaction time studies, longitudinal designs, and the analysis of physiological data.

PSYC 5104 [0.5 credit]**Psychology of Women**

This seminar will consider and evaluate research concerning the psychology of women, including research methods, gender roles and gender differences.

PSYC 5107 [0.5 credit]**Psychology of Family Violence**

Biopsychosocial antecedents and consequences of the abuse and neglect of children, partners and elders within the family. The efficacy of preventive and treatment strategies is also assessed, as are current controversies and research methods in the area.

PSYC 5208 [0.5 credit]**Advances in Positive Psychology**

Overview and critical analysis of current theory and research in positive psychology; application of principles in organizations, schools, and the community. Topics may include positive youth development, perspectives on psychological wellness and growth, positive emotions, resilience, and mindfulness.

PSYC 5209 [0.5 credit]**Topics in Health Psychology**

A critical examination of scientific theory and research in health psychology. Topics may include the biopsychological model of illness, stress and coping, psychoneuroimmunology, personality, and stress management.

PSYC 5300 [0.5 credit]**Perceptual Processes**

Theoretical and empirical issues of the area of perception. Topics may include: psychophysics, constancies, depth perception, pattern recognition, iconic memory, attention, hemispheric specialization.

PSYC 5301 [0.5 credit]**Psychophysics**

A study of classic and contemporary psychophysical methods. Applications to cognition will be included.

PSYC 5401 [0.5 credit]**Multivariate Techniques**

Applications of multivariate statistical techniques with psychological data including multivariate analysis of variance, canonical correlation, discriminant function analysis, and factor analysis. Extensive use is made of statistical software.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411.

PSYC 5407 [0.5 credit]**Scale Development and Psychometrics**

This course will typically be designed to provide an in-depth understanding of the process of psychological scale development with respect to both the classical (i.e., reliability, validity) and the more modern (item response theory) psychometric approaches.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5411.

PSYC 5410 [0.5 credit]**Advanced Analysis of Variance**

Concepts and applications of advanced analysis of variance designs, including factorial, within groups, and hierarchical designs, and analysis of covariance. Extensive use is made of statistical software.

Includes: Experiential Learning Activity

PSYC 5411 [0.5 credit]**Advanced Regression**

Concepts and applications of advanced regression analyses, including multiple regression, hierarchical and polynomial techniques. Extensive use is made of statistical software.

Includes: Experiential Learning Activity

PSYC 5412 [0.5 credit]**Topics in Advanced Statistics and Methods**

Selected topics in advanced statistics and research methods relevant to broad areas of psychology, varying from year to year. Topics may include broad analytic approaches, such as, program evaluation, qualitative methods, nonparametric statistics, among others.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5413 [0.25 credit]**Workshops in Advanced Statistics and Methods**

Intensive focus on specific statistical or methodological approaches relevant to psychological research such as advanced factor analysis, meta-analysis, observational methods.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5414 [0.5 credit]**Structural Equation Modeling**

An in depth examination of structural equation modeling (SEM) techniques. SEM involves the integration of path analysis and factor analysis. Basic issues such as model fitting and identification will be covered as well as more applied issues surrounding mediation and moderation testing in SEM.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5415 [0.5 credit]**Multilevel Modeling**

An in depth examination of multilevel modeling (MLM). Students will develop the skills required to interpret and conduct multi-level data analysis, including longitudinal and nested designs, using hierarchical linear modeling software. The primary focus will be on two- level and three-level hierarchies.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5416 [0.5 credit]**Advanced Survey Methods**

Analysis of data from complex sample designs, including the development of selection and non-response weights, methods for handling and imputing missing data, the effects of stratification and clustering on estimation, and methods of variance estimation for complex sample designs.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5417 [0.5 credit]**Categorical Data Analysis**

This course will provide students with an in-depth understanding of several statistical techniques that can be used to analyze categorical data. Topics include contingency tables, log-linear analysis, logistic regression analysis with categorical predictors, continuous predictors, and interaction terms, and receiver operator characteristic (ROC) analysis.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5500 [0.5 credit]**Topics in Developmental Psychology: Methodology**

A critical examination of methodology in developmental psychology. Topics may include observational and interview techniques, use of archival data, longitudinal designs, questionnaire development, and basic assessment methods. A research project will be required.

Includes: Experiential Learning Activity

PSYC 5503 [0.5 credit]**Advanced Topics in Developmental Psychology: Social and Emotional Development**

Recent developments in developmental psychology theory and research related to the study of social and emotional development. Topics may include child temperament, parenting and the family, peer relationships, self-system, and developmental psychopathology.

PSYC 5504 [0.5 credit]**Advanced Topics in Developmental Psychology: Cognitive Development**

Recent developments in developmental psychology theory and research related to the study of cognitive development. Topics may include: language, literacy, numeracy, and theory of mind.

PSYC 5505 [0.5 credit]**Topics in Developmental Psychology: Theory and Research**

Critical examination of scientific theory and research in developmental psychology. Special attention will be given to the mechanisms that account for change. Although most theories speak to the developmental of children, students will also have the opportunity to investigate theories of ageing.

PSYC 5601 [0.5 credit]**Topics in Personality Psychology**

Current debates in personality research, with contemporary theoretical and research papers in personality. Topics may include the structure of personality and its evolutionary, experiential, biological, social, and cultural processes.

PSYC 5700 [0.5 credit]**Advanced Topics in Cognition I**

An in-depth study of a specific topic in the area of basic cognitive processes. Topics will vary from year to year and may include judgmental processes, object identification, selective attention and spatial cognition.

PSYC 5703 [0.5 credit]**Topics in Cognitive Psychology**

A critical examination of scientific theory and research in cognitive psychology. Topics may include detection and processing of sensory signals, pattern recognition, attention, mental imagery and automaticity.

PSYC 5800 [0.5 credit]**Special Topics in Psychology**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5801 [0.5 credit]**Special Topics: Statistics**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5802 [0.5 credit]**Special Topics: Professional Development**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5804 [0.5 credit]**Special Topics in Health Psychology**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5900 [0.5 credit]**Directed Studies**

In-depth investigation of selected problems in psychology by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade. Includes: Experiential Learning Activity

PSYC 5901 [0.5 credit]**Independent Research**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

Includes: Experiential Learning Activity

PSYC 5903 [0.5 credit]**Practicum in Psychology**

The practicum offers master's level students the opportunity to gain experience in a range of applied psychology settings with the goal of integrating academic and practical aspects of psychology. This course cannot be repeated for credit. Students will receive a grade of satisfactory or unsatisfactory.

Includes: Experiential Learning Activity

PSYC 5904 [0.5 credit]**Community Mental Health and Well-Being Practicum**
Graded Sat/Uns.

Prerequisite(s): PSYC 5410 and PSYC 5411 with a grade of A- or higher and PSYC 5209 or other health-oriented course approved by the graduate supervisor, with a grade of A- or higher; and approval of the graduate supervisor.

PSYC 5906 [0.0 credit]**Pro-Seminar in Psychology**

The pro-seminar is based on the departmental invited colloquia series. This course provides breadth in terms of exposure to research. Colloquia are offered from September to April.

PSYC 5909 [2.5 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

PSYC 6101 [0.5 credit]**Advanced Topics in Social Psychology**

A higher-level critical examination of scientific theory and research in social psychology. Topics are taken from recent publications and debates in the discipline.

PSYC 6102 [0.5 credit]**Advanced Topics in Organizational Psychology**

A higher-level critical examination of scientific theory and research in organizational psychology. Topics are taken from recent publications and debates in the discipline.

PSYC 6104 [0.5 credit]**Seminar in University Teaching**

Theoretical and empirical work related to teaching in higher education. Analysis of instructional discourse, use of language in classroom decision-making, bases of effective practice and methods of instruction.

Constructivist principles of teaching and learning. Role of teaching in university scholarship.

Also offered at the undergraduate level, with different requirements, as ALDS 5204., for which additional credit is precluded.

PSYC 6114 [0.5 credit]**Teaching Practicum**

The purpose of this course is to provide doctoral students who have an interest in developing their teaching skills with the opportunity for mentored practice within the discipline of psychology. Graded SAT/UNS.

Includes: Experiential Learning Activity

PSYC 6410 [0.5 credit]**Capstone Research Project in Quantitative Methods**

Conduct an independent quantitative data analysis project that demonstrates a student's mastery of advanced quantitative techniques. This project may involve practical experience with an organization or agency when the principal activity extends the student's knowledge of quantitative techniques.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PSYC 6700 [0.5 credit]**Advanced Topics in Cognition II**

An in-depth study of a specific topic in higher-level cognitive processes. Topics will vary from year to year and may include mathematical knowledge and processes, problem solving, or models of reading.

PSYC 6704 [0.5 credit]**Advanced Topics in Cognitive Psychology**

A higher-level critical examination of scientific theory and research in cognitive psychology. Topics are taken from recent publications and debates in the discipline.

Precludes additional credit for PSYC 5704 (no longer offered).

PSYC 6800 [0.5 credit]**Special Topics in Psychology**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 6900 [0.5 credit]**Directed Studies**

In-depth investigation of selected problems in psychology by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade.

Includes: Experiential Learning Activity

PSYC 6901 [0.5 credit]**Independent Research**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

Includes: Experiential Learning Activity

PSYC 6903 [0.5 credit]**Practicum in Psychology**

The practicum offers Ph.D. students the opportunity to gain experience in a range of applied psychology settings with the goal of integrating academic and practical aspects of psychology. This course cannot be repeated for credit. Students will receive a grade of satisfactory or unsatisfactory.

Includes: Experiential Learning Activity

PSYC 6906 [0.0 credit]**Pro-Seminar in Psychology I**

The pro-seminar is based on the departmental invited colloquia series. This course provides breadth in terms of exposure to research. Colloquia are offered from September to April.

Includes: Experiential Learning Activity

PSYC 6907 [0.0 credit]**Pro-Seminar in Psychology II**

The pro-seminar is based on the departmental invited colloquia series. This course provides breadth in terms of exposure to research. Colloquia are offered from September to April.

Includes: Experiential Learning Activity

PSYC 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Public Policy and Administration

This section presents the requirements for programs in:

- Master of Public Policy and Administration
- Master of Public Policy and Administration with Concentration in Indigenous Policy and Administration
- Master of Public Policy and Administration with Specialization in Data Science
- Ph.D. Public Policy
- Ph.D. Public Policy with Specialization in Political Economy
- Graduate Diploma in Indigenous Policy and Administration

- Graduate Diploma in Public Policy and Program Evaluation

Program Requirements

Master of Public Policy and Administration (7.0 credits)

Requirements - Standard Admission (7.0 credits)

1. 5.0 credits in core courses:	5.0
PADM 5120 [0.5] Modern Challenges to Governance	
PADM 5121 [0.5] Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5] Public Management: Principles and Approaches	
PADM 5123 [0.5] Public Management in Practice	
PADM 5124 [0.5] Law and Ethics	
PADM 5125 [0.5] Qualitative Methods for Public Policy	
PADM 5126 [0.5] Quantitative Methods for Public Policy	
PADM 5127 [0.5] Microeconomics for Policy Analysis	
PADM 5128 [0.5] Macroeconomics for Policy Analysis	
PADM 5129 [0.5] Capstone Course	
2. 2.0 credits in approved elective courses, listed below	2.0
Total Credits	7.0

Master of Public Policy and Administration (Advanced Completion Option - 5.0 credits)

Requirements - Advanced Completion Option (5.0 credits)(See Note, below)

1. 3.0 credits in core courses from:	3.0
PADM 5120 [0.5] Modern Challenges to Governance	
PADM 5121 [0.5] Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5] Public Management: Principles and Approaches	
PADM 5123 [0.5] Public Management in Practice	
PADM 5124 [0.5] Law and Ethics	
PADM 5125 [0.5] Qualitative Methods for Public Policy	
PADM 5126 [0.5] Quantitative Methods for Public Policy	
PADM 5127 [0.5] Microeconomics for Policy Analysis	
PADM 5128 [0.5] Macroeconomics for Policy Analysis	
PADM 5129 [0.5] Capstone Course	
2. 2.0 credits in approved elective courses, listed below	2.0
Note:	
Additional credits may be required, as specified on offer of admission.	
Total Credits	5.0

Full-time students normally focus on the core courses during their first two semesters of study, and complete the core in the fall of second year. Part-time students normally complete the core courses before proceeding to the remainder of the program. Students are encouraged to focus their approved electives within particular clusters of courses (See School website for details).

While there is no formal second language requirement, students planning careers in or with governments in Canada are strongly encouraged to develop facility with French.

Co-operative Education

A co-operative education option is available to full-time students in the M.P.P.A. program. Students admitted to this option must satisfactorily complete two work terms in order to graduate with a co-op designation on their transcripts and diplomas. These work terms are four months in duration and locate students in government departments or other organizations in order to work at a junior officer level. They provide students with opportunities to integrate the theoretical and practical aspects of public administration. During a work term, students will register in PADM 5913, which does not count towards the program requirements. While on a work term, students are limited to an additional 0.5 credit course. It should be noted that most co-op positions in the federal public service are restricted to Canadian citizens.

Approved Elective Courses

PADM 5000-level courses	
PADM 6000-level courses (with approval of the M.P.P.A. Supervisor)	
PADM 5908 [1.0]	Research Essay
PADM 5909 [2.0]	M.P.P.A. Thesis
Graduate level courses from other disciplines at Carleton University (with approval of the M.P.P.A. Supervisor)	
Graduate-level courses from other universities (with approval of the M.P.P.A. Supervisor)	

Master of Public Policy and Administration with Concentration in Indigenous Policy and Administration (7.0 credits)

To complete the M.P.P.A. program with a concentration in Indigenous Policy and Administration, students should notify the M.P.P.A. Supervisor when registering for their first year.

Requirements (7.0 credits):

1. 5.0 credits in core courses:	5.0
PADM 5120 [0.5] Modern Challenges to Governance	
PADM 5121 [0.5] Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5] Public Management: Principles and Approaches	
PADM 5123 [0.5] Public Management in Practice	
PADM 5124 [0.5] Law and Ethics	
PADM 5126 [0.5] Quantitative Methods for Public Policy	
PADM 5127 [0.5] Microeconomics for Policy Analysis	
PADM 5128 [0.5] Macroeconomics for Policy Analysis	
PADM 5129 [0.5] Capstone Course	
PADM 5224 [0.5] Indigenous Policy	
2. 0.5 credits from:	0.5
PADM 5125 [0.5] Qualitative Methods for Public Policy	

PADM 5715 [0.5]	Policy Research and Evaluation for Indigenous Policy and Administration	
3. 1.5 credits from:		1.5
PADM 5712 [0.5]	Issues in Contemporary Governance: First Nations, Métis and Inuit	
PADM 5713 [0.5]	Leadership and Management in Indigenous Organizations and Governments	
PADM 5714 [0.5]	Financial Management in First Nations, Métis and Inuit Governments and Organizations	
PADM 5716 [0.5]	Economic and Community Development in Indigenous Territories	
PADM 5717 [0.5]	Indigenous Peoples and Canadian Law	
PADM 5718 [0.5]	Indigenous Peoples and Urban Policy and Administration	
PADM 5719 [0.5]	Indigenous Health and Social Policy	
PADM 5772 [0.5]	Policy Seminar (Indigenous Policy and Administration)	
PADM 5703 [0.5]	Directed Studies (Indigenous Public Administration)	
PADM 5908 [1.0]	Research Essay	
Note: Students are required to complete PADM 5224 before registering in any of the other electives for the IPA concentration in Item 3.		
Total Credits		7.0

Master of Public Policy and Administration with Concentration in Indigenous Policy and Administration (Advanced Completion, 5.0 credits)

Requirements: (See Notes below):

1. 3.5 credits in core courses:		3.5
PADM 5120 [0.5]	Modern Challenges to Governance	
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5]	Public Management: Principles and Approaches	
PADM 5123 [0.5]	Public Management in Practice	
PADM 5124 [0.5]	Law and Ethics	
PADM 5125 [0.5]	Qualitative Methods for Public Policy	
PADM 5126 [0.5]	Quantitative Methods for Public Policy	
PADM 5127 [0.5]	Microeconomics for Policy Analysis	
PADM 5128 [0.5]	Macroeconomics for Policy Analysis	
PADM 5129 [0.5]	Capstone Course	
PADM 5224 [0.5]	Indigenous Policy	
PADM 5715 [0.5]	Policy Research and Evaluation for Indigenous Policy and Administration	
2. 1.5 credits from:		1.5
PADM 5711 [0.5]	Indigenous-Canada Relations: Governance and Policy History	

PADM 5712 [0.5]	Issues in Contemporary Governance: First Nations, Métis and Inuit	
PADM 5713 [0.5]	Leadership and Management in Indigenous Organizations and Governments	
PADM 5714 [0.5]	Financial Management in First Nations, Métis and Inuit Governments and Organizations	
PADM 5716 [0.5]	Economic and Community Development in Indigenous Territories	
PADM 5717 [0.5]	Indigenous Peoples and Canadian Law	
PADM 5718 [0.5]	Indigenous Peoples and Urban Policy and Administration	
PADM 5719 [0.5]	Indigenous Health and Social Policy	
PADM 5772 [0.5]	Policy Seminar (Indigenous Policy and Administration)	
PADM 5703 [0.5]	Directed Studies (Indigenous Public Administration)	
PADM 5908 [1.0]	Research Essay	
Note: additional credits may be required, as specified on offer of admission.		
Note: Students are required to complete PADM 5224 before registering in any of the other electives for the IPA concentration in Item 2.		
Total Credits		5.0

Master of Public Policy and Administration with Specialization in Data Science (7.0 credits)

Requirements - Course work pathway:

1. 4.5 credits in core courses:		4.5
PADM 5120 [0.5]	Modern Challenges to Governance	
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5]	Public Management: Principles and Approaches	
PADM 5123 [0.5]	Public Management in Practice	
PADM 5124 [0.5]	Law and Ethics	
PADM 5125 [0.5]	Qualitative Methods for Public Policy	
PADM 5127 [0.5]	Microeconomics for Policy Analysis	
PADM 5128 [0.5]	Macroeconomics for Policy Analysis	
PADM 5129 [0.5]	Capstone Course	
2. 1.5 credits in data science core courses:		1.5
DATA 5000 [0.5]	Data Science Seminar	
PADM 5126 [0.5]	Quantitative Methods for Public Policy	
PADM 5218 [0.5]	Analysis of Socio-economic Data	
3. 0.5 credit from data science electives:		0.5
COMP 5111 [0.5]	Data Management for Business Intelligence	
COMP 5209 [0.5]	Visual Analytics	
COMP 5305 [0.5]	Advanced Database Systems	
COMP 5306 [0.5]	Data Integration	
PADM 5219 [0.5]	Advanced Statistical Policy Analysis	

PADM 5372 [0.5]	Policy Seminar (Data Science Specialization)	
PADM 5391 [0.5]	Directed Studies (Data Science Specialization)	
4. 0.5 credit in approved elective		0.5
Total Credits		7.0
Requirements - Research essay pathway:		
1. 4.5 credits in core courses:		4.5
PADM 5120 [0.5]	Modern Challenges to Governance	
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5]	Public Management: Principles and Approaches	
PADM 5123 [0.5]	Public Management in Practice	
PADM 5124 [0.5]	Law and Ethics	
PADM 5125 [0.5]	Qualitative Methods for Public Policy	
PADM 5127 [0.5]	Microeconomics for Policy Analysis	
PADM 5128 [0.5]	Macroeconomics for Policy Analysis	
PADM 5129 [0.5]	Capstone Course	
2. 1.5 credits in data science core courses:		1.5
DATA 5000 [0.5]	Data Science Seminar	
PADM 5126 [0.5]	Quantitative Methods for Public Policy	
PADM 5218 [0.5]	Analysis of Socio-economic Data	
3. 1.0 credit in:		1.0
PADM 5908 [1.0]	Research Essay (on a Data Science topic approved by the MPPA Graduate Supervisor and the Data Science governance committee)	
Total Credits		7.0

Master of Public Policy and Administration with Specialization in Data Science (Advanced completion, 5.0 credits)

Requirements - Course work pathway (Advanced completion, 5.0 credits - see Note, below):

1. 3.0 credits from core courses:		3.0
PADM 5120 [0.5]	Modern Challenges to Governance	
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5]	Public Management: Principles and Approaches	
PADM 5123 [0.5]	Public Management in Practice	
PADM 5124 [0.5]	Law and Ethics	
PADM 5125 [0.5]	Qualitative Methods for Public Policy	
PADM 5127 [0.5]	Microeconomics for Policy Analysis	
PADM 5128 [0.5]	Macroeconomics for Policy Analysis	
PADM 5129 [0.5]	Capstone Course	
2. 1.0 credit from data science core courses:		1.0
DATA 5000 [0.5]	Data Science Seminar	
PADM 5126 [0.5]	Quantitative Methods for Public Policy	
PADM 5218 [0.5]	Analysis of Socio-economic Data	
3. 0.5 credit from data science electives:		0.5

COMP 5111 [0.5]	Data Management for Business Intelligence	
COMP 5209 [0.5]	Visual Analytics	
COMP 5305 [0.5]	Advanced Database Systems	
COMP 5306 [0.5]	Data Integration	
PADM 5219 [0.5]	Advanced Statistical Policy Analysis	
PADM 5372 [0.5]	Policy Seminar (Data Science Specialization)	
PADM 5391 [0.5]	Directed Studies (Data Science Specialization)	
4. 0.5 credit in approved elective		0.5
Note: additional credits may be required, as specified on offer of admission.		
Total Credits		5.0

Requirements - Research essay pathway (Advanced completion, 5.0 credits - See Note, below):

1. 3.0 credits from core courses:		3.0
PADM 5120 [0.5]	Modern Challenges to Governance	
PADM 5121 [0.5]	Policy Analysis: The Practical Art of Change	
PADM 5122 [0.5]	Public Management: Principles and Approaches	
PADM 5123 [0.5]	Public Management in Practice	
PADM 5124 [0.5]	Law and Ethics	
PADM 5125 [0.5]	Qualitative Methods for Public Policy	
PADM 5127 [0.5]	Microeconomics for Policy Analysis	
PADM 5128 [0.5]	Macroeconomics for Policy Analysis	
PADM 5129 [0.5]	Capstone Course	
2. 1.0 credit from data science core courses:		1.0
DATA 5000 [0.5]	Data Science Seminar	
PADM 5126 [0.5]	Quantitative Methods for Public Policy	
PADM 5218 [0.5]	Analysis of Socio-economic Data	
3. 1.0 credit in:		1.0
PADM 5908 [1.0]	Research Essay (on a Data Science topic approved by the MPPA Graduate Supervisor and the Data Science governance committee)	
Note: additional credits may be required, as specified on offer of admission		
Total Credits		5.0

Ph.D. Public Policy (4.5 credits)

Requirements:

1. 2.0 credits in:		2.0
PADM 6010 [0.5]	Current Issues in Public Policy	
PADM 6011 [0.5]	Theoretical Foundations of Public Policy	
PADM 6012 [0.5]	Policy Process and Institutions	
PADM 6013 [0.5]	Research Design for Public Policy	
2. 0.5 credit in research methods, such as PADM 5218 or another research methods course at the 5000 or 6000 level. (See Note 1, below.)		0.5
3. 1.0 credit in an area of specialization. (See Note 1, below.)		1.0
4. 0.5 credit in:		0.5

PADM 6900 [0.5]	Ph.D. Comprehensive Examination (See Note 2, below.)	
5. 0.5 credit in:		0.5
PADM 6201 [0.5]	Doctoral Research Seminar (See Note 3, below.)	
6. Public defence of a written thesis proposal		
7. 0.0 credits in:		0.0
PADM 6909 [0.0]	Ph.D. Thesis (See Note 4, below.)	
8. Language requirement (See Note 5, below.)		
Total Credits		4.5

Ph.D. Public Policy with Specialization in Political Economy (4.5 credits)

Requirements:

1. 2.0 credits in:		2.0
PADM 6010 [0.5]	Current Issues in Public Policy	
PADM 6011 [0.5]	Theoretical Foundations of Public Policy	
PADM 6012 [0.5]	Policy Process and Institutions	
PADM 6013 [0.5]	Research Design for Public Policy	
2. 0.5 credit in research methods, such as PADM 5218 or another research methods course at the 5000 or 6000 level (See Note 1, below)		0.5
3. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
4. 0.5 credit in:		0.5
A relevant political economy course from the approved list.		
5. 0.5 credit in:		0.5
PADM 6900 [0.5]	Ph.D. Comprehensive Examination (See Note 2, below)	
6. 0.5 credit in:		0.5
PADM 6201 [0.5]	Doctoral Research Seminar (See Note 3, below)	
7. Public defence of a written thesis proposal		
8. 0.0 credits in:		0.0
PADM 6909 [0.0]	Ph.D. Thesis	
9. Language requirement (See Note 5, below)		
Total Credits		4.5

Notes

- Course components:** The four required courses PADM 6010 Current Issues in Public Policy, PADM 6011 Theoretical Foundations of Public Policy, PADM 6012 Policy Process and Institutions, and PADM 6013 Research Design for Public Policy will normally be taken in the first year of full-time study. The research methods course and specialization courses must be chosen by the student after consultation with, and approval by, the student's thesis supervisor and the Ph.D. Program Supervisor. Graduate courses offered by the School or by other university departments may be approved. When necessary, students must arrange formal permission from the relevant department for admission to courses.
- Comprehensive Examination:** Students will write a Comprehensive Examination, normally in the summer term of the first year, after they have successfully completed each of the four required courses PADM 6010 Current Issues in Public Policy,

PADM 6011 Theoretical Foundations of Public Policy, PADM 6012 Policy Process and Institutions, and PADM 6013 Research Design for Public Policy with a grade of B- or higher, and with an overall GPA of 9.0 (B+) or higher. The examination will focus on the material presented in the required courses. At the discretion of the examining board, a candidate whose performance is not satisfactory may be asked to take a second written examination.

- Doctoral Research Seminar:** Full-time students will normally register in PADM 6201 Doctoral Research Seminar over two terms in their second year of study. As part of the seminar, a research project will be prepared under the direction of the thesis supervisor and be preliminary to and supportive of the Ph.D. Thesis. Possible formats – to be approved by the supervisor – include a comprehensive and critical literature survey, or a self-contained study applying the principles of research design and research methods to an area of inquiry related to the specialization courses.
- Thesis:** Following the successful completion of the Comprehensive Examination, students will prepare a formal thesis proposal under a thesis advisory committee. The thesis supervisor will normally be a faculty member from the School of Public Policy and Administration. The proposal will normally be submitted by the end of the summer term of the second year of full-time registration and defended early in the fall term of the third year. The thesis must demonstrate an advanced ability to integrate multiple disciplines into the analysis of public policy. The thesis must be defended at an oral examination.
- Language Requirement:** Students will be required to demonstrate a reading knowledge of French. Another language may be substituted for French, if it is relevant to the thesis.

Graduate Diploma in Indigenous Policy and Administration (3.0 credits)

Requirements:

Students must complete:

1. 2.5 credits in:		2.5
PADM 5711 [0.5]	Indigenous-Canada Relations: Governance and Policy History	
PADM 5712 [0.5]	Issues in Contemporary Governance: First Nations, Métis and Inuit	
PADM 5713 [0.5]	Leadership and Management in Indigenous Organizations and Governments	
PADM 5714 [0.5]	Financial Management in First Nations, Métis and Inuit Governments and Organizations	
PADM 5715 [0.5]	Policy Research and Evaluation for Indigenous Policy and Administration	
2. 0.5 credit in elective, selected from other PADM courses or those offered by another unit, as approved by the I.P.A. Supervisor.		0.5
Total Credits		3.0

Graduate Diploma in Public Policy and Program Evaluation (3.0 credits)

The Diploma in Public Policy and Program Evaluation is designed to be completed in sixteen months, while working full-time. The program is divided into two parts: four applied courses; and a two-course practicum.

Students must be registered in the Diploma and have completed the four applied courses before registering in PADM 5445 and PADM 5446.

Graduate Diploma in Public Policy and Program Evaluation (3.0 credits)

1. 2.0 credits in required courses		2.0
PADM 5441 [0.5]	Introduction to Policy and Program Evaluation	
PADM 5442 [0.5]	Quantitative Research Methods in Evaluation	
PADM 5443 [0.5]	Qualitative Research Methods in Evaluation	
PADM 5444 [0.5]	Benefit-Cost Analysis for Program Evaluation	
2. 1.0 credit in electives approved by the DPE Supervisor		1.0
PADM 5445 [0.5]	Program Evaluation Planning and Designs	
PADM 5446 [0.5]	Program Evaluation Conduct, Analysis and Reporting	
Total Credits		3.0

Admission

Applicants must have an undergraduate or post-graduate degree (or equivalent), with an average of B+ or higher. The level of academic performance and potential demonstrated within the degree is more important than the discipline. Indeed, students enter the program from a wide variety of backgrounds in the social sciences, humanities, sciences and engineering.

The School also considers mid-career applicants who do not satisfy this grade average requirement, but who have demonstrated professional excellence over at least five years. Such applicants may use their high achievement in several designated university courses as evidence of their academic potential. These university courses are determined on an individual basis in consultation with the M.P.P.A. Supervisor. Contact the School for details.

All applicants must have completed a 0.5 credit university course covering microeconomic theory (ECON 1001 or equivalent) and a 0.5 credit university course in macroeconomic theory (ECON 1002 or equivalent) with an average grade over the two theory courses of B+ or higher. Applicants must also complete, with a grade of B+ or higher, a 0.5 credit university political science course at the second-year level or higher, dealing with institutions and processes by which governments legitimize and exercise power, ideally in a Canadian setting (PSCI 2003 or equivalent). A working knowledge of algebra is also expected.

In some cases, applicants may be admitted to the program despite not having completed one of these prerequisite courses in economics or political science, on the condition

that the course be extra to the degree requirements and be completed (with a grade of B+ or higher) in the first year of the program. Nevertheless it is strongly recommended that students complete the prerequisites before starting the program, to ensure that their progress through the core courses is unimpeded.

All applicants whose first language is not English must demonstrate proficiency in the English language. (See Section 3.6 of the General Regulations section of this Calendar for details.)

Applicants to the Master of Public Policy and Administration may be considered for admission to an Advanced Completion Option of the Master of Public Policy and Administration based on their demonstrated academic excellence in university courses deemed equivalent to the core courses of the program. This option will be determined on an individual basis in consultation with the M.P.P.A. Supervisor and the Faculty of Graduate and Postdoctoral Affairs and pursuant to Section 6.1 of the General Regulations section of this Calendar. Admission to the Master of Public Policy and Administration Advanced Completion Option may require courses in addition to the 5.0 credit program requirements.

Master of Public Policy and Administration Accelerated Pathway

The accelerated pathway in the Master of Public Policy and Administration is a flexible and individualized plan of graduate study. Students in their final year of the Bachelor of Public Affairs and Policy Management who have demonstrated academic excellence and an aptitude for research may qualify. Students in their third year of study in the Bachelor of Public Affairs and Policy Management should consult with both their undergraduate supervisor and the M.P.P.A. Supervisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses in their final year of undergraduate study.

Accelerated Pathway Requirements

1. PADM 5000-level courses with a grade of B+ or higher;
2. Minimum overall CGPA of 10.4 in the Bachelor of Public Affairs and Policy Management.

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Admission

Admission will be judged primarily on the applicant's ability to conduct advanced research and to complete the program successfully. Applications should contain at least one essay or paper at the M.A. level written by the applicant, as well as a statement of research interests and potential thesis topics.

Admission requires completion of an M.A. degree in any of public administration, political science, economics, political economy, business administration, law, or similar degree with first class standing (A- average or higher in their M.A. work).

A working knowledge of basic calculus is required for completion of the program. Assistance in acquiring these skills is provided by the program. Students requiring additional assistance should consult the Ph.D. Supervisor.

Applicants must also successfully complete prerequisites in statistics, political science, and economics as described in detail below. These prerequisites may be satisfied by the completion of appropriate course work at the intermediate undergraduate level or higher in each of the subjects listed.

Prerequisites in political science, economics and statistics must be completed prior to entry. Completed courses in political science should be approximately equivalent to PADM 5120 or PADM 5121. With permission of the Ph.D. Supervisor, this requirement may be done, as a directed study in the summer, prior to registration in the program, under the supervision of faculty in the School. Completed courses in economics should be approximately equivalent to PADM 5127. Equivalent courses may be taken at most universities throughout the academic year. Completed course in statistics should be approximately equivalent to PADM 5126. Applicants should seek advice from the Supervisor of the Ph.D. program about whether particular courses are acceptable as prerequisites.

All applicants whose first language is not English must demonstrate proficiency in the English language. (See Section 3.6 of the General Regulations section of this Calendar for details.)

Advanced standing will not normally be granted for any of the required courses described below. If granted, advanced standing will be limited to 1.0 credit.

Regulations

See the General Regulations section of this Calendar.

All candidates are required to obtain a grade of B- or higher in each course in the program.

The Diplomas are designed to be completed in two years while working full-time, although students may take the program on either a part-time or full-time basis.

The Graduate Diploma (Type 2) in Indigenous Policy and Administration may be taken concurrently with another graduate degree at Carleton University.

Regulations

See the General Regulations section of this Calendar.

A grade of B- or higher must normally be obtained in each course credited towards the M.P.P.A. A candidate may, with the recommendation of the M.P.P.A. Supervisor and the approval of the Dean of the Faculty of Graduate and Postdoctoral Affairs, be allowed a grade of C+ in courses totaling 1.0 credit.

Regulations

See the General Regulations section of this Calendar.

Public Administration (PADM) Courses

PADM 5120 [0.5 credit]

Modern Challenges to Governance

Modern challenges to states, citizens, and policy-making, explored with the help of contemporary and historical thinkers. Topics may include: inequality; national security and intelligence gathering; identity; globalization and global finance; trade agreements and property rights; climate change and environmental challenges.

Precludes additional credit for PADM 5115 (no longer offered).

PADM 5121 [0.5 credit]

Policy Analysis: The Practical Art of Change

Contemporary techniques of policy analysis. Topics may include: risk assessment, policy design, options analysis, and scenario-writing.

Precludes additional credit for PADM 5116 (no longer offered).

PADM 5122 [0.5 credit]

Public Management: Principles and Approaches

Principles and processes of public-sector management as they function through cabinet-parliamentary government, federalism, the public service and the judiciary. Institutional reforms and changes in the philosophy of public sector management.

Precludes additional credit for PADM 5117 (no longer offered).

PADM 5123 [0.5 credit]

Public Management in Practice

Contemporary public management practices. Topics may include: financial management, leadership, performance management, organizational design, human resource management, implementation.

PADM 5124 [0.5 credit]

Law and Ethics

The legal and normative environment of Canadian public administration, law, institutions and processes. The relationship between ethics, accountability and good governance. Canadian legal history, adjudicative procedures, delegation of powers to public authorities, procedural justice in decision making.

Precludes additional credit for PADM 5412 and PADM 5413.

PADM 5125 [0.5 credit]

Qualitative Methods for Public Policy

Qualitative methods and dimensions of policy research. Topics may include the formulation of research problems, research design and techniques for collecting and managing evidence, and the role of qualitative research in the analysis of public policies and programs.

Precludes additional credit for PADM 5715, PADM 5113 (no longer offered).

PADM 5126 [0.5 credit]**Quantitative Methods for Public Policy**

Descriptive statistics, probability theory and sampling distributions, hypothesis testing of quantitative and qualitative population parameters, and regression analysis.

Precludes additional credit for PADM 5114 (no longer offered).

PADM 5127 [0.5 credit]**Microeconomics for Policy Analysis**

Key concepts in microeconomic theory and their application to public policy. Topics may include incentives, rational choice theory, market structure, welfare economics, and strategic behaviour.

Precludes additional credit for PADM 5111 (no longer offered).

Prerequisite(s): ECON 1001 or equivalent.

PADM 5128 [0.5 credit]**Macroeconomics for Policy Analysis**

Theoretical foundations and current policy issues that relate to the level and growth of expenditure and production are analyzed in the Canadian and international context.

Precludes additional credit for PADM 5112 (no longer offered).

Prerequisite(s): ECON 1002 or equivalent.

PADM 5129 [0.5 credit]**Capstone Course**

An integrative workshop-based course in which teams of students develop and present strategies to address a policy problem.

Includes: Experiential Learning Activity

PADM 5211 [0.5 credit]**Intergovernmental Relations**

Major cost-sharing and fiscal transfer agreements.

The intergovernmental mechanisms for policy and administrative coordination in selected policy fields.

Precludes additional credit for PADM 5003 (no longer offered).

PADM 5212 [0.5 credit]**Civil Society and Public Policy**

The influence of various interests, social movements, voluntary organizations and citizens in the policy process in a Canadian and comparative context.

PADM 5213 [0.5 credit]**Gender and Public Policy**

The impact of public policy on gender relations and how gender relations shape policy. Topics covered may include gender inequalities in earnings and employment, macroeconomic policy, gender and development, and gender-based analysis.

Precludes additional credit for PADM 4701 and PADM 5701 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4213, for which additional credit is precluded.

PADM 5214 [0.5 credit]**Budgetary Policy in the Public Sector**

Selected aspects of the expenditure and revenue budget and budgetary process at all levels of government. Critical review of actual budgets and budgetary processes.

Precludes additional credit for PADM 5103 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4214, for which additional credit is precluded.

PADM 5215 [0.5 credit]**Benefit-Cost Analysis**

Benefit-cost analysis and its application to public-sector investment, pricing policy, discount rates, marginal cost and shadow pricing, and the handling of risk and uncertainty.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5216 [0.5 credit]**Economic Models of Politics and Public Policy**

Microfoundations of collective action, majority rule, political institutions and bureaucracy. Applications to various issues in Canadian and international public policy.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5217 [0.5 credit]**Applied Microeconomic Policy Analysis**

Microeconomic theory applied to public policy problems and issues.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5218 [0.5 credit]**Analysis of Socio-economic Data**

Correlation and regression analyses to test hypotheses about the relationships between socio-economic variables.

Prerequisite(s): PADM 5126 or equivalent.

PADM 5219 [0.5 credit]**Advanced Statistical Policy Analysis**

Econometric research on selected policy issues using selected econometric techniques.

Prerequisite(s): PADM 5218 or equivalent.

PADM 5220 [0.5 credit]**Regulation and Public Policy**

Political, economic, legal, and organizational theories of regulation in the Canadian and comparative context. Processes and consequences of regulatory practice in selected Canadian public policy fields.

Also offered at the undergraduate level, with different requirements, as PADM 4220, for which additional credit is precluded.

PADM 5221 [0.5 credit]**Health Policy in Canada**

Canadian health policies and programs set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4221, for which additional credit is precluded.

PADM 5222 [0.5 credit]**Economics and Health Policy**

This course applies microeconomic theory to a discussion of health policy. Focus on issues of particular interest to a student of Canadian health care policy.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5223 [0.5 credit]**Canadian Economic Policy**

Overview of Canadian economic development and how it has been affected by governments. Topics may be drawn from monetary, fiscal, industrial, trade, labour market or competition policies, viewed in contemporary and historical contexts.

Prerequisite(s): PADM 5128 or equivalent.

PADM 5224 [0.5 credit]**Indigenous Policy**

Canadian policies and programs on Indigenous peoples and Indigenous peoples' own policies as nations set in a comparative political-economic and institutional context. Precludes additional credit for PADM 5711, PADM 4806 (no longer offered) and PADM 5806 (no longer offered). Also offered at the undergraduate level, with different requirements, as PADM 4224, for which additional credit is precluded.

PADM 5225 [0.5 credit]**Trade Policy**

Canadian multilateral and regional trade policies and programs set in a comparative political-economic and institutional context.

Prerequisite(s): PADM 5127 or equivalent.

Also offered at the undergraduate level, with different requirements, as PADM 4225, for which additional credit is precluded.

PADM 5226 [0.5 credit]**Tax Policy**

Canadian tax policies set in a comparative political-economic and institutional context.

Prerequisite(s): PADM 5127 or equivalent.

Also offered at the undergraduate level, with different requirements, as PADM 4226, for which additional credit is precluded.

PADM 5227 [0.5 credit]**Education Policy**

Canadian policies and programs on education set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4227, for which additional credit is precluded.

PADM 5228 [0.5 credit]**Social Policy**

The nature and historical development of social programs in capitalist countries, with particular focus on Canada.

The course will concentrate on developing a critical understanding of the social forces shaping these programs.

Also offered at the undergraduate level, with different requirements, as PADM 4228, for which additional credit is precluded.

PADM 5229 [0.5 credit]**The Health of Populations**

Assessment of the medical model, and perspectives on the social and economic determinants of health, population health, and community health. The health of particular groups in Canada (e.g., women, Aboriginal peoples). International comparisons will be made.

PADM 5230 [0.5 credit]**Ethics for Public Policy**

The development and application of ethical theories to examine not simply what governments could do, but what they should do on the basis of consequences, principles, or motivations. Applications could include policies affecting climate change, income inequality, end of life, privacy, use of force.

Also offered at the undergraduate level, with different requirements, as PADM 4230, for which additional credit is precluded.

PADM 5291 [0.5 credit]**Directed Studies**

A tutorial or directed reading course on selected subjects related to policy analysis.

PADM 5372 [0.5 credit]**Policy Seminar (Data Science Specialization)**

One or more selected policy areas and topics related to policy and administration in the data science context. Topics will change each year.

PADM 5391 [0.5 credit]**Directed Studies (Data Science Specialization)**

A tutorial of directed reading on selected subjects related to data science.

PADM 5411 [0.5 credit]**Organization Theory**

Focusing on major theoretical approaches to organizations, the course develops practical insights into issues such as organizational design, leadership, technology, culture and diversity, motivation and power. It applies these insights to organizations in both the public and private sectors in a variety of national contexts.

PADM 5414 [0.5 credit]**Law of Public Authorities II**

Characteristics and selected problems of control of administrative action. Topics may include: varieties of constitutional, legal and judicial control, impact of the Charter, reforms to administrative law control systems in Canada, and comparisons with developments outside Canada.

Prerequisite(s): PADM 5124 or equivalent.

PADM 5415 [0.5 credit]**Strategic Management in the Public Sector**

Key concepts, principles and tools of strategic management, and their use in planning and policy implementation in the public sector. Reviews critical perspectives and cases in order to identify some of the limitations of strategic management.

Includes: Experiential Learning Activity

PADM 5416 [0.5 credit]**Budgetary Management for the Public Sector**

Theory and practice of budgeting in the public sector. From a management perspective, the course focuses on the objectives, methods and systems for the control and reporting of expenditures.

PADM 5417 [0.5 credit]**Principles of Finance**

The use of financial assets to obtain funds, evaluative criteria to compare alternative uses of funds, and derivative contracts to manage risk. Public sector applications of these practices are emphasized.

PADM 5418 [0.5 credit]**Human Resources Management**

The field of human resources management including the roles of human resource departments, employee motivation, staffing, compensation, benefits, training and development and employee relations.

PADM 5419 [0.5 credit]**Industrial Relations and Public Sector Collective Bargaining**

The basic concepts of industrial relations, with respect to both public and private sector employees and organizations.

PADM 5420 [0.5 credit]**Policy and Program Evaluation**

Selected concepts, issues, and processes in applied governmental planning and evaluation, utilizing both Canadian and comparative experiences.

PADM 5421 [0.5 credit]**Globalizing Public Management**

Public sector reform has swept the developed and developing world in the last two decades. The dynamics of this global movement, the models exported and adopted, and the success and failure of these exports.

PADM 5422 [0.5 credit]**Urban and Local Government**

The role of municipal government in the context of Canadian federalism. Current economic, political and social trends affecting Canada's major urban centres including growth, amalgamation, fiscal reform, immigration, housing, community engagement, and sustainable development.

PADM 5423 [0.5 credit]**Third Sector Governance and Management**

Governance and management of voluntary/nonprofit organizations and their role in democracy, public policy, and service delivery.

PADM 5424 [0.5 credit]**Evaluation Cases and Applications**

Selected case studies and emerging theories and issues in the development, design, management and implementation of policy and program evaluation.

Includes: Experiential Learning Activity

Prerequisite(s): PADM 5420.

PADM 5441 [0.5 credit]**Introduction to Policy and Program Evaluation**

Survey of evaluation in Canada and internationally. Topics include: Canadian context for public sector evaluation practice; approaches to research in evaluation; essentials of effective evaluation design, including logic modeling, theories of change/action, and contribution/attribution constructs.

PADM 5442 [0.5 credit]**Quantitative Research Methods in Evaluation**

Descriptive and inferential statistics, probability theory and sampling distributions, hypothesis testing of quantitative and qualitative population parameters, and regression analysis as these apply to the field of program evaluation.

PADM 5443 [0.5 credit]**Qualitative Research Methods in Evaluation**

Methods used in qualitative evaluation research. Topics include: formulating evaluation research questions; deriving research designs from questions; qualitative data gathering techniques and approaches; managing evidence, ethics reviews, and analysis of qualitative data.

PADM 5444 [0.5 credit]**Benefit-Cost Analysis for Program Evaluation**

Approaches to benefit-cost analysis in the Canadian evaluation context. Topics include: the role of benefit-cost analysis within program evaluation; its application to public sector investments, pricing and other forms of policy valuation; discount rates, marginal cost, and shadow pricing; risk and uncertainty.

PADM 5445 [0.5 credit]**Program Evaluation Planning and Designs**

Application of specific evaluation research designs to actual projects. Topics include: designs for formative, summative and developmental programs; designs for policy evaluation; attribution and contribution analysis; applied logic modeling; and managing evaluation projects at the planning stages.

Includes: Experiential Learning Activity

Prerequisite(s): PADM 5441, PADM 5442, PADM 5443, PADM 5444.

PADM 5446 [0.5 credit]**Program Evaluation Conduct, Analysis and Reporting**

Application of evaluation conduct to actual projects. Topics include: selecting data analysis methods specific to a project; forming evaluation findings and recommendations; data visualization; reporting techniques; and management of evaluation projects at the conduct stages.

Includes: Experiential Learning Activity

PADM 5510 [0.5 credit]**Energy Economics**

Micro- and macroeconomic concepts and techniques applied to such topics as international energy markets, energy production, and energy consumption.

PADM 5511 [0.5 credit]**Energy Management**

The fundamentals of energy management, focusing on current practices in both private and public sector organizations.

PADM 5512 [0.5 credit]**International Politics of Sustainable Energy**

Recent historical and contemporary developments in the role of energy in inter- and intranational relations, involving such topics as Canada/US relations, the international political economy of oil, energy security, and climate change.

PADM 5515 [0.5 credit]**Sustainable Energy Policy**

The institutions involved in energy policy, the processes through which policy is made, and the substantive energy-related issues currently preoccupying policy makers.

Precludes additional credit for PADM 5615.

PADM 5572 [0.5 credit]**Policy Seminar (Sustainable Energy)**

One or more selected topics or specialized aspects of sustainable energy policy. The topic will change each year.

PADM 5611 [0.5 credit]**Science and Technology Policies**

Theory and practice regarding governmental policies for science and technology, and the use of scientific knowledge in the policy and regulatory processes of government. Concerns regarding the ethical issues and the transparency of science in government.

Also offered at the undergraduate level, with different requirements, as PADM 4611, for which additional credit is precluded.

PADM 5612 [0.5 credit]**Industrial Policy, Innovation and Sustainable Production**

Sustainable production theory and key drivers, barriers and opportunities influencing innovation in industrial systems and processes. The relationship of public policies and industry practices are explored in a number of sectors. Also offered at the undergraduate level, with different requirements, as PADM 4612, for which additional credit is precluded.

PADM 5613 [0.5 credit]**Science, Risk and Evaluation**

Risk-benefit theories and practices and related issues in the evaluation of science and technology; how they are handled in applied regulatory and policy institutions in selected sectors (e.g. pesticides; health protection; biotechnology).

PADM 5614 [0.5 credit]**Natural Resource Management**

Governance and management of natural resources from a Canadian and international perspective. The use of various management instruments, regulatory approaches and community-based and co-management institutions are evaluated with evidence from several case studies from around the world.

PADM 5615 [0.5 credit]**Politics and Policy of Energy in Canada**

Dilemmas associated with energy policy in Canada. Economic, social and environmental dimensions of energy decision making; Canadian issues within the context of a changing international scene and long term energy transitions.

Precludes additional credit for PADM 5515.

Also offered at the undergraduate level, with different requirements, as PADM 4615, for which additional credit is precluded.

PADM 5616 [0.5 credit]**Environmental Policy**

Canadian environmental policies and programs set in a comparative political-economic and institutional context. Also offered at the undergraduate level, with different requirements, as PADM 4616, for which additional credit is precluded.

PADM 5617 [0.5 credit]**Implementing Sustainable Development in Industrialized Countries**

Genesis and evolution of the idea of sustainable development and the ways in which it is influencing public policy and public sector structures and processes. Canada's performance in implementing sustainable development will be assessed in comparison with other industrialized countries.

PADM 5618 [0.5 credit]**Environmental and Ecological Economics**

Environmental and ecological economics with applications to public policy and environmental management issues. Concepts of sustainability, non-market valuation and ecological stability, the determination of environmental targets, and the use of policy instruments, incentives and emissions markets.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5619 [0.5 credit]**Urban Sustainability**

Impact of economic growth and social change on cities and their attempts to forge sustainable growth. Incorporating political and fiscal issues, the focus is on 'smart growth' policies and initiatives in areas such as environmental control, transport, land use, housing and infrastructure.

PADM 5620 [0.5 credit]**The Science, Politics and Economics of Global Climate Change**

Scientific issues at the core of climate change and the domestic and international policy responses. Various environmental, economic, and political implications for both the developed and developing worlds and for the various regions of Canada.

PADM 5702 [0.5 credit]**Policy Seminars****PADM 5703 [0.5 credit]****Directed Studies (Indigenous Public Administration)**

A tutorial or directed reading course on selected subjects.

PADM 5711 [0.5 credit]**Indigenous-Canada Relations: Governance and Policy History**

Introduction to pre-contact history of select Indigenous nations and peoples, overview of contact period: the treaty relationship, evolving jurisprudence, changing power dynamics, federal and provincial administrative practices, contemporary and traditional forms of First Nations, Métis and Inuit governance. Contrasting approaches to understanding foundational events.

Includes: Experiential Learning Activity

Precludes additional credit for PADM 5224.

PADM 5712 [0.5 credit]**Issues in Contemporary Governance: First Nations, Métis and Inuit**

Diverse approaches to understanding and responding to the main governance issues facing contemporary and traditional First Nations, Inuit and Métis governments and organizations in Ontario and in the rest of Canada.

PADM 5713 [0.5 credit]**Leadership and Management in Indigenous Organizations and Governments**

Leadership, organizational development and innovation in various cultural contexts relevant to Indigenous peoples, organizational design, recruitment and human resources management, decision-making, project planning and implementation, media and communications. Practicum included.

Includes: Experiential Learning Activity

PADM 5714 [0.5 credit]**Financial Management in First Nations, Métis and Inuit Governments and Organizations**

Legislation, regulations, and financial management practices that apply in First Nations, Métis, Inuit organizations and governments. Sources and measures to mitigate and eliminate historical disparity, including asset management, strategic investment, and capital aggregation.

PADM 5715 [0.5 credit]**Policy Research and Evaluation for Indigenous Policy and Administration**

Policy research and program evaluation; applied research ethics, cultural and community protocols, legal frameworks, formulation of research problems, research design, and techniques for collecting and managing community-based and other data; research methodologies of specific Indigenous nations and peoples, and scholarly debates about epistemology and practice.

Precludes additional credit for PADM 5125.

PADM 5716 [0.5 credit]**Economic and Community Development in Indigenous Territories**

Community economic development theories; the ethics, benefits and costs of traditional, current and new approaches pertinent to building stable economies in rural and urban Aboriginal settings.

Includes: Experiential Learning Activity

PADM 5717 [0.5 credit]**Indigenous Peoples and Canadian Law**

Canadian law relating to Indigenous peoples from colonial times to the present. Jurisprudence on Indigenous and treaty rights: the duty to consult, fiduciary duties, the honour of the Crown, nation-to-nation relations; introduction to First Nations, Métis and Inuit legal traditions, and international law.

PADM 5718 [0.5 credit]**Indigenous Peoples and Urban Policy and Administration**

Policies and programs of and for Indigenous peoples living in Canadian cities, with a focus on institutional and intergovernmental challenges and opportunities for change.

PADM 5719 [0.5 credit]**Indigenous Health and Social Policy**

Development and delivery of health and social policies pertinent to Indigenous peoples living in diverse circumstances in Canada; theories and practices.

PADM 5772 [0.5 credit]**Policy Seminar (Indigenous Policy and Administration)**

One or more selected policy areas or specialized aspects of Indigenous Policy and Administration. The policy field or topic will change each year.

PADM 5811 [0.5 credit]**The International Policy Framework**

The evolution of the main international rules and institutions governing the economic relationships among nation states, with emphasis on the changing roles of the Bretton Woods institutions (IMF, World Bank, GATT/ WTO).

PADM 5812 [0.5 credit]**Governance in Developing Countries**

The roles of the state and civil society in the governance of developing countries in the context of public sector reform and globalization.

PADM 5813 [0.5 credit]**The Evolution of World Bank/IMF Policy Conditionality**

The changing nature of World Bank/IMF policy conditionality with emphasis on the period since the onset of the 1982 debt crisis.

PADM 5814 [0.5 credit]**Program and Project Management**

The context, critical issues and methods relating to the planning and implementation of development programs and projects.

PADM 5815 [0.5 credit]**Civil Society Organizations and Development**

The context, roles, structures and strategies of nongovernmental organizations in the development process at the global, national and local levels. The role of development aid and NGOs is considered. Also listed as IDMG 5615.

PADM 5816 [0.5 credit]**Program Evaluation in Developing Countries**

The context, critical issues and methods relating to the evaluation of development interventions. Also listed as IDMG 5616. Prerequisite(s): PADM 5126 or equivalent.

PADM 5817 [0.5 credit]**Health Policy in Developing Countries**

Debates regarding health policy in the developing world, in the context of the global health sector reform movement, trade and intellectual property regimes, and strategies of corporate and NGO actors. Issues of gender, class and the determinants of health.

Also listed as IDMG 5617.

Also offered at the undergraduate level, with different requirements, as PADM 4817, for which additional credit is precluded.

PADM 5818 [0.5 credit]**Theories of Development**

A survey of the theories and evidence to explain processes of growth and development, and their unevenness, in low-income countries and transition economies.

Precludes additional credit for INAF 5007.

PADM 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

PADM 5909 [2.0 credits]**M.P.P.A. Thesis**

Includes: Experiential Learning Activity

PADM 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Co-operative Education Option of the M.A. program and permission of the Co-op Supervisor.

PADM 6010 [0.5 credit]**Current Issues in Public Policy**

Current issues in Canadian public policy, their historical contexts, and interdisciplinary approaches to analyzing them. Issues may include inequality, gender, environment, Indigenous governance, US/Canada relations, populism. Approaches to analysis may include contemporary and classic thinkers.

Precludes additional credit for PADM 6114 (no longer offered).

PADM 6011 [0.5 credit]**Theoretical Foundations of Public Policy**

Normative and explanatory theories fundamental to public policy, drawing on multiple social science disciplines and incorporating ethical, economic, and political/administrative perspectives. Topics may include utilitarianism, rights-based traditions, contractualism, market failure, life-course dynamics.

Precludes additional credit for PADM 6111 (no longer offered).

PADM 6012 [0.5 credit]**Policy Process and Institutions**

Various theoretical approaches to policy-making. Topics may include policy formation, agenda-setting, institutionalism, theories of the bureau, theories of policy change, policy design and implementation, policy evaluation, advocacy and coalitions, private policy-making. Precludes additional credit for PADM 6112(no longer offered).

PADM 6013 [0.5 credit]**Research Design for Public Policy**

Introduction to the analytical challenges to the study of public policy, and ways of addressing them. Exploration of why particular explanatory, interpretive and normative research questions are asked; and why particular theories, units of analysis, concepts, methods and data are used. Precludes additional credit for PADM 6113 (no longer offered).

PADM 6200 [0.5 credit]**Doctoral Research Seminar**

Issues in developing research proposals and conducting public policy research; includes research presentations by senior doctoral students and faculty. Required for second-year doctoral students who present their thesis proposals. Issues surrounding quantitative or qualitative methods in public policy analysis may be discussed. Graded Pass/Fail.

PADM 6201 [0.5 credit]**Doctoral Research Seminar**

Presentations on research skills and strategies such as ethics approval, bibliographic software, work-flow management, subsequent publication. Supervised independent research projects preliminary to Ph.D. Thesis, drawing upon interdisciplinary approaches to study of public policy.

Precludes additional credit for PADM 6200.

Prerequisite(s): PADM 6900.

PADM 6900 [0.5 credit]**Ph.D. Comprehensive Examination**

Ph.D. preparation for the comprehensive examination.

The grade to be awarded will be that obtained on the comprehensive examination.

PADM 6901 [0.5 credit]**Ph.D. Specialization Tutorial**

A Ph.D. tutorial covering advanced theory and research in an area of specialization generally related to public policy. Specific topics will be selected in consultation with, and must be approved by, the academic supervisor and Ph.D. co-ordinator.

PADM 6902 [0.5 credit]**Ph.D. Specialization Tutorial**

A Ph.D. tutorial covering advanced theory and research in an area of specialization generally related to public policy. Specific topics will be selected in consultation with, and must be approved by, the academic supervisor and Ph.D. co-ordinator.

PADM 6909 [0.0 credit]**Ph.D. Thesis**

A thorough investigation of a public policy issue that integrates multiple disciplines into the analysis.

Includes: Experiential Learning Activity

Prerequisite(s): successful public defence of written thesis proposal.

Religion and Public Life

Program Requirements

M.A. Religion and Public Life (4.5 credits)

Requirements:

1. 0.5 credit in:		0.5
RELI 5801 [0.5]	Seminar in the Discipline	
2. 0.5 credit in:		0.5
RELI 5802 [0.5]	Seminar in Religion and Public Life	
3. 0.5 credit in:		0.5
RELI 5780 [0.5]	Graduate Research Seminar	
4. 1.5 credits in:		1.5
RELI 5908 [1.5]	Research Essay	
5. 1.5 credits at	the 5000-level chosen with the approval of the Graduate Program Coordinator. A selection of 5000-level thematic elective seminars in the study of Religion and Public Life are offered each year	1.5
RELI 5850 [0.5]	Seminar in the Study of Religion	
RELI 5851 [0.5]	Seminar in Western Traditions	
RELI 5852 [0.5]	Seminar in Asian Religions	

Total Credits**4.5**

Specific content of thematic elective courses reflects the interests and expertise of the instructor. Please refer to current course descriptions for more detailed information.

With the approval of the Graduate Studies Coordinator, a maximum of 1.0 credit may be selected from courses offered at the 4000-level, or in a related field, or at another university.

Each year, the Religion program offers 4000-level undergraduate 0.5-credit courses, which are open to students in the qualifying year and, with permission, to students in the M.A. program. Consult the Undergraduate Calendar for course information.

Guidelines for Completion of Master's Degree

Full-time students enrolled in the 4.5-credit M.A. program are expected to complete RELI 5801 and RELI 5802 in the first term of study and RELI 5780 in the second term of study.

RELI 5908 should be submitted by end of the Summer Study Semester. All elective coursework should be completed by the end of the second term of study.

Full-time students are required to file with the Graduate Studies Coordinator a detailed proposal of their Research Essay by the end of the second term of study. Part-time students must submit a detailed proposal of their Research Essay by the end of the term in which they are registered for RELI 5780.

The program is designed to be completed in a three term academic year.

Part-time students enrolled in the 4.5 credit M.A. program are expected to complete the required core courses (RELI 5801, RELI 5802 and RELI 5780) by the end of the third year of study. The Research Essay and all course work must be complete by the end of the sixth year of study.

Regulations

See the General Regulations section of this Calendar.

A grade of B- or higher must normally be obtained in each course credited towards the master's degree. Please refer to Section 11.2 of the General Regulations.

Admission

The normal requirement for admission to the Master's program is a B.A. Honours (or equivalent) in Religion/Religious Studies or a cognate discipline, with a High Honours standing (normally at least B+).

Students without a prior Method and Theory course in Religious Studies are required to complete RELI 4740.

Possession of the minimum entrance standing is not in itself, however, an assurance of admission into the program.

Qualifying Year

Applicants who do not qualify for direct admission to the master's program may be admitted to a qualifying-year program designed to raise their status to that of honours graduates in Religious Studies. Applicants who lack an honours degree but have a three-year degree with honours standing (at least B overall) will normally be admitted to a qualifying-year program. Please refer to the section 2.3 of the General Regulations. Students are expected to achieve a B+ average or better in the qualifying-year program in order to qualify for admission to the Master's year.

Qualifying-year students should consult the Undergraduate Calendar and the departmental website for a listing of 4000-level courses.

Religion (RELI) Courses

RELI 5701 [0.5 credit]

Directed Studies: Western Religions

Directed study course focused on one or more Western religious traditions.

RELI 5702 [0.5 credit]

Directed Studies: Eastern Religions

Directed study course focused on one or more Eastern religious traditions.

RELI 5780 [0.5 credit]

Graduate Research Seminar

This mandatory seminar, intended as a workshop, guides students through the process of producing a major paper proposal and the initial stages of writing the research essay.

RELI 5801 [0.5 credit]

Seminar in the Discipline

This mandatory seminar introduces students to graduate level work in Religious Studies. A faculty team addresses current debates and practices in both the discipline and profession. Students are evaluated on a pass/fail basis. Includes: Experiential Learning Activity

RELI 5802 [0.5 credit]

Seminar in Religion and Public Life

This mandatory seminar introduces the main methodological and theoretical tools of the program. The course focuses on key thinkers and case studies to approach "religion and public life" from Religious Studies perspectives. Includes: Experiential Learning Activity

RELI 5820 [0.5 credit]

Directed Studies: Themes in the Study of Religion

Directed study course focused one or more themes in the study of religion.

RELI 5840 [0.5 credit]

Directed Studies I

A program of supervised reading and preparation of written work to impart ability in particular research methods beyond the level of regular seminar offerings. Unscheduled/Requires permission of the department.

RELI 5841 [0.5 credit]

Directed Studies II

A program of supervised reading and preparation of written work to impart ability in particular research methods beyond the level of regular seminar offerings. Unscheduled/Requires permission of the department.

RELI 5850 [0.5 credit]

Seminar in the Study of Religion

Thematic seminar related to the comparative or general study of Religion and Public Life. Includes: Experiential Learning Activity Also offered at the undergraduate level, with different requirements, as RELI 4850, for which additional credit is precluded.

RELI 5851 [0.5 credit]

Seminar in Western Traditions

Thematic seminar related to the study of Religion and Public Life with a focus on one or more Western traditions.

RELI 5852 [0.5 credit]

Seminar in Asian Religions

Thematic seminar related to the study of Religion and Public Life with a focus on one or more Eastern traditions.

RELI 5908 [1.5 credit]

Research Essay

A research essay on a topic related to the theme of Religion and Public Life. The topic must be chosen with the approval of the Research Essay supervisor. Includes: Experiential Learning Activity

Social Work

This section presents the requirements for programs in:

- M.S.W. Social Work
- Ph.D. Social Work
- Ph.D. Social Work with Specialization in Political Economy

Program Requirements

M.S.W. Social Work (11.0 credits)

Students admitted into the Foundation Year (first year of the two year MSW program) must complete the Foundation Year (Year I) and the Advanced Year (Year II) of the MSW program. Students admitted into the Advanced Year must only complete Year II.

Requirements:

Foundation Year (Year I) Requirements (6.0 credits):

1. 6.0 credits in:	6.0
SOWK 5000 [0.5]	Theoretical Foundations of Social Work: A Critical Perspective
SOWK 5001 [1.0]	Interpersonal Practice in Social Work: Ethics, Knowledge and Skills
SOWK 5003 [0.5]	Policy Context of Social Work
SOWK 5004 [0.5]	Group Work
SOWK 5606 [2.0]	Practicum I
SOWK 5608 [0.5]	Community Practice
1.0 credit to be taken from graduate-level course offerings in the School	

Advanced Year (Year II) Requirements (5.0 credits):

2. 1.0 credit in:	1.0
SOWK 5011 [0.5]	Social Work and Social Justice
SOWK 5012 [0.5]	Social Work Research Foundations
3. 2.0 credits from:	2.0
SOWK 5013 [0.5]	Community-Based Participatory Research
SOWK 5014 [0.5]	Social Policy
SOWK 5015 [0.5]	Indigenous Knowledge and Theory for Social Work
SOWK 5016 [0.5]	Social Work Practice with Individuals and Families
SOWK 5017 [0.5]	Advanced Organizational Administration and Practice
SOWK 5018 [0.5]	Advanced Clinical Social Work Practice
SOWK 5020 [0.5]	Social Work in Health Care Settings
SOWK 5021 [0.5]	Advanced Social Work Practice with Groups and Communities
SOWK 5302 [0.5]	Mental Health
SOWK 5502 [0.5]	History of Social Welfare and Social Work
SOWK 5700 [0.5]	Special Topics in Social Policy
SOWK 5701 [0.5]	Special Topics in Direct Intervention
SOWK 5702 [0.5]	Special Topics in Social Work
SOWK 5703 [0.5]	Special Topics in Social Work
3. 2.0 credits in:	2.0

a) Thesis pathway:

SOWK 5909 [2.0]	Thesis
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or

b) Practicum pathway:

SOWK 5607 [2.0]	Practicum II
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Total Credits **11.0**

For all course options listed above, a minimum of 1.0 credit to be taken from graduate-level Social Work course offerings, or with permission from the School of Social Work, a maximum of 1.0 credit may be taken outside the School of Social Work, and a maximum of 0.5 credit may be taken at the 4000-level.

All students in SOWK 5903, SOWK 5909, SOWK 5606, SOWK 5607 must maintain continuous registration until completion of the course in accordance with the General Regulations as stated in this calendar.

Part-Time Studies

The School offers part-time studies to a limited number of qualified candidates. The requirements for part-time studies are identical to those of the regular program, except that part-time students are limited to a maximum of 1.0 credit of course work per term.

Students registered on a part-time basis must maintain continuous registration for a minimum of two terms per year until all course requirements are completed.

In their first fall term, part-time students in the MSW Foundation Year (Year I) must register in SOWK 5000 and one of SOWK 5003 or SOWK 5608. In their second fall term, they must register for SOWK 5001. Part-time students in the MSW Advanced Year (Year II) register in SOWK 5011 and SOWK 5012 in their first fall term.

Change of Status

Students contemplating changing their full-time or part-time status should consult the General Regulations section of this Calendar.

Ph.D. Social Work (5.5 credits)

Requirements:

1. 1.0 credit in:	1.0
SOWK 6101 [0.5]	Theoretical Foundations
SOWK 6102 [0.5]	Ethical Foundations
2. 1.0 credit in:	1.0
SOWK 6301 [0.25]	Ph.D. Seminar
SOWK 6302 [0.25]	Ph.D. Seminar
SOWK 6303 [0.25]	Ph.D. Seminar
SOWK 6304 [0.25]	Ph.D. Seminar
3. 1.0 credit in:	1.0
SOWK 6201 [0.5]	Theory and Methods
SOWK 6202 [0.5]	Research Design
4. 0.5 credit in:	0.5
SOWK 6401 [0.5]	Critical Pedagogy
5. 1.0 credit in electives, which may include:	1.0
1.0 credit in 5000- or 6000-level SOWK courses, or 0.5 credit in SOWK at the 5000- 6000-level and up to 0.5 credit at the 5000- or 6000- level from a discipline other than SOWK (with approval of the School)	
the SOWK courses may include:	
SOWK 6405 [0.5]	Directed Studies
SOWK 6406 [0.5]	Directed Studies

6. 0.5 credit in:	0.5
SOWK 6600 [0.5] Advocacy Practicum	
7. 0.5 credit in:	0.5
SOWK 6800 [0.5] Qualifying Examination	
8. 0.0 credits in:	0.0
SOWK 6909 [0.0] PhD Dissertation	
Total Credits	5.5

Notes:

1. The School requires that 5.0 credits in course work plus the 0.5 credit in the Qualifying exam be completed by the end of the first six semesters (i.e. fall, winter, spring/summer).
2. During the third year of study, students are required to develop and defend their research proposal.

Ph.D. Social Work with Specialization in Political Economy (5.5 credits)

Ph.D. Social Work with Specialization in Political Economy (5.5 credits)

1. 1.0 credit in:	1.0
SOWK 6101 [0.5] Theoretical Foundations	
SOWK 6102 [0.5] Ethical Foundations	
2. 0.5 credit in:	0.5
PECO 6000 [0.5] Political Economy: Core Concepts	
3. 0.5 credit in a relevant political economy course from the approved list	0.5
4. 1.0 credit in:	1.0
SOWK 6201 [0.5] Theory and Methods	
SOWK 6202 [0.5] Research Design	
5. 0.5 credit in:	0.5
SOWK 6401 [0.5] Critical Pedagogy	
6. 1.0 credit in:	1.0
SOWK 6301 [0.25] Ph.D. Seminar	
SOWK 6302 [0.25] Ph.D. Seminar	
SOWK 6303 [0.25] Ph.D. Seminar	
SOWK 6304 [0.25] Ph.D. Seminar	
7. 0.5 credit in:	0.5
SOWK 6600 [0.5] Advocacy Practicum	
8. 0.5 credit in:	0.5
SOWK 6800 [0.5] Qualifying Examination	
9. 0.0 credits in:	0.0
SOWK 6909 [0.0] PhD Dissertation	
Total Credits	5.5

Regulations

See the General Regulations section of this Calendar.

Candidates for the MSW degree must complete all course work (or the equivalent) counted towards the degree with a grade of B- or higher. The School of Social Work does not permit the C+ option.

Regulations

See the General Regulations section of this Calendar

Candidates must obtain a grade of B- or higher in each course and Satisfactory on the Ph.D. thesis and its oral defence.

Part-Time Studies

Students not able to remain in full-time studies may only apply for part-time status following the completion of their second year of studies and with evidence of satisfactory progress in their research.

Change of Status

Students contemplating changing their full-time or part-time status should consult the General Regulations section of this Calendar.

Admission

The School of Social Work provides two points of entry into the Master of Social Work program.

Applications are accepted to the Foundation Year (first year of a two year MSW program) from candidates who hold an Honours bachelor's degree, or the equivalent, with at least high honours standing (normally B+ or higher in the final two years/10 full credits of university courses; B- or higher overall) in a discipline other than social work.

Application are accepted to the Advanced Year (one year MSW program) from candidates who hold an accredited Bachelor of Social Work degree with honours standing (normally B+ or higher in the final two years/10 full credits of university courses; B- or higher overall).

Applications are accepted from candidates who are in the process of completing their final year of study, and who have maintained B+ or higher.

Work experience in social work or a related field is considered as one of several selection criteria for application to both Foundation Year and Advanced Year.

Applicants must have completed (or be in the process of completing) 0.5 credit in research methods or 0.5 credit in statistics with a minimum B grade or higher in either course.

The School of Social Work will not grant advanced standing for course work completed prior to entry into the MSW program.

Students accepted into Foundation Year will be expected to complete 6.0 credits of course work in year I and 5.0 credits of course work in year II.

Admission

There are three principal criteria for admission.

- Completion of an MSW at an accredited program in Social Work (Canadian Association for Social Work Education or equivalent), or a similarly accredited BSW and a closely related graduate degree. An average of A- or better at the Masters level is normally required.
- Demonstrated ability to conduct independent research and to complete the program. Applications must contain one academic or professional paper completed by the applicant at the graduate level or its equivalent.
- A minimum of two years full-time post graduate work experience, or five years post-baccalaureate work experience in the social services and/or social policy field.

Note: The School may require a candidate to complete an additional course (such as research methods or theory) to qualify for admission. Such a candidate may be provisionally admitted into the program and permitted to take the additional course concurrently with the regular PhD courses.

Social Work (SOWK) Courses

SOWK 5000 [0.5 credit]

Theoretical Foundations of Social Work: A Critical Perspective

History of social work and progressive social work. Introduction to critical theories and approaches informing contemporary social work in Canada: structural, anti-racist, Indigenous, anti-oppressive, queer, critical disability, post-structural, and political economy.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5001 [1.0 credit]

Interpersonal Practice in Social Work: Ethics, Knowledge and Skills

Theoretical exploration of the values, ethics, and historical development of direct social work knowledge and skills for practice. Focus on student skills development for beginning practice, including building therapeutic alliance, differential use of interviewing skills, contracting, biopsychosocial assessment, goal setting, and treatment planning.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5003 [0.5 credit]

Policy Context of Social Work

Historical context, theories and approaches to social policy analysis, development, and practice in Social Work. Examination of federal, provincial, municipal and organizational policies. Focus on processes for policy development, consultation, collaboration, political struggle, and challenges of bridging policy with individual services.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5004 [0.5 credit]

Group Work

History, theories, and models of social work practice with groups. A range of group practice approaches, including task-focused, mutual aid, psychoeducational, and process-oriented therapeutic groups.

Includes: Experiential Learning Activity

Prerequisite(s): SOWK 5000 and SOWK 5001.

SOWK 5011 [0.5 credit]

Social Work and Social Justice

Relationships between social work professionals and social justice movements. Indigenous, anti-racist, queer, disability, trans, class, and feminist knowledge, politics, and activism informing social work practice in Canada.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of MSW program.

SOWK 5012 [0.5 credit]

Social Work Research Foundations

Foundations of social work research with a focus on understanding evidence-based practice. Students will learn how to understand research to inform social work practice, and how to use research in social work practice. Prerequisite(s): BSW or Foundation Year of MSW program.

SOWK 5013 [0.5 credit]

Community-Based Participatory Research

Using community-based participatory research approaches, students will assist community organizations using qualitative and/or quantitative techniques to address research questions with a social justice focus. Emphasizes an understanding of different research paradigms, ethics, and the importance of self-reflection and integration.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of MSW program.

SOWK 5014 [0.5 credit]

Social Policy

Advanced study of social work contributions and strategies for policy development and analysis. Focus on policy change and negotiation within the contemporary context and the impact on clients' lives and social work practice. Attention to alternative policy processes, e.g., Indigenous, and social justice practice.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5015 [0.5 credit]

Indigenous Knowledge and Theory for Social Work

Exploration of Indigenous knowledge and Indigenous approaches to social work. Understanding history of social work with Indigenous peoples in Canada and strategies for reconciliation.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5016 [0.5 credit]

Social Work Practice with Individuals and Families

Biopsychosocial theories and practice models (i.e., psychodynamic, cognitive-behavioural, narrative) for working with individuals and families in a contemporary practice environment. A critical approach to theories and models.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5017 [0.5 credit]**Advanced Organizational Administration and Practice**

Theories of organizational behaviour, approaches to management, skills for developing funding proposals, program development, managing budgets, program evaluation and creating organizational change.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5018 [0.5 credit]**Advanced Clinical Social Work Practice**

Clinical concepts for relationship-based, theoretically and empirically grounded, social justice-seeking practice, e.g., reflexive use of self, transference/countertransference, and navigating power. Focus on development of one's individualized clinical practice framework.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5020 [0.5 credit]**Social Work in Health Care Settings**

Social work practice in a range of health-care settings with a focus on health-care policy practice and direct intervention in various areas of health care.

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5021 [0.5 credit]**Advanced Social Work Practice with Groups and Communities**

Focus on practice with groups and communities, particularly implementing approaches reviewed in undergraduate programs and/or Foundation Year, dealing with tensions in practice, critical reflection, advanced practice techniques and evaluation.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5302 [0.5 credit]**Mental Health**

Historical development, legislative framework, institutional and service structure, and practice issues related to mental health services in Canada. The interface between mental health and sexual abuse, family violence, racism, corrections, aging and immigration.

Includes: Experiential Learning Activity

SOWK 5502 [0.5 credit]**History of Social Welfare and Social Work**

Development of social welfare in Canada from the 19th century to the present. Federal and provincial state formation and colonialism, imperialism, class, and racism. Transformations in the politics of struggle for social and economic justice.

Prerequisite(s): registration in MSW Foundation Year (Year I).

SOWK 5504 [1.0 credit]**Directed Studies**

Individual exploration of selected theoretical perspectives for social work practice under the direct supervision of a member of faculty or visiting scholar.

SOWK 5506 [0.5 credit]**Directed Studies**

Individual exploration of selected theoretical perspectives for social work practice under the direct supervision of a member of faculty or visiting scholar.

Includes: Experiential Learning Activity

SOWK 5606 [2.0 credits]**Practicum I**

Integration of academic and practical aspects of social-work education. 450 hours of guided learning in a community-based setting. Field seminar required.

Includes: Experiential Learning Activity

Prerequisite(s): registration in MSW Foundation Year (Year I); completion of SOWK 5000, SOWK 5001, SOWK 5003, and SOWK 5608; and completion of or concurrent registration in SOWK 5004.

SOWK 5607 [2.0 credits]**Practicum II**

450 hours integrating advanced social work theories and practice in clinical, policy, research or other settings. Field seminar required. Offered spring/summer of advanced or second year.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or completion of MSW Foundation Year (Year I); completion of SOWK 5011, SOWK 5012.

SOWK 5608 [0.5 credit]**Community Practice**

Exploration of history, theory and practice of community work in social work. Engagement, assessment, and interventions with communities will be explored using a variety of community-based approaches including: Indigenous community change, and critical approaches to community work.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5700 [0.5 credit]**Special Topics in Social Policy**

The School will offer courses on substantive topics related to social administration and policy. Topics vary depending on the interests of faculty and students and the availability of instructors. Students outside of the School may register with permission from the School.

SOWK 5701 [0.5 credit]**Special Topics in Direct Intervention**

The School will offer courses on substantive topics related to direct intervention including community development. Topics vary depending on the interests of faculty and students and the availability of instructors. Students outside of the School may register with permission from the School.

Includes: Experiential Learning Activity

SOWK 5702 [0.5 credit]**Special Topics in Social Work**

The School will offer lecture courses on substantive topics related to social work and social welfare. Topics will vary each year depending on the interests of faculty and students. Students from outside the School of Social Work may register with permission of the School.

SOWK 5703 [0.5 credit]**Special Topics in Social Work**

The School will offer lecture courses on substantive topics related to social work and social welfare. Topics will vary each year depending on the interests of faculty and students. Students from outside the School of Social Work may register with permission of the School.

SOWK 5903 [1.0 credit]**Independent Research Studies in Social Work**

Individually-arranged independent research study. Requires a written proposal that outlines a research project with clear learning objectives, and practice objectives (where relevant).

Includes: Experiential Learning Activity

SOWK 5904 [0.5 credit]**Independent Research Studies in Social Work**

Individually-arranged independent research study. Requires a written proposal that outlines a research project with clear learning objectives, and practice objectives (where relevant).

Includes: Experiential Learning Activity

SOWK 5909 [2.0 credits]**Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): registration in MSW Advanced Year (Year II).

SOWK 6101 [0.5 credit]**Theoretical Foundations**

A focus on human rights and social justice that explores the dynamic tensions of life in an advanced capitalist, globalized political economy and the relevance for social work practices. This course will assist students in developing the theoretical frameworks for their dissertations.

Precludes additional credit for SOWK 6100 (no longer offered).

SOWK 6102 [0.5 credit]**Ethical Foundations**

This seminar examines notions of the subject and subjectivity, and the attendant concept of the other in the context of ethics in social work practice. What is the ethics of our social doing? What are we advancing and for whom?.

Precludes additional credit for SOWK 6100 (no longer offered).

SOWK 6201 [0.5 credit]**Theory and Methods**

Theories and methods from the social sciences and humanities as applied in social work research. Emphasis on theories and methods most consistent with structural approaches. Through engagement with the research literature, students acquire skills in assessing and comparing research approaches.

Includes: Experiential Learning Activity

SOWK 6202 [0.5 credit]**Research Design**

Building on SOWK 6201, this course supports students in learning how to design a critically-oriented research project, including how to ensure methodological coherence, ethics, rigour, timeliness and relevance to the field of structurally-informed social work.

Includes: Experiential Learning Activity

SOWK 6301 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6302 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6303 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6304 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6401 [0.5 credit]**Critical Pedagogy**

Application of educational theory, models, practices, design and technology for post-secondary education.

Theory and practice of critical pedagogy, curriculum development, teaching methods, skills and strategies.

Includes: Experiential Learning Activity

SOWK 6405 [0.5 credit]**Directed Studies**

Individually-arranged independent exploration of selected areas of inquiry that are offered subject to the availability of faculty. Requires a written proposal with clear learning objectives and study plan.

SOWK 6406 [0.5 credit]**Directed Studies**

Individually-arranged independent exploration of selected areas of inquiry that are offered subject to the availability of faculty. Requires a written proposal with clear learning objectives and study plan.

SOWK 6600 [0.5 credit]**Advocacy Practicum**

Students will work collaboratively with a community agency to create a social justice oriented project that will be completed for the agency. The project work will be guided by the student's advisor. Graded Sat/Uns.

Includes: Experiential Learning Activity

SOWK 6800 [0.5 credit]**Qualifying Examination**

A critical assessment and demonstration of mastery in an area of inquiry related to the research project, involving theoretical, methodological and substantive components. Requires a proposal to the Exam Committee, the successful completion of a Qualifying Exam paper and an Oral Qualifying Exam.

SOWK 6909 [0.0 credit]**PhD Dissertation**

An original scholarly research contribution constituting a significant contribution to the field of social welfare and the profession of social work. Dissertation must meet standards including a formal oral defense governed by the regulations of the Faculty of Graduate Studies and Postdoctoral Affairs.

Includes: Experiential Learning Activity

Sociology

This section presents the requirements for programs in:

- M.A. Sociology
- M.A. Sociology with Concentration in Quantitative Methodology
- M.A. Sociology with Collaborative Specialization in Climate Change
- M.A. Sociology with Collaborative Specialization in Latin American and Caribbean Studies
- M.A. Sociology with Specialization in African Studies
- M.A. Sociology with Specialization in Digital Humanities
- Ph.D. Sociology
- Ph.D. Sociology with Specialization in Political Economy

Program Requirements

Master's students in sociology are required to select and follow one of the optional program patterns below, chosen in consultation with a graduate adviser.

Transfer from Thesis to Course Work M.A.

Students who choose to change from the thesis to the course work program must normally do so before registering for a third term after initial, full-time registration, or before registering for a fifth term after initial part-time registration.

M.A. Sociology (5.0 credits)**Requirements - thesis program (5.0 credits)**

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 2.0 credits in courses.	With department permission 0.5 credit may be selected from courses at the 4000-level.	2.0
3. 2.0 credits in:		2.0
SOCI 5909 [2.0]	M.A. Thesis	
4. An oral examination on the candidate's thesis and program		
Total Credits		5.0

Requirements - research essay program (5.0 credits)

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 3.0 credits in courses.	With department permission 0.5 credit may be selected from courses at the 4000-level.	3.0
3. 1.0 credit in:		1.0
SOCI 5908 [1.0]	M.A. Research Essay	
4. An oral examination on the candidate's research essay and program		
Total Credits		5.0

Requirements - course work program (5.0 credits)

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	

2. **4.0 credits** in courses. With department permission 0.5 credit may be selected from courses at the 4000-level. 4.0

Total Credits 5.0

M.A. Sociology with Concentration in Quantitative Methodology (5.0 credits)

Students in either the research essay or thesis program options may pursue a concentration in quantitative methodology. For a concentration in quantitative methodology, courses selected must include the following:

Requirements - Thesis program (5.0 credits)

1. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
2. 1.0 credit from:	1.0
SOCI 5102 [0.5] Multiple Regression Analysis	
SOCI 5104 [0.5] Advanced Multivariate Analysis	
SOCI 5105 [0.5] Selected Topics in Social Research	
SOCI 5201 [0.5] Comparative Methods in Social Research	
SOCI 5605 [0.5] Demographic Analysis	
3. 1.0 credit in SOCI at the graduate level (not including those listed above)	1.0
4. 2.0 credits in a thesis	2.0
5. An oral examination on the candidate's thesis and program	
Total Credits	5.0

Requirements - Research Essay program (5.0 credits)

1. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
2. 1.0 credit from:	1.0
SOCI 5102 [0.5] Multiple Regression Analysis	
SOCI 5104 [0.5] Advanced Multivariate Analysis	
SOCI 5105 [0.5] Selected Topics in Social Research	
SOCI 5201 [0.5] Comparative Methods in Social Research	
SOCI 5605 [0.5] Demographic Analysis	
3. 2.0 credits in SOCI at the graduate level (not including those listed above)	2.0
4. 1.0 credit in a research essay	1.0
5. An oral examination on the candidate's research essay and program	0.0
Total Credits	5.0

Students in the Concentration in Quantitative Methodology may arrange a work placement as 0.5 credit toward the program requirements as an approved option course.

Placements can be arranged twice in two different academic terms and count for a total of 1.0 credit toward the program requirements. The conditions of the placement(s) are arranged with the student's supervisor and the placement coordinator. The paperwork is available on the departmental website and is to be submitted to the department for approval. Once approved, students shall enroll in SOCI 5906. Grades for the work placement

are assigned in consultation between the placement supervisor and the placement coordinator.

Students in the Concentration in Quantitative Methodology may apply for admission into a Cooperative Education option. This option provides an opportunity for students to enhance their educational experience through a work experience directly related to their area of interest and expertise. Once admitted into this option, students shall enrol in SOCI 5913 [0.0] Co-operative Work Term. Students enrolled in the Co-operative Education option may not arrange a SOCI 5906 work placement as credit towards program requirements.

M.A. Sociology with Collaborative Specialization in Climate Change (5.0 credits)

Requirements - Thesis pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
4. 1.0 credit in approved electives, chosen in consultation with the student's advisor	1.0
5. 2.0 credits in:	2.0
SOCI 5909 [2.0] M.A. Thesis (in the specialization)	
Total Credits	5.0

Requirements - Research essay pathway:

1. 1.0 credit in:	1.0
CLIM 5000 [1.0] Climate Collaboration	
2. 0.0 credit in:	
CLIM 5800 [0.0] Climate Seminar Series	
3. 1.0 credit in:	1.0
SOCI 5005 [0.5] Recurring Debates in Social Thought	
SOCI 5809 [0.5] The Logic of the Research Process	
4. 2.0 credit in approved electives, chosen in consultation with the student's advisor	2.0
5. 1.0 credit in:	1.0
SOCI 5908 [1.0] M.A. Research Essay (in the specialization)	
Total Credits	5.0

M.A. Sociology with Collaborative Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway:

1. 0.5 credit in:	0.5
LACS 5000 [0.5] Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:	
LACS 5800 [0.0] Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:	1.0

SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
4. 1.5 credits in	electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	1.5
5. 2.0 credits in:		2.0
SOCI 5909 [2.0]	M.A. Thesis (on an approved topic with significant content related to Latin American and Caribbean Studies)	

Total Credits 5.0

Requirements - Research Essay pathway:

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
4. 2.5 credits in	approved electives, including 1.0 credit in courses designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American Studies	2.5
5. 1.0 credit in:		1.0
SOCI 5908 [1.0]	M.A. Research Essay (on an approved topic with significant content related to Latin American and Caribbean Studies)	

Total Credits 5.0

Requirements - Coursework pathway:

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
4. 0.5 credit from:		0.5
ANTH 5109 [0.5]	Ethnography, Gender and Globalization	
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies	
SOCI 5007 [0.5]	Social Change and Economic Development	
SOCI 5409 [0.5]	The Politics of Social Movements and the State	

5. 3.0 credits in	approved electives, including 1.0 credit in course(s) designated as having sufficient Latin American and Caribbean Studies content, approved by both the Graduate Supervisor and the Coordinator of Latin American and Caribbean Studies	3.0
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Total Credits 5.0

M.A. Sociology with Specialization in African Studies (5.0 credits)

Requirements - Thesis program (5.0 credits):

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 1.5 credits in	courses. With departmental permission 0.5 credit may be selected from courses at the 4000-level.	1.5
3. 2.0 credits in:		2.0
SOCI 5909 [2.0]	M.A. Thesis	
4. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:		
AFRI 5800 [0.0]	Scholarly Preparation in African Studies (5. 0.0 credit in:)	

Total Credits 5.0

Requirements - Research Essay program (5.0 credits)

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 2.5 credits in	courses. With departmental permission 0.5 credit may be selected from courses at the 4000-level.	2.5
3. 1.0 credit in:		1.0
SOCI 5908 [1.0]	M.A. Research Essay	
4. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:		0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	

6. An oral examination on the candidate's research essay and program.

Total Credits 5.0

Requirements - Coursework program (5.0 credits)

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 2.5 credits in	courses excluding SOCI 5905. With departmental permission 0.5 credit may be selected from courses at the 4000-level.	2.5
3. 1.0 credit in	courses designated as having sufficient African Studies content, including at least 0.5 credit in:	1.0
SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies	
ANTH 5109 [0.5]	Ethnography, Gender and Globalization	

ANTH 5202 [0.5]	The Anthropology of Underdevelopment	
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa	
ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment	
Or, a Sociology or Anthropology course approved by the Graduate Coordinator of the Institute of African Studies.		
4. 0.5 credit in:		0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives	
5. 0.0 credit in:		
AFRI 5800 [0.0]	Scholarly Preparation in African Studies	
Total Credits		5.0

M.A. Sociology with Specialization in Digital Humanities (5.0 credits)

Requirements - Research Essay program (5.0 credits)

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 2.0 credits in courses. With departmental permission one of the courses may be 0.5 credit at the 4000-level.		2.0
3. An oral examination on the candidate's research essay and program		
4. 1.0 credit in:		1.0
SOCI 5908 [1.0]	M.A. Research Essay	
5. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
6. 0.5 credit from:		0.5
DIGH 5011 [0.5]	Graduate Practicum in Digital Humanities	
DIGH 5012 [0.5]	Directed Readings and Research in Digital Humanities	
Or, annually listed DIGH course.		
7. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
Total Credits		5.0

Requirements - Thesis program (5.0 credits)

1. 1.0 credit in:		1.0
SOCI 5005 [0.5]	Recurring Debates in Social Thought	
SOCI 5809 [0.5]	The Logic of the Research Process	
2. 1.0 credit in courses		1.0
3. 2.0 credits in:		2.0
SOCI 5909 [2.0]	M.A. Thesis	
4. An oral examination on the candidate's thesis and program		
5. 0.5 credit in:		0.5
DIGH 5000 [0.5]	Issues in the Digital Humanities	
6. 0.5 credit from:		0.5
DIGH 5011 [0.5]	Graduate Practicum in Digital Humanities	

DIGH 5012 [0.5]	Directed Readings and Research in Digital Humanities	
Or, annual listed DIGH course		
7. 0.0 credit in:		0.0
DIGH 5800 [0.0]	Digital Humanities: Professional Development	
Total Credits		5.0

Ph.D. Sociology (3.0 credits)

Requirements:

1. 1.0 credit in:		1.0
SOCI 6002 [0.5]	Doctoral Seminar Year 1	
SOCI 6003 [0.5]	Doctoral Seminar Year 2	
2. 0.0 credits in:		0.0
SOCI 6909 [0.0]	Ph.D. Thesis	
3. Written and oral comprehensive examinations in two areas of specialization		
4. Presentation of a thesis proposal		
5. 2.0 credits in SOCI courses at the 5000- or 6000-level or, with the permission of the graduate supervisor, up to 1.0 credit of graduate level courses from another unit at Carleton		2.0
6. An oral defence of the thesis		
Total Credits		3.0

Ph.D. Sociology with Specialization in Political Economy (3.0 credits)

Requirements:

1. 1.0 credit in:		1.0
SOCI 6002 [0.5]	Doctoral Seminar Year 1	
SOCI 6003 [0.5]	Doctoral Seminar Year 2	
2. 0.0 credits in:		0.0
SOCI 6909 [0.0]	Ph.D. Thesis	
3. Written and oral comprehensive examinations in two areas of specialization		
4. Presentation of a thesis proposal		
5. 0.5 credit in:		0.5
PECO 6000 [0.5]	Political Economy: Core Concepts	
6. 0.5 credit in:		0.5
A relevant political economy course from the approved list or part of comprehensive preparation in the subfield of political economy		
7. 1.0 credit in SOCI courses at the 5000- or 6000-level or, with the permission of the graduate supervisor, up to 1.0 credit of graduate level courses from another unit at Carleton		1.0
8. An oral defence of the thesis		
Total Credits		3.0

Comprehensive Examinations

Each Ph.D. candidate is required to write comprehensive examinations in two of the following areas:

- Theory and Methodology
- Stratification and Power
- Cultural Studies
- Applied Social Research

Subjects of instruction and research subsumed under these four areas are:

Theory and Methodology

- Logic of Social Scientific Inquiry
- Classical Social Theories
- Contemporary Social Theories
- Feminist Theories
- Research Methods (Historical, Qualitative, and Quantitative)

Stratification and Power

- Occupations, Organizations, and the Labour Process
- Class Analysis and Social Stratification
- Political Sociology
- Race and Ethnic Relations
- Gender Relations
- Political Economy
- Canadian Society
- Social and Economic Development
- Citizenship Studies
- Governance, Regulation, and Law

Cultural Studies

- Communication and Popular Cultures
- Ethnographic Analysis
- Discourse Analysis
- Social Anthropology
- Social and Virtual Spaces

Applied Social Research

- Criminal Justice
- Health and Illness Policy
- Population Studies
- Sociology of Language
- Built Environments
- Education Policy

Upon petition to the sociology graduate program's coordinator, an approved field in sociology or a related discipline may be substituted for one of the options above. The subjects of instruction and research subsumed under each of the areas are indicative, and may be subsumed under more than one area, depending on the analytic approach adopted.

The comprehensive examinations are to be completed after course requirements for the Ph.D. have been completed. Comprehensive examinations must be completed no later than two years or six terms after initial full-time registration, and four years or twelve terms after initial part-time registration.

The thesis proposal is to be presented after comprehensive requirements have been completed. Normally the thesis proposal must be presented no later than two and one-half years or seven terms after initial full-time registration and five years or fifteen terms after initial part-time registration.

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or better must normally be obtained in each credit counted toward the master's degree. With the recommendation of the department, and permission of the Dean of the Faculty of Graduate Studies and Research, a candidate may be allowed a grade of C+ in 1.0 credit.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.A. Sociology, including all concentrations and specializations, is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Regulations

See the General Regulations section of this Calendar.

Candidates must obtain a grade of B- or better in each credit, and Satisfactory on the comprehensive examinations, the Ph.D. thesis and its oral defence.

Co-operative Education Program in Sociology

The Co-operative Education program in Sociology provides Master of Arts (M.A.) students enrolled in the Concentration in Quantitative Methodology stream the opportunity to combine work placements with academic study.

Co-operative Education Admission Requirements

Students interested in admission into the Co-operative Education program in Sociology must apply by the end of the first semester of academic study.

To be eligible for admission to the Co-operative Education program in Sociology, students must:

- a. be registered in the Sociology M.A. Concentration in Quantitative Methodology stream;
- b. have successfully completed, by the start-date of the first work term, the required first-year core research methods courses (SOCI 5809 and at least 1.0 credit selected from: SOCI 5102, SOCI 5104, SOCI 5105, SOCI 5201, SOCI 5605);
- c. be registered full-time in each academic term prior to work term;
- d. be eligible to work in Canada (for off-campus work placements).

Students admitted to the Co-operative Education program must successfully complete two work placement term, each work term lasting four months, to receive a Co-operative Education designation on their academic transcript. Students register in the 0.0 credit Co-operative Education course SOCI 5913 and are permitted to enrol in one additional 0.5 credit course during each work term.

More information on Co-operative Education regulations can be found in Section 14.0 of the general regulations section of this Calendar.

Admission

The requirement for admission into the master's program is a B.A. Honours or equivalent with at least high honours standing in sociology or a closely-related field. Where relevant, previous professional experience will be taken into account in determining an applicant's standing on admission.

Applicants with general (three-year) bachelor's degrees may be admitted into a qualifying-year program designed to raise their standing to honours status. Students earning at least high honours standing in their qualifying-year courses will be considered for admission into the master's program. Refer to the General Regulations section of this Calendar for details of the regulations governing the qualifying year.

Accelerated Pathway

The accelerated pathway in the Department of Sociology is a flexible and individualized plan of graduate study. Students in their final year of a Carleton B.A. Honours degree in Sociology, or equivalent, may qualify for this pathway.

Students in their third-year of study in the Carleton B.A. Honours degree in Sociology, or related discipline, should consult with both the Undergraduate Advisor and Graduate Advisor to determine if the accelerated pathway is appropriate for them and to confirm their selection of courses for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. Any two 0.5 credit 5000-level courses with a grade of B+ or higher
2. Minimal overall CGPA of B+

Students may receive advanced standing with transfer of up to 1.0 credit which can reduce their time to completion of the M.A.

Admission

The minimum requirement for admission into the Ph.D. program is a master's degree (or the equivalent) in sociology, normally with a minimum average of B+ in courses (including the thesis where applicable), and with no grade below B

Applicants who have deficiencies in certain areas may be admitted to the Ph.D. program, but will normally be required to complete additional course work.

Sociology (SOCl) Courses

SOCl 5000 [0.5 credit]

Classical Sociological Theory

Crucial sociological concepts and ideas by the founders of sociology. Attention will be given to Marx, Weber, Durkheim, Pareto, Comte, and Husserl.

SOCl 5001 [0.5 credit]

Selected Topics in Classical Theory

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCl 5002 [0.5 credit]

Contemporary Sociological Theory

Major theoretical perspectives in sociology, including social behaviourism; social action theories such as symbolic interactionism, phenomenological sociology, ethnomethodology; and structuralist theories such as structural functionalism, neo-Marxism and critical theory.

SOCl 5003 [0.5 credit]

Selected Topics in Contemporary Theory

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCl 5005 [0.5 credit]

Recurring Debates in Social Thought

Recurring issues and debates in the discipline. Topics such as the nature of social science; the objective world versus social construction; questions of evidence, meaning and measurement; agency versus structure; the relation between research and praxis; knowledge and power, may be considered.

Prerequisite(s): restricted to graduate students in sociology. Others may be admitted by permission of the Department.

SOCl 5007 [0.5 credit]

Social Change and Economic Development

Critical examination of studies of change and development in historical and contemporary national and transnational systems.

SOCl 5102 [0.5 credit]

Multiple Regression Analysis

An in-depth study of multiple regression analysis and its application in social science research. Interpretation and communication of the results are emphasized. The course provides an overview of descriptive and inferential statistics. Students learn how to use STATA/SAS to analyze social survey data.

Includes: Experiential Learning Activity

SOCl 5104 [0.5 credit]

Advanced Multivariate Analysis

Commonly-used advanced statistical techniques. Topics may include factor analysis, multinomial logistic regression analysis, event history analysis, analysis of covariance, multilevel models and structural equation modeling. STATA/SAS is used in addition to specialized statistical software.

Includes: Experiential Learning Activity

SOCl 5105 [0.5 credit]

Selected Topics in Social Research

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCl 5106 [0.5 credit]

Research Design and Data Analysis

An integrated approach to the problems involved in the analysis of quantitative data, research design and procedures.

Includes: Experiential Learning Activity

SOCI 5107 [0.5 credit]**Advanced Qualitative Research Methods**

In-depth study of a range of qualitative research methodologies. Students will sharpen their practical skills in developing research questions, gathering and analyzing data and presenting results. Students will engage in discussions of theoretical, methodological, and ethical issues and challenges in qualitative research.

SOCI 5201 [0.5 credit]**Comparative Methods in Social Research**

Current analytical problems and applications of comparative methods in social research. Students are expected to individually conduct research or to participate in a group research project in which one or more of these methods will be applied.

Includes: Experiential Learning Activity

SOCI 5204 [0.5 credit]**Consuming Passions: The Regulation of Consumption, Appearance and Sexuality**

Examination of the rise of consumption and private pleasures and their regulation and self-regulation.

Also listed as LAWS 5008.

SOCI 5205 [1.0 credit]**Canadian Society**

A critical examination of sociological models of modern societies and their relevance to Canada.

SOCI 5206 [0.5 credit]**Sociology of Occupations and Professions**

A consideration of the development of occupational recruitment patterns and workforce issues, with attention to their sociological implications.

SOCI 5207 [0.5 credit]**Sociology of Formal Organizations**

A consideration of the forms and processes of bureaucracy in modern society, government and industry.

SOCI 5209 [0.5 credit]**Sociology of Science and Technology**

Study of the interaction among science, technology and change in modern societies.

SOCI 5303 [0.5 credit]**Sociology of Education**

The relations between education and other social institutions, the structure of educational opportunity, educational systems and organizations, and the sociology of learning.

SOCI 5304 [0.5 credit]**Food Studies**

A sociological analysis of food cultures. Possible topics include: the relationship between food and identity; social movements organized around food; and the production, preparation, consumption, and disposal of food.

SOCI 5305 [0.5 credit]**Police and Capital**

The idea of 'police' as a general historical project aimed at the fabrication of social order and the development of liberal philosophy, political economy and security. Contemporary public and private security provision considered in light of commodification, class conflict, and risk thinking.

Also listed as LAWS 5306.

SOCI 5306 [0.5 credit]**Cultural Studies**

The relations between cultural practices and other social practices in definite social formations. Discussions are grounded through the choice of specific Canadian research on topics such as media, art, music, education, pedagogy, etc.

SOCI 5308 [0.5 credit]**Feminist Analyses**

Current theory and research in recent feminist analysis.

SOCI 5309 [0.5 credit]**Cultural Theory**

A survey of developments in European and North American Marxist and Post-Marxist cultural theories of the past quarter century.

SOCI 5400 [0.5 credit]**Political Sociology**

An examination of theoretical and empirical work on selected aspects of the state, politics and political behaviour, primarily in North America and Europe.

SOCI 5401 [0.5 credit]**Critical Disability Studies**

Course engages contemporary disability theory, culture, and activism to consider bodily difference and its relation to the workings of power and social control, accessibility, normalization, ableism, and medicalization. Students will gain an understanding of the contemporary debates, theories, and methodologies of critical disability studies.

SOCI 5403 [0.5 credit]**The Sociology of Solidarity**

The possibilities and practices of solidarity raise core questions about how we understand the social, the other and how we can live together. The course explores these questions in inter-personal, community and global contexts.

SOCI 5404 [0.5 credit]**Race, Ethnicity and Class in Contemporary Societies**

Various theoretical approaches concerning the persistence and re-emergence of ethnic and/or racial groups are examined. Particular emphasis is given to the intersection and overlap of ethnicity and race with social class.

SOCI 5405 [0.5 credit]**Power and Stratification**

An examination of theories of elite behaviour, social class, and ideology.

SOCI 5406 [0.5 credit]**Citizenship and Globalization**

Examination of debates about the changing nature of citizenship in the context of globalization of capital, culture and peoples. Employing post-Marshallian, political economic, post-structuralist, post-colonial and feminist perspectives, the seminar explores the emergence of market-driven, hierarchical and cosmopolitan notions of citizenship and transnational identities.

SOCI 5407 [0.5 credit]**Governmentality and Politics**

Examination of Foucault's concept of governmentality and work which has developed this idea, especially the relevance of governmentality for global political studies. Topics may include: sovereignty, biopolitics, technopolitics, neoliberalism and citizenship. Also listed as PSCI 5303.

Also offered at the undergraduate level, with different requirements, as PSCI 4303, for which additional credit is precluded.

SOCI 5408 [0.5 credit]**Feminism and Materialism**

Recent developments of feminist materialist theory and analyses. Topics may include: the gender division of labour; family and economy; gender and class; gender, race and ethnicity; sexuality; reproduction; theory and politics.

SOCI 5409 [0.5 credit]**The Politics of Social Movements and the State**

Origins, ideologies, strategies and political implications of social and popular movements. May include attention to the peace, feminist, LGBT2SQ, disability, ecology, and anti-racism movements, as well as conservative, religious, and ethnonationalist movements.

SOCI 5501 [0.5 credit]**Phenomenology for Anthropologists and Sociologists**

This seminar builds theoretical and methodological bridges between phenomenology and anthropology/sociology. Students read key texts from, among others, Husserl, Heidegger, Merleau-Ponty, Plessner, Schultz, and Waldenfels and learn to apply concepts in research. Topics include body and senses, intersubjectivity and life-world, selfhood and otherness.

Also listed as ANTH 5501.

Seminar

SOCI 5504 [0.5 credit]**Selected Problems in Political Economy I**

A selected topic from current research in political economy. As the topic varies from year to year, students should check with the Department regarding the current offering.

Also listed as PECO 5501, PSCI 5501.

SOCI 5505 [0.5 credit]**Selected Problems in Political Economy II**

A selected topic from current research in political economy. As the topic varies from year to year, students should check with the Department regarding the current offering.

Also listed as PECO 5502, PSCI 5502.

SOCI 5600 [0.5 credit]**Critical Discourse Analysis**

Examination of the relations between discourse, social semiotics, extradiscursive semiotics and social organization.

SOCI 5605 [0.5 credit]**Demographic Analysis**

Examination of classical debates and contemporary demographic issues such as low fertility, population aging and migration policies. Introduction to the concepts, tools and techniques that demographers use; focus on empirical demographic research.

SOCI 5606 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5607 [0.5 credit]**Contemporary Theories of Crime and Social Regulation**

Recent developments in theories of criminality and social regulation. Particular reference will be made to the regulatory mechanisms of both public and private spheres within legal institutions, corrections, economic institutions, and the family.

SOCI 5707 [0.5 credit]**Crime, Social Control and Social Change**

An examination of the role of the discourses and ideologies surrounding crime, criminal processes, and social change. Topics may include such issues as juvenile justice, victimization, corporate crime, criminalization of indigenous peoples, substance use and abuse.

SOCI 5802 [0.5 credit]**Departmental Seminar**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5803 [0.5 credit]**Critical Theory**

Recent developments in critical theory based upon its initial formulation by the Frankfurt School, with emphasis upon particular contemporary theories in a given year, e.g., J. Habermas, H. Willems, etc.

SOCI 5804 [0.5 credit]**Modern Marxist Theory**

An examination of topics of theory and research in modern Marxist literature; the central focus is on problems of class analysis, the state, and politics in advanced capitalist societies.

SOCI 5805 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5806 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5809 [0.5 credit]**The Logic of the Research Process**

An examination of the research process, including the phases of conceptualization, choice of indicators, sampling, data collection, and analysis. Published articles will be studied as exemplars of the range of possible research strategies.

Includes: Experiential Learning Activity

SOCI 5900 [0.5 credit]**Tutorial****SOCI 5906 [0.5 credit]****Placement in Sociology**

This course provides an opportunity to enhance educational experience through work placement. Students may not be enrolled in the Co-operative Work Term (SOCI 5913) and the Placement in Sociology (SOCI 5906) simultaneously.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

SOCI 5908 [1.0 credit]**M.A. Research Essay**

Students may enrol in this course for a maximum of three consecutive terms of study, including one summer term.

Students must enrol in this course not later than the beginning of the second full year of study.

Includes: Experiential Learning Activity

SOCI 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

SOCI 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Sociology Master of Arts Cooperative Education program.

SOCI 6001 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 6002 [0.5 credit]**Doctoral Seminar Year 1**

Development of self-awareness and skills as sociological scholars and writers. Foundations of sociological research, research techniques, and attendant theoretical issues.

Research project design, grant applications writing, research work management, scholarly writing and presentation.

SOCI 6003 [0.5 credit]**Doctoral Seminar Year 2**

Support for writing comprehensive papers and dissertation research proposal, continued attention to research project design, research work management, scholarly writing and presentation.

SOCI 6900 [0.5 credit]**Tutorial****SOCI 6909 [0.0 credit]****Ph.D. Thesis**

Includes: Experiential Learning Activity

Sustainable Energy

This section presents the requirements for programs in:

- M.A. Sustainable Energy
- M.A.Sc. Sustainable Energy
- M.Eng. Sustainable Energy
- M.Eng. Sustainable Energy with Collaborative Specialization in Climate Change

Program Requirements

M.A. Sustainable Energy (5.0 credits)

M.A. Sustainable Energy (5.0 credits)

1. 2.0 credits in:	2.0
SERG 5002 [0.5] Sustainable Energy Engineering for Policy Students	
SERG 5003 [0.5] Energy Evaluation and Assessment Tools	
SERG 5004 [1.0] Applied Interdisciplinary Project	
2. 0.0 credit in:	0.0
SERG 5800 [0.0] Sustainable Energy Seminar	
3. 0.5 credit in:	0.5
PADM 5121 [0.5] Policy Analysis: The Practical Art of Change	
4. 0.5 credit in:	0.5
PADM 5510 [0.5] Energy Economics	
5. 0.5 credit in:	0.5
PADM 5515 [0.5] Sustainable Energy Policy or PADM 5615 [0.5] Politics and Policy of Energy in Canada	
6. 1.5 credits from Sustainable Energy Policy courses listed below or other courses as approved by the MA supervisor	1.5
Total Credits	5.0

Notes:

1. Courses must be appropriate to the student's qualifications and selected with the approval of the student's program supervisor.

M.A.Sc. Sustainable Energy (5.0 credits)

M.A.Sc. Sustainable Energy (5.0 credits)

1. 1.0 credit in:	1.0
SERG 5001 [0.5] Sustainable Energy Policy for Engineers	
SERG 5003 [0.5] Energy Evaluation and Assessment Tools	
2. 0.0 credit in:	0.0

SERG 5800 [0.0] Sustainable Energy Seminar

3. 1.5 credits from the Mechanical Energy Conversion courses (below), or from the Efficient Electrical Energy Systems courses (below), or from the Sustainable Energy Policy courses. A maximum of 0.5 credits in Sustainable Energy Policy courses will be allowed.

4. 2.5 credits in M.A.Sc. thesis: 2.5
MECH 5909/SYSC 5905 or ELEC 5909 [2.5]

Total Credits 5.0

M.Eng. Sustainable Energy (5.0 credits)

Requirements:

1. 2.0 credits in: 2.0

SERG 5001 [0.5] Sustainable Energy Policy for Engineers

SERG 5003 [0.5] Energy Evaluation and Assessment Tools

SERG 5004 [1.0] Applied Interdisciplinary Project

2. 0.0 credit in: 0.0

SERG 5800 [0.0] Sustainable Energy Seminar

3. 1.5 credits in: 1.5

Mechanical Engineering focus:

1.5 credits in Mechanical Energy Conversion courses (listed below), or Sustainable Energy Policy courses. A maximum of 0.5 credits in Sustainable Energy Policy courses will be allowed.

or

Electrical Engineering focus:

1.5 credit in Efficient Electrical Energy Systems courses (listed below) or Sustainable Energy Policy courses. A maximum of 0.5 credits in Sustainable Energy Policy courses will be allowed.

4. 1.5 credits in: 1.5

Mechanical Engineering focus:

Graduate-level MECH courses

or

Electrical Engineering focus:

Graduate level ELEC, SYSC or EACJ courses

Total Credits 5.0

M.Eng. Sustainable Energy with Collaborative Specialization in Climate Change (5.0 Credits)

Requirements:

1. 1.0 credit in: 1.0

CLIM 5000 [1.0] Climate Collaboration

2. 0.0 credit in:

CLIM 5800 [0.0] Climate Seminar Series

3. 2.0 credits in: 2.0

SERG 5001 [0.5] Sustainable Energy Policy for Engineers

SERG 5003 [0.5] Energy Evaluation and Assessment Tools

SERG 5004 [1.0] Applied Interdisciplinary Project

4. 0.0 credit in:

SERG 5800 [0.0] Sustainable Energy Seminar

5. 2.0 credits in: 2.0

Mechanical Engineering focus:

Graduate-level MECH courses

or

Electrical Engineering focus:

Graduate level ELEC, SYSC or EACJ courses

Total Credits 5.0

Courses - Mechanical Energy Conversion

MECH 5009 [0.5] Environmental Fluid Mechanics Relating to Energy Utilization

MECH 5201 [0.5] Methods of Energy Conversion

MECH 5203 [0.5] Nuclear Engineering

MECH 5204 [0.5] Fundamentals of Combustion

MECH 5205 [0.5] Building Performance Simulation

MECH 5402 [0.5] Gas Turbines

ENVE 5101 [0.5] Air Pollution Control

ENVE 5102 [0.5] Traffic-Related Air Pollution

ENVE 5103 [0.5] Air Quality Modeling

ENVE 5104 [0.5] Indoor Environmental Quality

SERG 5906 [0.5] Directed Studies in Sustainable Energy

With the approval of the Department, the following courses may be included in the above list:

MECH 5800 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5801 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5802 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5803 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5804 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5805 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5806 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5807 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5808 [0.5] Special Topics in Mechanical and Aerospace Engineering

MECH 5809 [0.5] Special Topics in Mechanical and Aerospace Engineering

Courses - Efficient Electrical Energy Systems

ELEC 5200 [0.5] Advanced Topics in Integrated Circuits and Devices 0.5

ELEC 5302 [0.5] Renewable and Distributed Energy Resource Technologies 0.5

ELEC 5405 [0.5] Advanced Linear and Nonlinear Circuit Theory and Applications 0.5

ELEC 5509 [0.5] Integrated Circuit Technology 0.5

ELEC 5707 [0.5] Microsensors and MEMS 0.5

ELEC 5808 [0.5] Signal Processing Electronics 0.5

ELEC 5900 [0.5] Engineering Project I 0.5

SYSC 5001 [0.5] Simulation and Modeling 0.5

SYSC 5004 [0.5] Optimization for Engineering Applications 0.5

SYSC 5006 [0.5] Design of Real-Time and Distributed Systems 0.5

SYSC 5103 [0.5] Software Agents 0.5

SYSC 5104 [0.5] Methodologies For Discrete-Event Modeling And Simulation 0.5

SYSC 5105 [0.5]	Software Quality Engineering and Management	0.5
SYSC 5207 [0.5]	Distributed Systems Engineering	0.5
SYSC 5401 [0.5]	Adaptive and Learning Systems	0.5
SERG 5906 [0.5]	Directed Studies in Sustainable Energy	0.5

Courses - Sustainable Energy Policy

PADM 5510 [0.5]	Energy Economics	
PADM 5511 [0.5]	Energy Management	
PADM 5512 [0.5]	International Politics of Sustainable Energy	
PADM 5572 [0.5]	Policy Seminar (Sustainable Energy)	
PADM 5611 [0.5]	Science and Technology Policies	
PADM 5612 [0.5]	Industrial Policy, Innovation and Sustainable Production	
PADM 5613 [0.5]	Science, Risk and Evaluation	
PADM 5614 [0.5]	Natural Resource Management	
PADM 5616 [0.5]	Environmental Policy	
PADM 5617 [0.5]	Implementing Sustainable Development in Industrialized Countries	
PADM 5618 [0.5]	Environmental and Ecological Economics	
PADM 5619 [0.5]	Urban Sustainability	
PADM 5620 [0.5]	The Science, Politics and Economics of Global Climate Change	
PADM 5908 [1.0]	Research Essay	
SERG 5906 [0.5]	Directed Studies in Sustainable Energy	

Other courses as approved by the MA supervisor

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or better must be obtained in each course counted towards the master's degree.

Full-time Continuation

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after two terms of full-time study (or equivalent), or if they receive a grade of less than B- in any two courses they have registered in.

Part-time Continuation

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after completing 2.0 credits, or if they receive a grade of less than B- in any two courses they have registered in.

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or better must be obtained in each course counted towards the master's degree.

Full-time Continuation

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-)

after two terms of full-time study (or equivalent), or if they receive a grade of less than B- in any two courses they have registered in.

Part-time Continuation

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after completing 2.0 credits, or if they receive a grade of less than B- in any two courses they have registered in.

Regulations

See the General Regulations section of this Calendar.

Academic Standing

A grade of B- or better must be obtained in each course counted towards the master's degree.

Full-time Continuation

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after two terms of full-time study (or equivalent), or if they receive a grade of less than B- in any two courses they have registered in.

Part-time Continuation

Students will be required to withdraw from the program if their weighted grade point average falls below 7.0 (B-) after completing 2.0 credits, or if they receive a grade of less than B- in any two courses they have registered in.

Regularly Scheduled Break

For immigration purposes, the summer term (May to August) for the M.Eng. Sustainable Energy (coursework and project pathways only) is considered a regularly scheduled break approved by the University. Students should resume full-time studies in September.

Admission

Applicants must have a bachelor's degree (or equivalent), with an average of B+ or higher. The level of academic performance and potential demonstrated within the degree is more important than the discipline; students may enter the program from a wide variety of academic backgrounds in the social sciences, humanities, sciences and engineering. Mid-career applicants who do not have a bachelor's degree, but who have demonstrated professional excellence over a number of years of work in the public sector will also be considered.

All applicants must have completed 1.0 credit in university-level micro- and macroeconomic theory (ECON 1000 [1.0] or the equivalent)

0.5 credit in PSCI at the 2000-level or higher, dealing with institutions and processes by which governments legitimize and exercise power, ideally in a Canadian setting (PSCI 2003 or equivalent).

A working knowledge of algebra is also expected.

In some cases, applicants may be admitted to the program despite not having completed one of these prerequisite courses in economics or political science, on the condition that the course be completed with a grade of B- or higher in the first year of the program. It is strongly recommended that students complete the prerequisites before starting

the program, to ensure that their progress through the core courses is unimpeded.

Students whose first language is not English or who have not completed a previous degree at an English speaking university must demonstrate an adequate command of English by attaining, at least, a TOEFL score of 237 CBT (computer-based test) or 580 (written); or 86 IBT overall with a minimum score in each component of: writing: 22; speaking: 22; reading: 20; and listening: 20, or a CAEL score of 70, or an IELTS score of 7.0.

Admission

Applicants must have a bachelor's degree (or equivalent) in a discipline relevant to engineering disciplinary foundations.

Normally, an average of B+ or higher is required for admission.

Admission

Applicants must have a bachelor's degree (or equivalent) in a discipline relevant to engineering disciplinary foundations.

Normally, an average of B+ or higher is required for admission.

Co-operative Education

For more information about how to apply for the Co-op program and how the Co-op program works please visit the Co-op website.

All students participating in the Co-op program are governed by the Graduate Co-operative Education Policy.

Graduate Co-operative Education Policy

Admission and Participation Requirements

For co-op admission and participation requirements please visit: <http://calendar.carleton.ca/grad/gradregulations/administrationoftheregulations/#14>.

Master of Arts, Sustainable Energy: Co-op Admission and Continuation Requirements

A co-op option is available to full-time students in the M.A. program. Students admitted to this option must satisfactorily complete at least two work terms in order to graduate with a co-op designation on their transcripts and diplomas. These work terms are four months in duration and locate students in government departments or other organizations in order to work at a junior officer level. They provide students with opportunities to integrate the theoretical and practical aspects of public administration. During a work term, students will register in PADM 5913. While on a work term, students are limited to an additional 0.5 credit course. It should be noted that most co-op positions in the federal public service are restricted to Canadian citizens.

Co-operative Education

For more information about how to apply for the Co-op program and how the Co-op program works please visit the Co-op website.

All students participating in the Co-op program are governed by the Graduate Co-operative Education Policy.

Graduate Co-operative Education Policy

Admission and Participation Requirements

For co-op admission and participation requirements please visit: <http://calendar.carleton.ca/grad/gradregulations/administrationoftheregulations/#14>.

Master of Engineering, Sustainable Energy: Co-op Admission and Continuation Requirements

A co-op option is available to full-time students in the M.Eng. program. Students admitted to this option must satisfactorily complete at least two work terms in order to graduate with a co-op designation on their transcripts and diplomas.

These work terms are four months in duration and locate students in government departments or other organizations in order to work at a junior level. They provide students with opportunities to integrate the theoretical and practical aspects of engineering and public administration. During a work term, students will be registered in SERG 5913. While on a work term, students are limited to an additional 0.5 credit course, which must be taken outside of work hours. It should be noted that most co-op positions in the federal public service are restricted to Canadian citizens.

Admission Requirements

Students who are interested in admission into the co-op education option and who anticipate meeting the admission requirements outlined below by the end of their second term of academic study must apply by the end of their first term of academic study.

To be eligible for admission to the co-op option, students must:

- a. be registered in the M.Eng. Sustainable Energy program;
- b. have successfully completed, before the start of their first work term, a minimum of 2.0 credits towards the M.Eng. program (of which 0.5 credits must be SERG 5001), with a minimum GPA in the program of 9.0;
- c. be eligible to work in Canada (for off-campus work placements).

Meeting the preceding requirements only establishes eligibility for admission to the co-op option – the prevailing job market may limit enrolment in it. Students should also note that hiring priority is given to Canadian citizens for co-op positions under the auspices of the Public Service Commission. Every effort will be made to find a work placement for each student admitted into the co-op program, but there are no assurances that a co-op position will be found. Students with high CGPA, enthusiasm, and potential, however, will have a competitive edge in securing co-op employment. Students will be assisted by the Carleton University Co-op Office to find work term positions.

Graduation

Students must successfully complete two work terms with a grade of SAT for each, in addition to the M.Eng. degree requirements, to successfully graduate and receive a co-op designation on their final transcript and diploma.

Work Term Course:

SERG 5913 [0.0] Co-operative Work term 0.0

Students who are accepted into the Co-op Education Option will be registered in SERG 5913 each time they secure a work term. In order to make it possible to complete their program no later than one study term after their two work terms, a student should also register in SERG 5004 during their fall work term.

Sustainable Energy (SERG) Courses

SERG 5001 [0.5 credit]

Sustainable Energy Policy for Engineers

This course introduces engineering students to the policy world by examining political and policy institutions, and covering basic principles of policy analysis, as they relate to the energy realm.

SERG 5002 [0.5 credit]

Sustainable Energy Engineering for Policy Students

This course introduces policy students to fundamental principles of engineering, particularly as they relate to energy production, transformation and consumption.

SERG 5003 [0.5 credit]

Energy Evaluation and Assessment Tools

Introduction to principles and tools for financial and performance analysis of energy projects, systems and technologies, and their application. Topics may include: probability theory, regression analysis, cost-benefit analysis, life cycle analysis, carbon accounting and emissions modeling, and other techniques particular to the energy field.

SERG 5004 [1.0 credit]

Applied Interdisciplinary Project

Application of assessment tools, energy evaluation methods, engineering, economics and policy studies to actual sustainable energy projects.

Includes: Experiential Learning Activity

Precludes additional credit for SERG 5000 (no longer offered).

Prerequisite(s): SERG 5003 and one of SERG 5001 or SERG 5002.

SERG 5800 [0.0 credit]

Sustainable Energy Seminar

A series of seminars presented by researchers and practitioners in the area of sustainable energy. To complete this course, a student must attend at least ten seminars during their program.

SERG 5906 [0.5 credit]

Directed Studies in Sustainable Energy

A directed course on selected subjects related to sustainable energy as approved by a course supervisor.

SERG 5913 [0.0 credit]

Co-operative Work term

Includes: Experiential Learning Activity

Technology Innovation Management

This section presents the requirements for programs in:

- Master of Applied Business Analytics - Technology Innovation Management
- M.A.Sc. Technology Innovation Management
- M.Eng. Technology Innovation Management
- Master of Entrepreneurship - Technology Innovation Management

Program Requirements

Master of Applied Business Analytics - Technology Innovation Management (5.5 credits)

Requirements – Project pathway:

1. 2.5 credits in:	2.5
TIMG 5001 [0.5]	Principles of Technology Innovation Management
TIMG 5002 [0.5]	Technology Entrepreneurship
TIMG 5003 [0.5]	Issues in Technology Innovation Management
TIMG 5301 [0.5]	Applied Analytics for Technology Innovation Management
TIMG 5303 [0.5]	Machine Learning for Technology Entrepreneurship Problem-Solving
2. 1.0 credit in approved TIMG elective	1.0
3. 1.0 credit in approved electives in engineering, business, or science	1.0
4. 1.0 credit in:	1.0
TIMG 5907 [1.0]	M.A.B.A. Project

Total Credits 5.5

M.A.Sc. Technology Innovation Management (5.5 credits)

Requirements - Thesis pathway (5.5 credits)

1. 1.5 credits in compulsory courses including:	1.5
TIMG 5001 [0.5]	Principles of Technology Innovation Management
TIMG 5002 [0.5]	Technology Entrepreneurship
TIMG 5003 [0.5]	Issues in Technology Innovation Management
2. 2.0 credits in approved restricted elective courses	2.0
3. 2.0 credits in thesis	2.0

Total Credits 5.5

Restricted Elective Courses

Students in the M.A.Sc. program must complete 1.0 credit in the field of technology innovation management and 1.0 credit in engineering, business or science. Courses in the field of technology innovation management begin with the prefix TIMG.

Non-Restricted Elective Courses

All students in the project option of the master's program are required to complete 1.0 credit from courses offered in engineering, business, or science.

M.Eng. Technology Innovation Management (5.5 credits)

Students in the Master of Engineering program are required to complete a total of 5.5 credits of which at least 5.0 must be at the 5000-level or above, as follows:

Requirements - Project pathway (5.5 credits)

1. 1.5 credits in compulsory courses including:	1.5
TIMG 5001 [0.5] Principles of Technology Innovation Management	
TIMG 5002 [0.5] Technology Entrepreneurship	
TIMG 5003 [0.5] Issues in Technology Innovation Management	
2. 2.0 credits in approved restricted elective courses	2.0
3. 1.0 credit in approved non-restricted electives	1.0
4. 1.0 credit in a graduate project	1.0
Total Credits	5.5

Restricted Elective Courses

Students in the M.Eng. program must complete 1.0 credit in the field of technology innovation management and 1.0 credit in engineering, business or science. Courses in the field of technology innovation management begin with the prefix TIMG.

Non-Restricted Elective Courses

Students in the M.Eng. program are required to complete 1.0 credit from courses offered in engineering, business, or science.

Master of Entrepreneurship - Technology Innovation Management (5.5 credits)

Students in the Master of Entrepreneurship program are required to complete a total of 5.5 credits of which at least 5.0 must be at the 5000-level or above, as follows:

Requirements - Project pathway (5.5 credits)

1. 2.5 credits in:	2.5
TIMG 5001 [0.5] Principles of Technology Innovation Management	
TIMG 5002 [0.5] Technology Entrepreneurship	
TIMG 5003 [0.5] Issues in Technology Innovation Management	
TIMG 5005 [0.5] Customer Value Creation in Technology Firms	
TIMG 5201 [0.5] Technology and Wealth	
2. 2.0 credits in approved restricted electives courses:	2.0
1.0 credit in TIMG, and	
1.0 credit in engineering, business or science.	
3. 1.0 credit in a graduate project	1.0
Total Credits	5.5

Admission

The normal requirement for admission to the master's program is a bachelor's degree in engineering, business, or science, with at least high honours standing.

Candidates are normally required to have two years of technical experience prior to admission.

Candidates applying for admission with degrees in other areas will be considered by the admissions committee.

The committee is responsible for establishing criteria for degree equivalencies.

Regulations

See the General Regulations section of this Calendar.

Technology Innovation Management (TIMG) Courses

TIMG 5001 [0.5 credit]

Principles of Technology Innovation Management

Develops a common level of knowledge among students on topics in product and service development, technology entrepreneurship, and commercialization. These topics build on the literature in the fields of project management, leadership, industrial marketing, managerial economics and organizational behaviour.

Precludes additional credit for TTMG 5001 (no longer offered).

TIMG 5002 [0.5 credit]

Technology Entrepreneurship

Key theories and models of technology entrepreneurship. Topics include the nature of technology products, collaborative experimentation and production of new products, assets, and their attributes, and the firm's asset ownership rights.

Precludes additional credit for TTMG 5002 (no longer offered).

TIMG 5003 [0.5 credit]

Issues in Technology Innovation Management

Key readings relevant to technology innovation management. Topics include the introduction of new products to the global market, technology sourcing, intellectual property rights, industry trends, technology and ethics, new business opportunities and product identification, industry characteristics, regulation, international competition, ecosystems, economic development, and open source.

Precludes additional credit for TTMG 5003 (no longer offered).

TIMG 5004 [0.5 credit]

Research Methods in Technology Innovation Management

Prepares students to undertake research in technology innovation management. Students learn to define interesting research problems and hypotheses relevant to technology innovation management, and learn the different research approaches used in the field of technology innovation management.

Precludes additional credit for TTMG 5004 (no longer offered).

Prerequisite(s): TIMG 5001 and one of TIMG 5002 or TIMG 5003.

TIMG 5005 [0.5 credit]**Customer Value Creation in Technology Firms**

Topics include: architecture, product/service management; technology and complementary assets; latent needs; co-design and user innovation; life-cycle management; pricing; alignment of technology and business strategy; user experience; customer retention.

Precludes additional credit for TTMG 5005 (no longer offered).

Prerequisite(s): TIMG 5001 and TIMG 5002.

TIMG 5006 [0.5 credit]**Management of Software Engineering Projects**

Models for the development of software. Software project management tools. Quality control. Risk assessment and management. Examples are drawn from the development of new technology products.

Includes: Experiential Learning Activity

Precludes additional credit for TTMG 5006 (no longer offered).

Prerequisite(s): TIMG 5001 or TTMG 5001 and TIMG 5002 or TTMG 5002.

TIMG 5101 [0.5 credit]**Integrated Product Development**

The new product introduction process and time-based competition, basic concepts of integrated product development, parallelism and concurrency of development activities, flexibility and agility, the voice of the customer, cross-functional teams, organizing for innovation, collaboration across firm boundaries, manufacturing and design.

Prerequisite(s): TIMG 5001 and TIMG 5002.

TIMG 5103 [0.5 credit]**Advanced Topics in Technology Innovation Management**

In-depth exploration of an advanced topic in the field of technology innovation management. A different topic is covered each semester and more than one section, with different topics, may be offered in the same semester.

Prerequisite(s): one of TIMG 5004, TIMG 5005, or TIMG 5101.

TIMG 5104 [0.5 credit]**Directed Studies in Technology Innovation Management**

The student explores, through extensive literature surveys, specific topics in the areas of technology innovation management. The objective is to enable study on a specific topic to acquire a suitable background to initiate and complete thesis work.

Precludes additional credit for TTMG 5104 (no longer offered). any other directed studies.

TIMG 5105 [0.5 credit]**Designing Innovation Communities**

This course helps entrepreneurs and product managers understand the role of communities in innovation (eg. peer production and crowdsourcing). It provides them with tools for designing communities, and guidelines for selecting the technology for supporting a community.

TIMG 5106 [0.5 credit]**Open Source Business**

The management of open source businesses. Topics may include company participation in open source projects, capturing value from open source projects, creating and managing open source ecosystems, open-source development, role of architecture in open source projects.

TIMG 5201 [0.5 credit]**Technology and Wealth**

Tools, models, approaches, theories and frameworks used to deploy technology to create and appropriate wealth.

TIMG 5301 [0.5 credit]**Applied Analytics for Technology Innovation Management**

Application of advanced business analytics in the domain of technology innovation management and technology entrepreneurship. Topics include supervised and unsupervised machine learning, anticipatory thinking, and anomaly detection, to inform managerial judgement and support strategic and operating decisions faced by managers and entrepreneurs.

Includes: Experiential Learning Activity

Prerequisite(s): TIMG 5001.

TIMG 5303 [0.5 credit]**Machine Learning for Technology Entrepreneurship Problem-Solving**

Application of machine learning tools to co-create solutions to entrepreneurial problems, with an emphasis on unstructured text analytics. Topics include machine learning tools, application of topic modeling and text analytics, generation of practical competitive insights for managers, and analysis of publicly-available sources including websites.

Includes: Experiential Learning Activity

Prerequisite(s): TIMG 5002.

TIMG 5901 [1.0 credit]**M.Eng. Project**

Includes: Experiential Learning Activity

Precludes additional credit for TTMG 5901 (no longer offered).

TIMG 5905 [1.0 credit]**M.Ent. Project**

Includes: Experiential Learning Activity

TIMG 5907 [1.0 credit]**M.A.B.A. Project**

Master of Applied Business Analytics Project.

Includes: Experiential Learning Activity

TIMG 5909 [2.0 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

Precludes additional credit for TTMG 5909 (no longer offered).

Women's and Gender Studies

This section presents the requirements for programs in:

- M.A. Women's and Gender Studies
- M.A. Women's and Gender Studies with Specialization in African Studies
- M.A. Women's and Gender Studies with Specialization in Latin American and Caribbean Studies

Program Requirements

M.A. Women's and Gender Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:	0.5
WGST 5900 [0.5]	Program Seminar
2. 0.5 credit in:	0.5
WGST 5906 [0.5]	Feminist Theory
3. 0.5 credit in:	0.5
WGST 5907 [0.5]	Researching Women's and Gender Issues
4. 1.5 credit in additional course work chosen from available elective courses (see below)	1.5
5. 2.0 credits in:	2.0
WGST 5909 [2.0]	M.A. Thesis

Total Credits 5.0

Requirements - Research essay pathway (5.0 credits)

1. 0.5 credit in:	0.5
WGST 5900 [0.5]	Program Seminar
2. 0.5 credit in:	0.5
WGST 5906 [0.5]	Feminist Theory
3. 0.5 credit in:	0.5
WGST 5907 [0.5]	Researching Women's and Gender Issues
4. 2.5 credits of additional course work chosen from available elective courses (see below)	2.5
5. 1.0 credit in:	1.0
WGST 5908 [1.0]	Research Essay

Total Credits 5.0

Requirements - Coursework pathway (5.0 credits)

1. 0.5 credit in:	0.5
WGST 5900 [0.5]	Program Seminar
2. 0.5 credit in:	0.5
WGST 5906 [0.5]	Feminist Theory
3. 0.5 credit in:	0.5
WGST 5907 [0.5]	Researching Women's and Gender Issues
4. 3.5 credits in additional course work chosen from available elective courses (see below)	3.5

Total Credits 5.0

M.A. Women's and Gender Studies with Specialization in African Studies (5.0 credit)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 0.5 credit in:	0.5
WGST 5900 [0.5]	Program Seminar

4. 0.5 credit in:	0.5
WGST 5906 [0.5]	Feminist Theory
5. 0.5 credit in:	0.5
WGST 5907 [0.5]	Researching Women's and Gender Issues
6. 1.0 credit in additional course work chosen from available elective courses (see below)	1.0
7. 2.0 credits in:	2.0
WGST 5909 [2.0]	M.A. Thesis

Total Credits 5.0

Requirements - Research essay pathway (5.0 credits)

1. 0.5 credit in:	0.5
AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
2. 0.0 credit in:	0.0
AFRI 5800 [0.0]	Scholarly Preparation in African Studies
3. 0.5 credit in:	0.5
WGST 5900 [0.5]	Program Seminar
4. 0.5 credit in:	0.5
WGST 5906 [0.5]	Feminist Theory
5. 0.5 credit in:	0.5
WGST 5907 [0.5]	Researching Women's and Gender Issues
6. 2.0 credits in additional course work chosen from available elective courses (see below)	2.0
7. 1.0 credit in:	1.0
WGST 5908 [1.0]	Research Essay

Total Credits 5.0

Selection of Courses - African Studies

The courses listed below are relevant to students of African Studies and could, with the approval of the specific requirements of the units involved, be used as courses to help fulfil degree requirements. There are also often graduate courses and 4000-level courses in a number of units at Carleton that are offered on an ad hoc basis that have significant content appropriate to African Studies. To have any such course count towards their degree requires approval of the Director of the Institute of African Studies when it is being offered.

African Studies

AFRI 5000 [0.5]	African Studies as a Discipline: Historical and Current Perspectives
AFRI 5050 [0.5]	Selected Topics in African Studies
AFRI 5100 [0.5]	African Studies Abroad
AFRI 5700 [0.5]	Directed Readings in African Studies
AFRI 5900 [0.5]	Placement
AFRI 5800 [0.0]	Scholarly Preparation in African Studies

Anthropology

ANTH 5109 [0.5]	Ethnography, Gender and Globalization
ANTH 5202 [0.5]	The Anthropology of Underdevelopment
ANTH 5209 [0.5]	Special Topics in the Anthropology of Africa

ANTH 5809 [0.5]	Selected Topics in the Anthropology of Development and Underdevelopment
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English

ENGL 5008 [0.5]	Studies in African Literature
ENGL 5010 [0.5]	Studies in Caribbean Literature

French

FREN 5212 [0.5]	Littératures francophones
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International Affairs

INAF 5603 [0.5]	Issues in Development in Africa
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Law

LAWS 5007 [0.5]	Race, Ethnicity and the Law
LAWS 5603 [0.5]	International Law: Theory and Practice

Political Science

PSCI 5107 [0.5]	Globalization, Adjustment and Democracy in Africa
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5203 [0.5]	Southern Africa After Apartheid

Sociology

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
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Women's and Gender Studies

WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II
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M.A. Women's and Gender Studies with Specialization in Latin American and Caribbean Studies (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 0.5 credit in:		0.5
LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 0.5 credit in:		0.5
WGST 5900 [0.5]	Program Seminar	
4. 1.0 credit in:		1.0
WGST 5906 [0.5]	Feminist Theory	
WGST 5907 [0.5]	Researching Women's and Gender Issues	
5. 1.0 credit in	courses designated as having sufficient Latin American and Caribbean Studies content, approved by both the Women's and Gender Studies Supervisor and the Latin American and Caribbean Studies Coordinator	1.0
6. 2.0 credits in:		2.0
WGST 5909 [2.0]	M.A .Thesis (in the specialization)	
Total Credits		5.0

Requirements - Research essay pathway (5.0 credits)

1. 0.5 credit in:		0.5
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LACS 5000 [0.5]	Interdisciplinary Approaches to Latin American and Caribbean Studies	
2. 0.0 credit in:		0.0
LACS 5800 [0.0]	Scholarly Preparation in Latin American and Caribbean Studies	
3. 0.5 credit in:		0.5
WGST 5900 [0.5]	Program Seminar	
4. 1.0 credit in:		1.0
WGST 5906 [0.5]	Feminist Theory	
WGST 5907 [0.5]	Researching Women's and Gender Issues	
5. 1.0 credit in	courses designated as having sufficient Latin American and Caribbean Studies content, approved by both the Women's and Gender Studies Supervisor and the Latin American and Caribbean Studies Coordinator	1.0
6. 1.0 credit in	available elective courses	1.0
7. 1.0 credit in:		1.0
WGST 5908 [1.0]	Research Essay (in the specialization)	
Total Credits		5.0

Elective Courses

Electives may be taken from a selection of courses offered outside the program in a related discipline, subject to the approval of the Graduate Supervisor.

Elective courses may include but are not limited to:

ANTH 5704 [0.5]	Anthropology of the Body, Health, Illness and Healing
COMS 5509 [0.5]	Gender, Sexuality, Culture
HIST 5803 [0.5]	History of Women, Gender and Sexuality: Foundations
INAF 5003 [0.5]	Project Operations in a Developing Country Context
INAF 5609 [0.5]	Development Project Evaluation and Analysis
LAWS 5302 [0.5]	Feminism, Law and Social Transformation
LAWS 6003 [0.5]	Human Rights, Citizenship and Global Justice
PADM 5213 [0.5]	Gender and Public Policy
PHIL 5304 [0.5]	Tutorial in Selected Problems of Philosophy I
PHIL 5350 [0.5]	Topics in Ethics or Political Philosophy
PHIL 5500 [0.5]	Topics in Contemporary Philosophy
PSCI 5200 [0.5]	Nationalism
PSCI 5202 [0.5]	Development Theory and Issues
PSCI 5208 [0.5]	Global Social Policy
PSCI 5209 [0.5]	Forced Migration and Global Politics
PSCI 5210 [0.5]	Politics and Popular Culture
PSCI 5407 [0.5]	Reproductive Rights Policy in North America
PSCI 5506 [0.5]	Gender and Politics
PSCI 5607 [0.5]	Politics of North America
PSCI 6301 [0.5]	Political Theory II
PSYC 5001 [0.5]	Qualitative Research Methods in Psychology
SOCI 5308 [0.5]	Feminist Analyses

SOCI 5404 [0.5]	Race, Ethnicity and Class in Contemporary Societies
SOCI 5409 [0.5]	The Politics of Social Movements and the State
SOCI 5809 [0.5]	The Logic of the Research Process
WGST 5000 [0.5]	Issues for Feminist Scholarship
WGST 5001 [0.5]	Research Seminar in Women's and Gender Studies
WGST 5901 [0.5]	Advanced Topics in Women's and Gender Studies I
WGST 5902 [0.5]	Advanced Topics in Women's and Gender Studies II
WGST 5910 [0.5]	Directed Studies
WGST 5911 [0.5]	Directed Studies
WGST 5920 [1.0]	Internship in Women's and Gender Studies

Progress through the program

The first year of study is essentially the same for all full-time students entering the program regardless of whether their intention is to pursue the Thesis, Research Essay or Course work option (the schedule for program completion for part-time students is in consultation with the unit). All full-time students will be expected to complete the core feminist theory and methodologies courses in the first year.

At the end of the winter term of the first year of study, and in consultation with the Graduate Supervisor, full-time students will be required to declare their intention to pursue the Thesis, Research Essay, or Course work option. The deadline for this decision will normally be in writing on or before April 1st.

Thesis option

In the fall of the second year of study, all full-time students will be expected to submit a research proposal that has been approved by their Thesis supervisor. The deadline for submitting the proposal is September 15.

Research Essay option

In the fall of the second year of study, all full-time students will be expected to submit a research proposal that has been approved by their Research Essay supervisor. The deadline for submitting the proposal is September 15. Students pursuing the Research Essay option will also be required to complete two additional half-course electives. Typically, these courses will be completed in the fall term of the second year.

Coursework option

Students pursuing the coursework option will be required to complete four additional half-course electives. Typically, these courses will be completed over the fall and winter terms of the second year.

Regulations

See the General Regulations section of this Calendar.

Academic standing of B- or higher must be obtained in each course counted towards the fulfillment of the degree requirements. Candidates must also maintain a CGPA of 9.0 or higher and achieve Satisfactory or better on the M.A. thesis and its oral defence.

Admission

The minimum requirement for admission to the MA program in Women's and Gender Studies is a BA Honours degree in Women's and Gender Studies or related areas with high honours standing. Students who have completed a degree with a significant focus on gender and gender-related coursework from disciplines including Sociology, History, English, Philosophy, Anthropology, Canadian Studies and Political Science, for example, will be considered for admission to the program. Applicants without the requisite background may be required to take a maximum of 2.0 credits from designated courses at the undergraduate level in Women's and Gender Studies in addition to their normal MA program requirements.

Qualifying Year Program

Applicants without a B.A. Honours degree in Women's and Gender Studies but who have a three year degree with a Women's and Gender Studies major, minor or a degree in a related discipline with a minimum average of B+ will be required to complete successfully a qualifying year of full-time study, before proceeding to apply to the Master's program. At this time, the Institute will determine the student's eligibility to enter the program.

Accelerated Pathway

The accelerated pathway in Women and Gender Studies is a flexible and individualized plan of graduate study for students in their final year of a Carleton B.A. Honours degree in Women and Gender Studies.

Students in their third-year of study in the B.A Honours degree in Women and Gender Studies should consult with both the Undergraduate Advisor and the Graduate Advisor determine if the accelerated pathway is appropriate for them and to confirm their selection of courses and Honours project supervisor for their final year of undergraduate studies.

Accelerated Pathway Requirements

1. Two courses at the 5000-level with a grade of B+ or higher.
2. Minimal overall CGPA of B+

Students may receive advanced standing with transfer of credit of up to 1.0 credit which can reduce their time to completion.

Women's and Gender Studies (WGST) Courses

WGST 5000 [0.5 credit]

Issues for Feminist Scholarship

Selected issues based on the research expertise of the Instructor, designed to provide students with a broad introduction to the diversity of women's experiences within that issue. Critical issues related to race, class, gender and ability.

WGST 5001 [0.5 credit]**Research Seminar in Women's and Gender Studies**

An examination of the Instructor's research focus (topics will vary from year-to-year) with respect to issues of feminist methodologies and epistemology related to developing and conducting feminist or women-centred research. The focus is interdisciplinary.

WGST 5003 [0.5 credit]**Traversing Feminisms**

Interdisciplinary overview of key historical concepts in Women's and Gender Studies in the areas of theory, epistemology, and research design. Topics will vary from year to year. The course provides additional background for students entering Women's and Gender Studies from other disciplines.

Prerequisite(s): permission of the Institute.

Also offered at the undergraduate level, with different requirements, as WGST 4003, for which additional credit is precluded.

WGST 5102 [0.5 credit]**Queer Theory**

A critical approach to gender and sexuality by engaging in key debates and texts in the field of queer theory and studies.

Includes: Experiential Learning Activity

Prerequisite(s): Graduate student standing and permission of the institute.

Also offered at the undergraduate level, with different requirements, as SXST 4102, for which additional credit is precluded.

WGST 5900 [0.5 credit]**Program Seminar**

MA candidates are required to take part in a seminar in which faculty members and students discuss new work in the field, analyze current issues in Women's and Gender Studies, and pursue topics of professional development. Students will prepare their thesis or research paper.

Includes: Experiential Learning Activity

Precludes additional credit for WGST 5905 (no longer offered).

Prerequisite(s): Permission of the Institute.

WGST 5901 [0.5 credit]**Advanced Topics in Women's and Gender Studies I**

The applications of gender to different fields of knowledge, cultural expression, and institutional regulation. Gender will be interrogated as it intersects with race, class, ethnicity, age, ability and cross-cultural perspectives.

WGST 5902 [0.5 credit]**Advanced Topics in Women's and Gender Studies II**

Selected topics may include: gender, power and social inequalities; women's writing; gender history; gender, sexuality and music embodiment; race, gender and imperialism; gender, criminology and criminal justice; queer theory; transnational feminisms.

WGST 5906 [0.5 credit]**Feminist Theory**

An analysis of contemporary feminist theoretical debates that provides students with competence in the application of a range of theoretical models, and an appreciation of their specific historical contexts and development.

WGST 5907 [0.5 credit]**Researching Women's and Gender Issues**

Consideration of a range of research methodologies and approaches relevant to women's and gender studies. In particular, students will examine the impact of gender studies on epistemological and methodological issues in a variety of academic disciplines.

WGST 5908 [1.0 credit]**Research Essay**

An examination of an approved topic in an area of specialization of either the Institute faculty or associated faculty from across the University. Students will have a supervisor and a second reader.

Includes: Experiential Learning Activity

WGST 5909 [2.0 credits]**M.A. Thesis**

A substantial investigation of a topic in Women's and Gender Studies that will be determined in consultation with the Institute. Students will have a primary supervisor selected from within the Institute or from associated Faculty across the University. The candidate will be examined orally on.

Includes: Experiential Learning Activity

WGST 5910 [0.5 credit]**Directed Studies**

Directed study on selected topics may be arranged with a faculty member or visiting scholar with the permission of the Institute. Students cannot accumulate more than 1.0 credit in directed studies towards their degree requirements.

WGST 5911 [0.5 credit]**Directed Studies**

Directed study on selected topics may be arranged with a faculty member or visiting scholar with the permission of the Institute. Students cannot accumulate more than 1.0 credit in directed studies towards their degree requirements.

WGST 5920 [1.0 credit]**Internship in Women's and Gender Studies**

Experience in applied feminisms through a combination of classroom seminars and internship. Each project will be negotiated individually as a contract between the student, instructor and institutional partner. Students must complete both the in-class and the internship portion of the course.

Includes: Experiential Learning Activity

Prerequisite(s): Enrollment in the M.A. Women's and Gender Studies program.

Also offered at the undergraduate level, with different requirements, as WGST 4801, for which additional credit is precluded.

Work and Labour

This section presents the requirements for programs in:

- M.A. Political Economy with Concentration in Work and Labour
- Graduate Diploma in Work and Labour

M.A. Political Economy with Concentration in Work and Labour (5.0 credits)

Requirements - Thesis pathway (5.0 credits)

1. 1.0 credit in:	1.0
PECO 5000 [0.5]	Theories of Political Economy
PECO 5001 [0.5]	The Methodology of Political Economy
2. 0.5 credit in:	0.5
PECO 5002 [0.5]	Political Economy of Work and Labour
3. 0.5 credit from:	0.5
PECO 5503 [0.5]	Selected Issues in Work and Labour I
or PECO 5504 [0.5]	Selected Issues in Work and Labour II
4. 0.5 credit in:	0.5
PECO 5906 [0.5]	Reflective Practice on Work and Labour
or PECO 5907 [0.5]	Placement in Political Economy
5. 0.5 credit in approved elective	0.5
6. 2.0 credits in:	2.0
PECO 5909 [2.0]	M.A. Thesis (on a Work and Labour topic)
Total Credits	5.0

Requirements - Research essay pathway (5.0 credits)

1. 1.0 credit in:	1.0
PECO 5000 [0.5]	Theories of Political Economy
PECO 5001 [0.5]	The Methodology of Political Economy
2. 0.5 credit in:	0.5
PECO 5002 [0.5]	Political Economy of Work and Labour
3. 0.5 credit from:	0.5
PECO 5503 [0.5]	Selected Issues in Work and Labour I
or PECO 5504 [0.5]	Selected Issues in Work and Labour II
4. 0.5 credit in:	0.5
PECO 5906 [0.5]	Reflective Practice on Work and Labour
or PECO 5907 [0.5]	Placement in Political Economy
5. 1.5 credits in approved electives	1.5
6. 1.0 credit in:	1.0
PECO 5908 [1.0]	Research Essay
Total Credits	5.0

Graduate Diploma in Work and Labour (2.5 credits)

Requirements (2.5 credits):

1. 0.5 credit in:	0.5
PECO 5002 [0.5]	Political Economy of Work and Labour

2. 0.5 credit from:	0.5
PECO 5503 [0.5]	Selected Issues in Work and Labour I
or PECO 5504 [0.5]	Selected Issues in Work and Labour II
3. 0.5 credit from:	0.5
PECO 5906 [0.5]	Reflective Practice on Work and Labour
PECO 5907 [0.5]	Placement in Political Economy
4. 1.0 credit in approved cognate discipline courses	1.0
Total Credits	2.5

Admission

Type 2 Diploma

Applicants must be enrolled at Carleton University in a master's or doctoral program in a related discipline.

Type 3 Diploma

Applicants must possess an honours bachelor or equivalent four-year undergraduate university degree in a social sciences, humanities, or disciplinary program relevant to Work and Labour. Applicants without these qualifications may be considered for admission with a BA General degree and significant relevant work or volunteer experience in the area of labour issues.

Political Economy (PECO) Courses

PECO 5000 [0.5 credit]

Theories of Political Economy

A survey of the core concepts and ideas proposed by both the founders and modern practitioners of political economy. Particular attention will be paid to contemporary theorists and classical theorists such as Smith, Ricardo, Marx, Mill, Schumpeter, Keynes, Veblen, and Innis.

PECO 5001 [0.5 credit]

The Methodology of Political Economy

An examination of the methods, procedures, and rules for developing theory and guiding inquiry in political economy research, including topics such as logic of inquiry, conceptualization, research design, dialectics, level of analysis, comparison, evidence and statistics.

PECO 5002 [0.5 credit]

Political Economy of Work and Labour

Interdisciplinary survey of core concepts, contexts, and debates in the study of work and labour; critical and historical approach addressing inequalities of class, race, and disabilities; relational perspective on labour including technological change, care, political action, and the environment.

PECO 5501 [0.5 credit]

Selected Problems in Political Economy I

Also listed as SOCI 5504, PSCI 5501.

PECO 5502 [0.5 credit]

Selected Problems in Political Economy II

Also listed as SOCI 5505, PSCI 5502.

PECO 5503 [0.5 credit]**Selected Issues in Work and Labour I**

Topics and emphasis vary from term to term according to current policies and events influencing the distribution and benefits of work and labour including migration, technological and environmental change, privatization, austerity, and transnational legislation.

PECO 5504 [0.5 credit]**Selected Issues in Work and Labour II**

Topics and emphasis vary from term to term according to current policies and events influencing the distribution and benefits of work and labour including migration, technological and environmental change, privatization, austerity, and transnational legislation.

PECO 5900 [0.5 credit]**Tutorial in Political Economy**

Directed readings on selected aspects of political economy, involving preparation of papers as the basis for discussion with the tutor. Offered when no regular course offering meets a candidate's specific needs.

Prerequisite(s): permission of the Director.

PECO 5906 [0.5 credit]**Reflective Practice on Work and Labour**

Through a reflection on their current work environment, it is expected that students that are working would apply the knowledge received to enrich their work place. Students will provide relevant reflections and proposals to enrich their work-practices over the period of one-semester.

Includes: Experiential Learning Activity

Prerequisite(s): PECO 5002 and permission of the department.

PECO 5907 [0.5 credit]**Placement in Political Economy**

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in the community. Placement possibilities may be initiated by the student or arranged through community contacts established by the Institute of Political Economy.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Director.

PECO 5908 [1.0 credit]**Research Essay**

Directly linked to the student's course work, the research essay must be interdisciplinary in approach.

Includes: Experiential Learning Activity

PECO 5909 [2.0 credits]**M.A. Thesis**

The thesis is an alternative to the research essay. It must also be interdisciplinary in approach, and requires greater substance and originality than the Research Essay.

Normally, a student's thesis committee will be composed of members from more than one discipline.

Includes: Experiential Learning Activity

PECO 6000 [0.5 credit]**Political Economy: Core Concepts**

Core concepts in political economy, drawn from classical and contemporary writings. Topics will be selected in consultation with participating units, taking into account the potential number of students, their research interests and those of the participating units.

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Accounting (ACCT)

Accounting (ACCT) Courses

ACCT 5001 [0.25 credit]

Financial Accounting

Fundamentals of financial accounting. Techniques used to measure business transactions, preparation of financial statements, recording and valuation of assets, liabilities and equities.

Precludes additional credit for BUSI 5004 (no longer offered).

ACCT 5002 [0.25 credit]

Managerial Accounting

Fundamentals of managerial accounting and control. Techniques for management decision-making, planning, and control including cost-volume-profit analysis, product costing, variance analysis, relevant costing, transfer pricing and the balanced scorecard.

Precludes additional credit for BUSI 5005 (no longer offered).

Prerequisite(s): ACCT 5001.

ACCT 5011 [0.25 credit]**Financial Statement Analysis**

A user-oriented approach to the study of financial statements. The role of the financial statements and the annual report in the financial reporting process, using ratio analysis to analyze firm performance and make forecasts of future performance.

Precludes additional credit for BUSI 5000 (no longer offered).

Prerequisite(s): ACCT 5002.

ACCT 5012 [0.25 credit]**Performance Measurement and Control**

Efficacy and efficiency of corporate strategies. Design and use of performance measurement systems from an organizational integrated systems view. Balanced scorecard, activity-based management, and other performance measurement and control systems.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5000 (no longer offered).

Prerequisite(s): ACCT 5002.

ACCT 5013 [0.25 credit]**Financial Reporting and Control in Public Organizations**

Public sector accounting principles, practices, and unique financial reporting requirements. Comparison with private sector financial reporting, control, and performance evaluation.

Prerequisite(s): ACCT 5002.

ACCT 5014 [0.25 credit]**Governance and Accountability**

Corporate governance functions including management and controllership, boards of directors, auditors, security commissions and the control of enterprise-wide risk management. Historical development and evaluation of current practices, including Sarbanes Oxley and its implications.

ACCT 5120 [0.5 credit]**Advanced Concepts**

An in-depth exploration of selected topics in financial accounting, assurance and taxation.

Includes: Experiential Learning Activity

ACCT 5121 [0.5 credit]**Advanced Concepts II**

An in-depth exploration of selected topics in management accounting, finance and corporate governance.

ACCT 5122 [0.25 credit]**Issues in Taxation**

This course will provide students additional knowledge in Canadian Federal Taxation required in the MAcc program. Emphasis on corporate income tax and some specialized topics.

Prerequisite(s): permission of the M.Acc. office.

ACCT 5123 [0.5 credit]**Advanced Taxation**

Canadian taxation planning issues regarding personal and business decisions involving individuals, corporations, partnerships and trusts.

Includes: Experiential Learning Activity

ACCT 5124 [0.25 credit]**Data Analytics for Professional Accountants**

Data and information analysis with application to professional accounting.

ACCT 5125 [0.5 credit]**Advanced Assurance**

Assurance concepts are applied to a range of assurance and auditing engagements, including auditing financial statements and non-financial statement assurance engagements. Current trends in assurance are also explored.

Includes: Experiential Learning Activity

ACCT 5128 [0.25 credit]**Strategy for Professional Accountants**

Overview of the strategy process required of professional accountants. Case-based course with accounting focus, exploring the development of a company's situation analysis, identification and analysis of strategic and operational issues.

Includes: Experiential Learning Activity

ACCT 5129 [0.25 credit]**Professional Accounting Cases I**

An introduction to approaching, planning and writing accounting cases, including integration across multiple disciplines.

Includes: Experiential Learning Activity

ACCT 5130 [0.5 credit]**Advanced Finance**

The impact of the financing decision upon the value of the firm, firm valuation, investing and risk management.

ACCT 5131 [0.5 credit]**Performance Management**

Exploration of performance management in evaluating organizational performance, management decision making, effective problem solving skills and making recommendations for improvements to organizational operations.

Includes: Experiential Learning Activity

ACCT 5134 [0.5 credit]**Advanced Integration I**

Discussion, analysis and integration with an emphasis on the application of strategic management to various accounting and finance issues.

Includes: Experiential Learning Activity

Precludes additional credit for ACCT 5133 (no longer offered).

Prerequisite(s): ACCT 5128. Completion of a minimum of 2.0 credits in the Master of Accounting program with a minimum average grade of B-.

ACCT 5136 [0.5 credit]**Advanced Integration II**

Discussion, analysis and integration of issues involving financial reporting, assurance, finance, management accounting, taxation and/or strategy.

Includes: Experiential Learning Activity

Precludes additional credit for ACCT 5135 (no longer offered).

Prerequisite(s): ACCT 5134.

ACCT 5137 [0.25 credit]**Professional Accounting Cases II**

A continued development and honing of problem solving abilities when placed in real-life, business situations.

Case-writing skills will be finessed, with focus on analysis and integration, while keeping the big picture in mind.

Includes: Experiential Learning Activity

Prerequisite(s): ACCT 5120 and ACCT 5121.

ACCT 5199 [1.0 credit]**Internship**

Application of M.Acc. course knowledge and building management skills in a professional environment.

Minimum 480 hours. Graded Sat/Uns.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the M.Acc. office.

African Studies (AFRI)

African Studies (AFRI) Courses**AFRI 5000 [0.5 credit]****African Studies as a Discipline: Historical and Current Perspectives**

This course examines the formation of African Studies as a discipline, including the historical and ongoing debates over its boundaries and genealogies and its changing research paradigms.

AFRI 5050 [0.5 credit]**Selected Topics in African Studies**

A course on a selected topic in African Studies. Topic varies from year to year and will be announced in advance of registration period.

Also offered at the undergraduate level, with different requirements, as AFRI 4050, for which additional credit is precluded.

AFRI 5060 [0.5 credit]**African Feminisms**

African feminisms as theoretical interventions and as political practice, and as diverse forms. Gender as a marker of power: status, hierarchy, social capability, and as a system of distribution of resources, responsibilities and solidarities.

Also offered at the undergraduate level, with different requirements, as AFRI 4060, for which additional credit is precluded.

AFRI 5100 [0.5 credit]**African Studies Abroad**

Based at one of Carleton's partner universities in Africa, course will include lectures, seminars, guest speakers, field visits and group research projects to examine a topic in African studies, as selected by the instructor. Topic and location may change annually.

Includes: Experiential Learning Activity

AFRI 5700 [0.5 credit]**Directed Readings in African Studies**

A Tutorial on a selected topic in African Studies in which seminars are not available.

AFRI 5800 [0.0 credit]**Scholarly Preparation in African Studies**

This course will provide scholarly preparation in African Studies by requiring participation in public talks as both audience member and presenter.

Includes: Experiential Learning Activity

AFRI 5900 [0.5 credit]**Placement**

Students spend up to one day a week participating in an organization that has an African focus, while carrying out tasks that have a scholarly content. Consult the Director of the Institute of African Studies.

Includes: Experiential Learning Activity

Anthropology (ANTH)

Anthropology (ANTH) Courses**ANTH 5004 [0.5 credit]****Ecological Anthropology**

Theoretical and ethnographic approaches to the production of nature across disciplinary categories and natural-cultural configurations. Specific topics considered may include ecological crisis, indigenous rights and posthuman ethnography.

ANTH 5005 [0.5 credit]**Visual Anthropology as a Research Method: Dilemmas and Debates**

Anthropological theories, debates, and dilemmas related to visual anthropology as part of ethnographic practice in historical and contemporary contexts. Topics may include ethics, analysis of images, film, symbols; the use of visual materials in ethnographic writing.

ANTH 5106 [0.5 credit]**North American Indigenous Peoples**

Selected issues in North American Indian, Inuit, and Métis ethnographic studies. Debates over social change, cultural autonomy, native rights, and government policy.

ANTH 5107 [0.5 credit]**Issues in North American Ethnohistory**

Methodological and substantive problems in the history of North American indigenous peoples. Controversies concerning the impact of European penetration and colonial policies on inter-tribal relations, cultural identity, and other aspects of native life.

ANTH 5109 [0.5 credit]**Ethnography, Gender and Globalization**

Intersections of gender and globalization; ethnographic focus on how the movements of people, goods, ideas, and capital are transforming existing formations of gender and sexualities. Topics and approaches may vary from year to year.

Also offered at the undergraduate level, with different requirements, as ANTH 4109, for which additional credit is precluded.

ANTH 5202 [0.5 credit]**The Anthropology of Underdevelopment**

Analysis of theoretical and historically concrete issues in the study of variable economic systems ranging from domestic subsistence and peasant production to slavery and capital-dominated markets.

ANTH 5208 [0.5 credit]**Anthropology of Indigeneity**

An international exploration of what it means to claim indigeneness within a variety of contexts. The cultural politics of indigenous status in relation to such issues as primitivism, memory and revivalism in modern nation-states and diasporic communities.

ANTH 5209 [0.5 credit]**Special Topics in the Anthropology of Africa**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5210 [0.5 credit]**Special Topics in Indigenous Studies**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5305 [0.5 credit]**Special Topics in Ethnography**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5355 [0.5 credit]**Anthropology of Natural Resources**

Anthropology of natural resources. Topics may include the economies, ecologies, cultural and social dynamics of fishing, forestry, lands, mining, oil, wildlife, at varying analytical scales, including a critical examination of the term "natural resource" itself.

Also offered at the undergraduate level, with different requirements, as ANTH 4355, for which additional credit is precluded.

Seminar and discussion three hours per week.

ANTH 5401 [0.5 credit]**Theories and Methods I**

Theoretical and methodological debates in contemporary anthropology.

ANTH 5402 [0.5 credit]**Theories and Methods II**

Theoretical and methodological debates in contemporary anthropology.

Prerequisite(s): ANTH 5401 or permission of the Department.

ANTH 5403 [0.5 credit]**Interpreting Symbols**

Theoretical and methodological approaches to the anthropology of signs and symbols, including the internal workings of symbolic systems, and their relationship to other aspects of social life.

ANTH 5501 [0.5 credit]**Phenomenology for Anthropologists and Sociologists**

This seminar builds theoretical and methodological bridges between phenomenology and anthropology/sociology. Students read key texts from, among others, Husserl, Heidegger, Merleau-Ponty, Plessner, Schultz, and Waldenfels and learn to apply concepts in research. Topics include body and senses, intersubjectivity and life-world, selfhood and otherness.

Also listed as SOCI 5501.

seminar

ANTH 5505 [0.5 credit]**Anthropology of Performance**

The seminar introduces students to the anthropological concept of performance and its foundations in speech act theory, practice theory, semiotics and phenomenology. Topics range from the cross-cultural study of diverse performance genres to reflections on the performative nature of social life and cultural reality.

ANTH 5560 [0.5 credit]**Economic Anthropology**

Anthropology's holistic, comparative and critical contribution to the study of livelihood. How practices and understandings of production, circulation, consumption, and property vary cross-culturally. Relevant theoretical debates including those among formalist (neo-classical), substantivist, Marxist, and interpretive approaches over the applicability of capitalist thinking.

Also offered at the undergraduate level, with different requirements, as ANTH 4560, for which additional credit is precluded.

Seminar three hours a week.

ANTH 5570 [0.5 credit]**Political Anthropology**

Can anthropology help us understand politics? Can ethnographic encounters help us approach political theory and political action differently? This seminar will focus on concepts (power, authority, equality) and practices (resistance, subjection, solidarity) through which anthropologists invite us to rethink the way we live together.

Also offered at the undergraduate level, with different requirements, as ANTH 4570, for which additional credit is precluded.

ANTH 5701 [0.5 credit]**Anthropology of Religion**

Anthropological literature and theories on religion in light of current debates in anthropology.

ANTH 5704 [0.5 credit]**Anthropology of the Body, Health, Illness and Healing**

Issues and applications in medical anthropology. Topics may include the sociocultural meanings inscribed on the body; cultural perceptions of the prevention, causes and treatment of illness; social dimensions of the illness experience; and the political economy of health.

ANTH 5706 [0.5 credit]**Contemporary Material Cultures**

The study of material culture and its potential for addressing contemporary social and cultural conditions in a variety of local and transcultural contexts.

ANTH 5708 [0.5 credit]**Special Topics in Anthropology**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5807 [0.5 credit]**Special Topics in Symbolism and Culture**

Topic varies from year to year, and will be announced in advance of the registration period.

ANTH 5808 [0.5 credit]**Selected Topics in North American Native Studies**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

ANTH 5809 [0.5 credit]**Selected Topics in the Anthropology of Development and Underdevelopment**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

ANTH 5812 [0.5 credit]**Research Design**

Design and methods of anthropological enquiry.
Includes: Experiential Learning Activity

ANTH 5900 [0.5 credit]**Tutorial****ANTH 5906 [0.5 credit]****Fieldwork**

Directed field research.
Includes: Experiential Learning Activity
Prerequisite(s): permission of the Department.

ANTH 5907 [0.5 credit]**Placement in Anthropology**

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in museums, government departments, non-governmental organizations, or other professional research settings. Placement research must be related to the preparation of the master's thesis.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ANTH 5908 [1.0 credit]**M.A. Research Essay**

Students will normally enrol in this course for a maximum of three consecutive terms of study, including one summer term. Students must normally enrol in this course not later than the beginning of the second full year of study.

Includes: Experiential Learning Activity

ANTH 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

ANTH 6000 [1.0 credit]**Doctoral Seminar: Theory and Method in Contemporary Anthropology**

An in-depth exploration of theory and method in contemporary socio-cultural anthropology with special emphasis on engaged anthropology. This course is required of all first year doctoral students in anthropology.

ANTH 6001 [0.5 credit]**Selected Topics in Anthropology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

ANTH 6002 [0.5 credit]**Research Design**

Issues in the design and methods of anthropological inquiry, including proposal-writing, research ethics, and research funding. Required of all first-year Ph.D Anthropology students.

Includes: Experiential Learning Activity

ANTH 6100 [0.0 credit]**Thesis Writing Seminar**

This seminar will meet on a regular basis for students who are writing their doctoral theses to present draft chapters for constructive critical discussion. Normally required for all Ph.D. Anthropology students who have completed their doctoral research, until the completion of their theses.

ANTH 6900 [0.5 credit]**Tutorial**

A tutorial is designed to permit students to pursue individual research on a relevant topic. Topics will be chosen in consultation with at least one faculty member, the student's supervisor, and the Anthropology graduate coordinator.

ANTH 6907 [0.5 credit]**Placement in Anthropology**

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in museums, government departments, nongovernmental organizations, or other professional research settings. Placement research must be related to the preparation of the doctoral research.

Includes: Experiential Learning Activity

ANTH 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Applied Linguistics and Discourse Studies (ALDS)

Applied Linguistics and Discourse Studies (ALDS) Courses

ALDS 5001 [0.5 credit]**Directions in Applied Linguistics and Discourse Studies**

A survey of current research directions in Applied Linguistics and Discourse Studies and an introduction to ongoing research in the School. The course introduces students to the scope of theory and practice in the field.

ALDS 5002 [0.5 credit]**Inquiry Strategies in Applied Linguistics and Discourse Studies**

A consideration of various approaches to the design of studies and the collection and analysis of data. Naturalistic and quasi-experimental methods will be discussed. The role of statistics in disciplined inquiry, including an introduction to elementary procedures.

ALDS 5005 [0.5 credit]**Theoretical Foundations for Applied Linguistics and Discourse Studies**

Overview of the works of 20th and 21st-century theorists such as Bakhtin, Bourdieu, Burke, Foucault, Latour and Vygotsky.

ALDS 5102 [0.5 credit]**Systemic-Functional Linguistics**

Functions of language in the exchange of meanings between people in a wide variety of communicative situations. Semantic and syntactic resources at risk in these different contexts. Interactions between language and the social context.

Prerequisite(s): restricted to graduate students in Applied Linguistics and Discourse Studies and Journalism and Communication.

Also offered at the undergraduate level, with different requirements, as ALDS 4709, for which additional credit is precluded.

ALDS 5202 [0.5 credit]**Curriculum in Language Teaching**

Current theory and practice in language curriculum development and evaluation in the light of recent research in linguistics, sociolinguistics, language acquisition and language education policy.

Includes: Experiential Learning Activity

ALDS 5203 [0.5 credit]**Issues in English Language Teaching/Teacher Education**

A research seminar to explore current issues in English language teaching/teacher education.

ALDS 5204 [0.5 credit]**Seminar in University Teaching**

Theoretical and empirical work related to teaching in higher education. Analysis of instructional discourse, use of language in classroom decision-making, bases of effective practice and methods of instruction. Constructivist principles of teaching and learning. Role of teaching in university scholarship.

Also listed as PSYC 6104.

ALDS 5207 [0.5 credit]**Pedagogical Grammar in Second and Foreign Language (SL/FL) Teaching**

The concept of pedagogical grammar in SL/FL teaching. Critical examination of recent theories of 'focus on form' in communicative language classrooms, and related empirical work.

Includes: Experiential Learning Activity

ALDS 5208 [0.5 credit]**Languages for Specific Purposes (LSP)**

Introduction to LSP, a sub-field of applied linguistics tailoring language instruction to specific groups of learners. Developments in strands of LSP (English for Science, Business, etc.). Research and teaching methodology. Emphasis on English for Academic Purposes/English for Specific Purposes research and instruction at Carleton.

Also offered at the undergraduate level, with different requirements, as ALDS 4208, for which additional credit is precluded.

ALDS 5215 [1.0 credit]**Methodology and Practicum in Teaching English as a Second Language**

Classification of classroom teaching methods and materials; creation and adaptation of teaching materials for particular situations; teaching techniques and strategies. The required practicum portion of the course integrates academics with practical work. Observation in ESL classes and possible assistance with teaching materials or classes.

Includes: Experiential Learning Activity

Precludes additional credit for ALDS 5205 (no longer offered), ALDS 5806 (no longer offered).

ALDS 5301 [0.5 credit]**Language and Cognition**

Structure and representation of linguistic knowledge in human cognition. Evidence from child language acquisition, language processing and language impairment.

Includes: Experiential Learning Activity

Also listed as CGSC 5003 and LING 5608.

ALDS 5302 [0.5 credit]**Second Language Acquisition and Learning Theories**

Current social and cognitive theories of knowledge and learning and their application to the acquisition of first and additional languages; relation of theory to empirical studies of language learning in classroom and natural settings.

Includes: Experiential Learning Activity

ALDS 5303 [0.5 credit]**Linguistic Analysis, Culture and Cognition**

Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

Includes: Experiential Learning Activity

ALDS 5407 [0.5 credit]**Language Policy and Planning**

Interaction of political, social, and cultural factors in the planning and implementation of language policy in international contexts.

Prerequisite(s): fourth-year courses in linguistics or permission of the School.

ALDS 5408 [0.5 credit]**Critical Discourse Analysis**

Discourse in the structuring of social and cultural change and in a wide range of contexts such as the media and education.

Includes: Experiential Learning Activity

ALDS 5501 [0.5 credit]**Language Testing and Assessment**

Issues in language testing and classroom assessment, including validity theory and current validation research; challenges in test development; washback; models of alternative assessment.

Includes: Experiential Learning Activity

ALDS 5604 [0.5 credit]**Statistics for Language Research**

Application of statistical procedures to analysis of language data and to problems of measurement in experimental linguistics, applied linguistics, psycholinguistics, and related fields.

Includes: Experiential Learning Activity

Also listed as LING 5606.

Also offered at the undergraduate level, with different requirements, as ALDS 4606 and LING 4606., for which additional credit is precluded.

ALDS 5605 [0.5 credit]**Research and Theory in Workplace Writing**

Developments in the study of workplace writing from the 1970s, with a focus on recent work. Discussion of how writing is used in accomplishing work, what constitutes proficiency in workplace writing, and how novices learn to write in the workplace.

Includes: Experiential Learning Activity

ALDS 5607 [0.5 credit]**Research and Theory in Academic Writing**

Major developments in the study of academic writing from the 1970s, with a focus on recent work. Discussion of what academic writing entails, what constitutes proficiency in academic writing, and how instruction can help students develop their writing abilities.

Includes: Experiential Learning Activity

ALDS 5703 [0.5 credit]**Approaches to Genre Studies**

Major developments in the study of non-literary genres from the 1980s, with a focus on recent work. Consideration of genre as text-based social action. Discussion of genre as a central concept and tool of analysis in Writing Studies and Discourse Studies.

Includes: Experiential Learning Activity

ALDS 5705 [0.5 credit]**Second Language Writing: Research and Theory**

Second language writing: research, theory, and pedagogy.

ALDS 5801 [0.5 credit]**Linguistic Field Methods**

With a language consultant, students discover the phonological, morphological, and syntactic structures of the target language using linguistic elicitation. Language will vary from year to year, but will normally be a non-European language. Language documentation, data management, ethical issues surrounding research in indigenous communities.

Includes: Experiential Learning Activity

Also listed as LING 5801.

Also offered at the undergraduate level, with different requirements, as LING 4801, for which additional credit is precluded.

Lectures three hours a week.

ALDS 5902 [0.5 credit]**Tutorial in Applied Linguistics and Discourse Studies**

A one-term tutorial to study applications of linguistics in such areas as first-language education and second-language teaching.

ALDS 5903 [0.5 credit]**Special Topics in the Teaching and Acquisition of Additional Languages**

Exploration of topics from current research into the teaching and acquisition of additional languages. Topic to be announced.

ALDS 5904 [0.5 credit]**Special Topics in Written Discourse/Literacies**

Exploration of topics from current research into the nature, acquisition and teaching of written discourse/literacies. Topic to be announced.

ALDS 5905 [0.5 credit]**Special Topics in Applied Linguistics and Discourse Studies**

Exploration of a topic from current research in Applied Linguistics and Discourse Studies. Topic to be announced.

ALDS 5907 [1.0 credit]**Tutorial in Applied Linguistics and Discourse Studies**

A two-term tutorial to study applications of linguistics in such areas as first-language education and second-language teaching.

ALDS 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

ALDS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

ALDS 6101 [0.5 credit]**Doctoral Core Seminar in Applied Linguistics and Discourse Studies, Part I**

Detailed examination of foundational texts, current theories, and research methodologies in Applied Linguistics and Discourse Studies.
Includes: Experiential Learning Activity

ALDS 6102 [0.5 credit]**Doctoral Core Seminar in Applied Linguistics and Discourse Studies, Part II**

Detailed examination of foundational texts, current theories, and research methodologies in Applied Linguistics and Discourse Studies.
Includes: Experiential Learning Activity
Prerequisite(s): ALDS 6101.

ALDS 6105 [0.5 credit]**Directed Readings in Applied Linguistics and Discourse Studies**

Research on a topic chosen in consultation with a faculty member and with the approval of the graduate supervisor.

ALDS 6109 [0.5 credit]**Doctoral Project I: Literature Review**

The production, oral presentation and written submission of a synthesis of a prescribed body of theory and research underlying the fields of Applied Linguistics and Discourse Studies.
Prerequisite(s): ALDS 6102.

ALDS 6200 [1.0 credit]**Praxis in Applied Linguistics and Discourse Studies**

Field placement in an educational, workplace or community setting with guided reflective, theory-informed analysis of the field experience.
Includes: Experiential Learning Activity
Precludes additional credit for ALDS 6201 (No longer offered), ALDS 6202 (No longer offered), ALDS 6211, ALDS 6212.

ALDS 6209 [0.5 credit]**Doctoral Project II: Thesis Proposal**

The production, public presentation, written submission, and defence of a proposal for the student's thesis research.

ALDS 6211 [0.5 credit]**Praxis in Applied Linguistics and Discourse Studies I**

Field placement in an educational, workplace or community setting with guided reflective, theory-informed analysis of the field experience.
Includes: Experiential Learning Activity
Precludes additional credit for ALDS 6200, ALDS 6201 (no longer offered), ALDS 6202 (no longer offered).

ALDS 6212 [0.5 credit]**Praxis in Applied Linguistics and Discourse Studies II**

Field placement in an educational, workplace or community setting with guided reflective, theory-informed analysis of the field experience.
Includes: Experiential Learning Activity
Precludes additional credit for ALDS 6200, ALDS 6201 (no longer offered), ALDS 6202 (no longer offered).

ALDS 6300 [0.5 credit]**Interpretive Analysis in Applied Linguistics and Discourse Studies**

Analysis of research data and presentation of results. Emphasis on students' own data collection and analysis process. Qualitative, quantitative, and/or mixed methods will be emphasized, depending on the student's research. Graded Sat/Uns.
Precludes additional credit for ALDS 6301.
Tutorial.

ALDS 6309 [0.5 credit]**Doctoral Project III: Research Progress Report**

A written progress report on the student's thesis research, which, in consultation with the thesis supervisor, can consist of a research article prepared for publication, a conference-based paper, or another format deemed of relevance to the student's doctoral research.

ALDS 6407 [0.5 credit]**Revitalization Policy**

The core PhD seminar in Revitalization Policy. Topics include the detailed examination of foundational texts, current theories, research methodologies, and best practices in language revitalization. Includes significant focus on interactions with language communities, field methods, and related ethics.

ALDS 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Architecture - MAS (ARCT)

Architecture-MAS (ARCT) Courses**ARCT 5909 [2.0 credits]****M.A.S. Thesis**

Scholarly written thesis supported by methods of two and three-dimensional representation. Research undertaken by the student is expected to engage a topic in the culture of practice in Architecture. Proposals must be approved by the graduate committee of the Azrieli School of Architecture and Urbanism.(ARCU).

Includes: Experiential Learning Activity

Architecture - Studio (ARCS)

Architecture - Studio (ARCS) Courses**ARCS 5031 [2.0 credits]****M.Arch. 1 - Studio I**

Sensory components of architecture: use, effect, and symbolic potential. Light, lighting, sound, sensation of heat and cold, and related phenomena studied in modes of building proposals. Social considerations of architecture. Conventions of architectural drawing. Computer modeling as a medium of architectural analysis, documentation, and presentation.

ARCS 5032 [1.5 credit]**M.Arch. 1 - Studio II**

Building materials and practices within the context of increasingly complex building programs. Social context of architecture in relation to material expression. Modeling is stressed.

ARCS 5033 [1.0 credit]**M.Arch. 1 - Studio III**

A comprehensive studio dealing with issues of program and site as the culturally defining aspects of architectural practice within complex urban and social situations, using difficult sites and hybrid programs. Projects brought to a high degree of technical, formal, and graphic resolution.

ARCS 5105 [1.5 credit]**Graduate Studio 1**

An architectural investigation within a contemporary urban setting, usually dealing with central-city sites and complex programs. Projects address the question of urban architecture both from practical and theoretical perspectives. Architecturally relevant building technology and systems will be introduced in the Studio as required.

Includes: Experiential Learning Activity

ARCS 5106 [1.5 credit]**Graduate Studio 2**

The design of a large-scale and culturally significant building project, set within a prominent urban or natural landscape. Integrated resolution of the combined issue of site, program, and expression is expected.

Architecturally relevant building technology and systems will be introduced in the Studio as required.

Includes: Experiential Learning Activity

Prerequisite(s): ARCS 5105.

ARCS 5909 [2.0 credits]**Thesis - Independent Study**

Student-initiated design investigation, developed with a thesis supervisor, supported by text and appropriate methods of two and three-dimensional representation. Proposals must be approved by the Graduate Committee of the Azrieli School of Architecture and Urbanism.

Includes: Experiential Learning Activity

Architecture - Technical (ARCC)

Architecture - Technical (ARCC) Courses**ARCC 5000 [0.5 credit]****Directed Studies in Architecture and Technology**

Reading and research tutorials.

Prerequisite(s): permission of the School.

ARCC 5001 [0.5 credit]**Introduction to Design and Multimedia**

Multimedia and interactive design as they relate to architecture and the field of design. Special topics include virtual environments, user interface in software, Web and product design, perceptual and cognitive science, navigation, film/video and sound editing and animation technologies.

ARCC 5002 [0.5 credit]**Topics in Design and Multimedia: Information Architecture and the World Wide Web**

Introduction to the design of Web-based applications, focusing on process, site architecture, usability testing, and Web functionality. Students synthesize and customize software applications. Client and server-side functionality. Introduction to relational database design, JavaScript, cgi scripts, and «middleware» products such as WebObjects and ColdFusion.

ARCC 5003 [0.5 credit]**Design and Technology Workshop**

The prime objective of the workshop is to investigate issues in architectural design in relation to technology as a cultural paradigm. The workshop operates as a directed study with specific content, objectives, and scheduling arranged between student and academic advisor.

Includes: Experiential Learning Activity

ARCC 5096 [0.5 credit]**Building Technology I**

General introduction to materials and methods of construction with particular focus on wood and timber frame construction. Site conditions, foundations, structure and envelope in terms of their response to local climate: sun (light and heat), wind, moisture.

Includes: Experiential Learning Activity

ARCC 5097 [0.5 credit]**Building Technology II**

Technical issues involved in architectural design of buildings from ancient times to the present. Technological innovation and materials related to structural developments, and the organization and design of structures. Basic concepts of equilibrium, and mechanics of materials. Final projects developed in conjunction with design studio.

Includes: Experiential Learning Activity

ARCC 5098 [0.5 credit]**Building Technology III**

Wood frame, post and beam, steel and concrete systems and construction techniques. Structural systems and building envelope principles and practice are explored in conjunction with mechanical and electrical systems in small buildings. Final projects developed in conjunction with design studio.

Includes: Experiential Learning Activity

ARCC 5099 [0.5 credit]**Building Technology IV**

Medium scale steel, concrete, and wood frame buildings as case studies to explore approaches to building science principles, building envelope design, advanced construction methods and materials, acoustics and sound control, and fire protection, with a focus on sustainable design strategies and environmental impact.

Includes: Experiential Learning Activity

ARCC 5100 [0.5 credit]**Advanced Building Systems**

Introduction to advanced design in building technology and systems integration. Leading edge building materials, technologies and philosophies will be explored through intensive case study research and analysis, comparing, and critically evaluating, traditional methods with current computer modeling and analysis techniques.

Includes: Experiential Learning Activity

ARCC 5200 [0.5 credit]**Professional Practice**

The practice of architecture. Professional organization and conduct, the architect's services, business law, office organization and management, contract documents, building codes, contract management, cost control, accounting and site supervision. Guest speakers and case studies.

Includes: Experiential Learning Activity

Precludes additional credit for ARCU 4200.

ARCC 5401 [0.5 credit]**Workshop: Technical Studies in Heritage Conservation**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

ARCC 5500 [0.5 credit]**Advanced Design Economics**

Principles of building economics. Determinants and prediction of building costs. Uncertainty and investment economics. Creative cost control for buildings during schematic design, design development, construction document preparation and construction. Economic evaluation during all phases of design process; emphasis on sustainable strategies.

Includes: Experiential Learning Activity

ARCC 5909 [2.0 credits]**M.Arch. Post-Professional Thesis (Design and Technology)**

Basic or applied research in architectural, industrial, and digital design. Areas include interactive education/training, product/interface design, programming/scripting, culture/technology, or research as defined by the student. Final thesis documentation must satisfy the requirements established by the Faculty of Graduate Studies.

Includes: Experiential Learning Activity

Prerequisite(s): Proposals must be approved by the Graduate Committee of the Azrieli School of Architecture and Urbanism.

Architecture - Techniques (ARCN)

Architecture - Techniques (ARCN) Courses

ARCN 5000 [0.5 credit]**Directed Studies in Computer-Aided Design**

Reading and research tutorials.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

ARCN 5001 [0.5 credit]**Directed Studies in Architecture**

Reading and research tutorials.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

ARCN 5005 [0.5 credit]**Theory and Practice of Architectural Representation**

Free-hand drawing as a way of observing and understanding the world. Various media and techniques introduced through a wide range of studio and outdoor exercises. (Theory/History Elective).

Includes: Experiential Learning Activity

ARCN 5100 [0.5 credit]**Representation and Documentation in Architectural Conservation**

An in-depth study of the conventions and history of heritage recording including traditional field survey, photogrammetry, laser scanning technologies, and hybrid representations.

Workshop, six hours a week (including field trips and on-site work).

ARCN 5101 [0.5 credit]**Interactive Design Workshop I**

An intensive introduction to the design of interactive environments, using multimedia software including Adobe Photoshop, Illustrator, Premiere, Macromedia, Dreamweaver, Fireworks, Director, 3D Modeling programs, and sound editing. Basic design, graphic design, and software literacy. Presentations by design professionals.

Includes: Experiential Learning Activity

ARCN 5102 [0.5 credit]**Interactive Design Workshop II**

An introduction to the logistic aspects of producing multimedia products with an emphasis on usability testing and user-interface design. Topics include: storyboarding/graphic design, instructional design, rapid prototyping, project streaming, management and marketing, technical writing, product evaluation. Organized as a seminar. Work is done in teams.

Includes: Experiential Learning Activity

ARCN 5301 [0.5 credit]**Workshop: Daedalic Exercises I**

Experimental mediation, materiality and making.

Includes: Experiential Learning Activity

ARCN 5302 [0.5 credit]**Workshop: Daedalic Exercises II**

Innovative mediation, materiality and making.

Includes: Experiential Learning Activity

ARCN 5909 [2.0 credits]**Thesis - Directed Research Studio (DRS)**

An intensive research-based design project. The unit is initiated and guided by a faculty member engaged in organized research. Proposals must be approved by the Graduate Committee of the Azrieli School of Architecture and Urbanism.

Includes: Experiential Learning Activity

ARCN 6001 [0.5 credit]**Workshop: Daedalic Exercises I**

Experimental mediation, materiality and making. This course is required of all first year doctoral students in architecture.

Includes: Experiential Learning Activity

ARCN 6002 [0.5 credit]**Workshop: Daedalic Exercises II**

Experimental mediation, materiality and making. This course is required of all first year doctoral students in architecture.

Includes: Experiential Learning Activity

ARCN 6901 [0.5 credit]**Placement in Architecture**

An opportunity to earn academic credit by engaging in research activities under the supervision of a professional architect or researcher in architectural, government, non-governmental or other professional settings. Placement research must be related to the preparation of the doctoral research. Design Studios/Design Thesis/Research (ARCS).

Includes: Experiential Learning Activity

Architecture - Theory/History (ARCH)

Architecture - Theory/History (ARCH) Courses

ARCH 5000 [0.5 credit]**Directed Studies in History and Theory of Architecture**

Reading and research tutorials.

Prerequisite(s): permission of the School.

ARCH 5001 [0.5 credit]**Architecture Seminar 1**

An introduction to the intellectual frameworks connecting design and culture as manifest in theories of culture and architecture. The seminar builds on previous undergraduate studies, and is not an introduction to these fields. The field of inquiry is both historical and contemporary.

ARCH 5002 [0.5 credit]**Architecture Seminar II**

A continuation of ARCH 5001, this seminar follows the same general description, but concentrates more on architectural design, on the contemporary condition, and on the ways of thinking that characterize embodiment of cultural content in architecture and other artifacts.

Prerequisite(s): ARCH 5001.

ARCH 5003 [0.5 credit]**Design and Culture Workshop**

The prime objective of the workshop is to investigate cultural issues in architectural design. The workshop operates as a directed study with specific content, objectives, and scheduling arranged between student and academic advisor.

Includes: Experiential Learning Activity

ARCH 5010 [0.5 credit]**History and Theory of Modern Architecture**

Architectural and urban ideals of modernism with emphasis upon the development of the avant-garde in the early twentieth century. The phenomenon of modern architecture within the broader framework of the development of western thought.

ARCH 5020 [0.5 credit]**Theories of Modernity**

Theories of modernity (including recent developments in cultural theory, theorizing from the Global South and more, recent technological and socio-political transformations) and how they help shape contemporary architectural discourse.

ARCH 5100 [0.5 credit]**Directed Studies in Architecture and Society**

Reading and research tutorials.

Prerequisite(s): permission of the School.

ARCH 5101 [1.0 credit]**Colloquium I**

This seminar brings together graduate students with architectural faculty to present their work-in-progress. It focuses on an immersion in conventions of theoretical and methodological approaches to advanced architectural research, including research ethics, proposal writing and research funding.

ARCH 5200 [0.5 credit]**Graduate Seminar 1: Introduction to Critical Thought in Architecture**

Critical theories and research approaches relevant to the field of architecture. Identification of issues through a coordinated series of lectures and readings. Development of analytical and interpretative skills through seminar discussions and writing culminating in a scholarly position paper by the student.

ARCH 5201 [0.5 credit]**Graduate Seminar 2: Contemporary Theoretical Perspectives in Architecture**

Lectures, readings, and case studies on contemporary issues in architecture and allied fields of study. Critical analysis of trends and possibilities set against traditional modes of architectural thought and practice. This course serves as a forum for a preliminary articulation of the thesis proposal.

Includes: Experiential Learning Activity

Prerequisite(s): ARCH 5200.

ARCH 5301 [0.5 credit]**Seminar: Vitruvian Exercises I**

Investigation of the cunning and graphic intelligence of architects: i.e. architectural modes of research.

ARCH 5302 [0.5 credit]**Seminar II: Vitruvian Exercises II**

Seminar II builds upon the fall term with a focus on the study of the fabric of architectural theory stretched within the marble loom of construction. This course is required of all first year M.A.S. students.

ARCH 5402 [0.5 credit]**Evaluation of Heritage Properties**

The cultural, political, economic and legal factors that shape our definition of heritage architecture. Processes for and implications of heritage designation, cultural value and costs associated with restoration and ongoing preservation. (Theory/History Elective).

Includes: Experiential Learning Activity

Lectures, three hours a week.

ARCH 5600 [0.5 credit]**Housing and Culture Seminar**

Housing as a function of social organization, demographics, market demand and governmental policies.

The evolution of housing form, the role of the state, and the participation of architects in the housing marketplace promoting design as a form of social reform.

Precludes additional credit for ARCH 4201.

ARCH 5909 [2.0 credits]**M.Arch. Post-Professional Thesis (Architecture and Cultural Diversity)**

A scholarly, written thesis supported by appropriate methods of two and three-dimensional representation.

Research undertaken by the student is expected to engage one of the research topics outlined above. Final thesis documentation must satisfy the requirements established by the Faculty of Graduate and Postdoctoral Affairs.

Includes: Experiential Learning Activity

Prerequisite(s): Proposals must be approved by the graduate committee of the Azrieli School of Architecture and Urbanism.

ARCH 6001 [0.5 credit]**Seminar: Vitruvian Exercises I**

Investigation of the cunning and graphic intelligence of architects: i.e. architectural modes of research. This course is required of all first year doctoral students in architecture.

ARCH 6002 [0.5 credit]**Seminar II: Vitruvian Exercises II**

Seminar II builds upon the fall term with a focus on the study of the fabric of architectural theory stretched within the marble loom of construction. This course is required of all first year doctoral students in architecture.

ARCH 6101 [1.0 credit]**Colloquium I**

This seminar brings together doctoral students with architectural faculty to present their work-in-progress. Immersion in conventions of theoretical and methodological approaches to advanced architectural research, including research ethics, proposal writing and research funding. This course is required of all first year doctoral students in architecture.

Includes: Experiential Learning Activity

ARCH 6102 [1.0 credit]**Colloquium II**

This seminar continues to bring together doctoral students with architectural faculty and guest lecturers to present their work-in-progress. This course is required of all students enrolled in the Ph.D. program from the second year through until completion of the dissertation.

Includes: Experiential Learning Activity

ARCH 6907 [1.0 credit]**Ph.D. Comprehensive Examination**

Students must demonstrate to their thesis advisory committees a sufficiently broad background in the theoretical and topical area literatures and constructions relevant to their individual projects.

ARCH 6908 [1.0 credit]**Ph.D. Proposal Examination**

Students must demonstrate to thesis advisory committees their ability to link theory to a work or practice of architecture. This examination requires the preparation of a drawing or a model, to then be discussed within a theoretical framework during the oral part of the exam.

ARCH 6909 [0.0 credit]**Ph.D. Dissertation**

The dissertation will be comprised of two critical modes of investigation of equal importance: a speculative project and a research text. The speculative project is realized using specific traditional and non-traditional media as deemed appropriate.

Includes: Experiential Learning Activity

Architecture - Urban (ARCU)

Architecture - Urban (ARCU) Courses**ARCU 5000 [0.5 credit]****Directed Studies in Architecture and the City**

Reading and research tutorials.

Includes: Experiential Learning Activity

ARCU 5402 [0.5 credit]**Workshop: Urban Studies in Heritage Conservation**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

Art and Architectural History (ARTH)

Art and Architectural History (ARTH) Courses**ARTH 5010 [1.0 credit]****Art and Its Institutions**

The institutions of art and art history, the archive, the social institutions of art and their mediations. Gender, Aboriginal culture, commodification, reception, technology, memory and subversive tactics are addressed. Canadian contexts are emphasized.

Precludes additional credit for ARTH 5000.

ARTH 5011 [0.5 credit]**Graduate Practicum**

Practical on-site work in the collecting institutions of the National Capital Region (as available), including a written assignment. The practicum coordinator and the on-site supervisor jointly determine the final mark. A maximum of 1.0 practicum credit may be applied towards degree requirements.

Includes: Experiential Learning Activity

Precludes additional credit for ARTH 5001.

ARTH 5012 [0.5 credit]**Directed Readings and Research**

Students pursue topics in art and its institutions, which they select in consultation with the graduate faculty of the program.

Includes: Experiential Learning Activity

Precludes additional credit for ARTH 5002.

ARTH 5112 [0.5 credit]**Topics in Historiography, Methodology and Criticism**

Historiographical, methodological, and critical issues in the history of art and criticism in Canadian and/or international contexts.

Precludes additional credit for ARTH 5102.

ARTH 5113 [0.5 credit]**Perspectives on Pre-Modernity**

Issues in premodern art and institutions of art production, and critical theory in light of current concerns and new research.

ARTH 5114 [0.5 credit]**Feminism and Gender**

Art and its institutions in terms of critical issues of feminism and gender studies. Topics include the questioning of the canon, sexuality, the gaze, queer theory, the body, and the use of art as a means to communicate issues of public significance.

Precludes additional credit for ARTH 5104 and ARTH 5106.

ARTH 5115 [0.5 credit]**Topics in Modern and Contemporary Art**

The production and reception of modern and contemporary art in light of current concerns in Canadian and/or international contexts.

Precludes additional credit for ARTH 5105.

ARTH 5117 [0.5 credit]**Community/Identity**

Art and the interrelationships among the artist, architect, patron, critic and public in the context of the contribution of art and its institutions to the articulation or constitution of communal identities in Canadian and/or international contexts.

Precludes additional credit for ARTH 5107.

ARTH 5210 [0.5 credit]**Topics in Indigenous Art**

The creative production, aesthetic culture, and reception of selected indigenous peoples in pre-contact, historic, and/or modern time, drawing on postcolonial and critical theory.

Precludes additional credit for ARTH 5200 (no longer offered), ARTH 5204 (no longer offered), and ARTH 5303 (no longer offered).

ARTH 5218 [0.5 credit]**Museum Studies and Curatorial Practice**

Aspects of museum practice, history and theoretical discourse will be examined in a classroom setting, or the preparation, realization, and/or study of an exhibition in an Ottawa-area museum.

Precludes additional credit for ARTH 5207 and ARTH 5208.

ARTH 5403 [0.5 credit]**Architecture and Its Institutions**

Specialized topics examine theory and practice of architects, architectural historians and critics from historical and contemporary perspectives in Canadian and/or international contexts.

ARTH 5500 [0.5 credit]**Photography and Its Institutions**

Photographic practice and reception with emphasis on social, political and cultural contexts and theoretical approaches to the study of photographs in Canadian and/or international contexts.

ARTH 5777 [0.5 credit]**Art Exhibition Studio**

This course is a hands-on examination of art exhibition practices that includes site visits and a series of workshops designed to help students create an exhibition proposal for submission to the Carleton University Art Gallery or other space.

Includes: Experiential Learning Activity

ARTH 5788 [0.5 credit]**Directed Art Exhibition**

Selected students will be offered the opportunity to put on an exhibition in the Carleton University Art Gallery, in another venue on campus or online.

Includes: Experiential Learning Activity

ARTH 5800 [0.0 credit]**Carleton Art Forum**

Students are required to participate as audience members or presenters in scholarly and art community activities such as professional talks, symposia, conferences and art gallery events. The course will be graded as either satisfactory or unsatisfactory based on participation and engagement.

Includes: Experiential Learning Activity

ARTH 5908 [1.0 credit]**Research Essay**

An examination of an approved topic that is in an area of departmental specialization.

Includes: Experiential Learning Activity

ARTH 5909 [1.5 credit]**M. A. Thesis**

Includes: Experiential Learning Activity

Biology (BIOL)

Biology (BIOL) Courses**BIOL 5001 [0.5 credit] (BIO 5101)****Topics in Biotechnology**

A course concerned with the use of biological substances and activities of cells, genes, and enzymes in manufacturing, agricultural, and service industries. A different topic will be selected each year.

Includes: Experiential Learning Activity

Prerequisite(s): a course in cell physiology or biochemistry, or permission of the instructor and permission of the director or associate director of OCIB.

BIOL 5002 [0.5 credit]**Seminar in Biochemistry I**

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.

Includes: Experiential Learning Activity

Also listed as CHEM 5800.

BIOL 5003 [0.5 credit] (BIO 5103)**Advanced Biochemistry**

Advanced topics in biochemistry: the chemical structure and function of biological macromolecules, biochemical thermodynamics, metabolism, photosynthesis, lipids and membranes.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5004 [0.5 credit] (BIO 5104)**Advances in Applied Biochemistry**

A practical hands-on course in the field of Biochemistry. This course is run in a laboratory and will train students in highly specialized technique(s) in Biochemistry. The students will run experiments, gather data, assess and analyze the results and present the findings as a seminar.

Includes: Experiential Learning Activity

Also listed as CHEM 5806.

BIOL 5105 [0.5 credit] (BIO 5302)**Methods in Molecular Genetics**

Theory and associated applications of emerging methods in molecular genetics, including information gathered from large-scale genome-wide analysis and protein-protein interaction data, and how this information can advance understanding of cell biology.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5106 [0.5 credit] (BIO 5308)**Laboratory Techniques in Molecular Genetics**

Laboratory course designed to give students practical experience in recent important techniques in molecular genetics.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5111 [0.5 credit] (BIO 5111)**Biophysical Techniques**

Theory and application of current biochemical/biophysical instrumentation and techniques including X-ray crystallography, nuclear magnetic resonance spectrometry, infrared, circular dichroism and fluorescence spectroscopy, and isothermal titration and differential scanning calorimetry.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5121 [0.5 credit] (BIO 5121)**Advances in Protein Engineering**

An advanced lecture, discussion and seminar course covering the theory, development and current techniques of protein and enzyme engineering. Topics to be discussed may also include applications in biotechnology, nanotechnology and new frontiers in basic and applied research.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5201 [0.5 credit]**Evolutionary Bioinformatics**

Basic concepts in molecular evolution and hands-on experience with the computer analysis of DNA sequences. Topics may include molecular sequence databases, multiple alignments and phylogenetic trees.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5202 [0.5 credit] (BIO 8302)**Topics in Evolutionary Genetics**

A lecture/seminar course on the genetic mechanisms and forces responsible for variation and evolutionary change in natural populations. Topics to include protein and genome evolution, molecular phylogenies, DNA sequences in population biology, and the evolution of multigene families.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5203 [0.5 credit] (BIO 8303)**Advanced Microscopy**

Development of the practical skills of microscopy through original research and supporting theory lectures.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5304 [1.0 credit]**Fundamentals in Neuroscience**

A comprehensive neuroscience course from cellular levels to neural systems and behaviour. Topics covered include aspects of neuroanatomy, neurophysiology, neuropharmacology and behavioural and cognitive neuroscience.

Also listed as NEUR 5100.

Precludes additional credit for PSYC 5200.

BIOL 5307 [0.5 credit] (BIO 8122)**Advanced Insect Biology**

Overview of the biological processes that allow insects to function in their environments and to overcome the constraints and limitations that the environment places on them.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5402 [0.5 credit] (BIO 8162)**Advanced Endocrinology**

Major topics in comparative endocrinology: understanding the structure, function and evolution of vertebrate endocrine systems, including endocrine disruption.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5407 [0.5 credit] (BIO 5305)**Biostatistics I**

Application of statistical analyses to biological data. Topics include ANOVA, regression, GLMs, and may include loglinear models, logistic regression, general additive models, mixed models, bootstrap and permutation tests.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5409 [0.5 credit] (BIO 5306)**Modelling for Biologists**

Use and limitations of mathematical and simulation modelling approaches for the study of biological phenomena.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5501 [0.5 credit] (BIO 8900)**Directed Studies in Biology**

One-to-one instruction in selected aspects of specialized biological subjects not covered by other graduate courses. Students may not take this course from their thesis supervisor(s), and are limited to one directed studies course per program.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5502 [0.5 credit] (BIO 8120)**Selected Topics in Biology**

Lecture and seminar courses in selected aspects of specialized biological subjects not covered by other graduate courses.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5503 [0.5 credit] (BIO 5901)**Biological Science in Practice**

Introduction to cross-cutting skills and issues in common to all biological disciplines. Key perspectives on philosophy of science, practical approaches to scientific publication and peer-review, data analysis and presentation, scientific inference, and technical writing will be provided through discipline-specific examples and associated practical work.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5506 [0.5 credit] (BIO 5213)**Principles and Methods of Biological Systematics**

Biological systematics with reference to morphological and molecular character evolution and phylogeny reconstruction.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5508 [0.5 credit] (BIO 8306)**Advanced Topics in Ecology**

Recent developments in population, community and/or ecosystem ecology.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5510 [0.5 credit] (BIO 5310)**Advanced Evolutionary Biology**

Advances in micro- and macroevolution including the mechanisms both driving and constraining evolutionary change, phylogenetic relationships, patterns of evolutionary change at the molecular or phenotypic level, and evolutionary theory and techniques as applied to these areas.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5511 [0.5 credit] (BIO 5311)**Advanced Evolutionary Ecology**

The ecological causes and consequences of evolutionary change, focussing on how the ecological interactions among organisms and their biotic and abiotic environments shape the evolution of phenotypic and species diversity.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5512 [0.5 credit] (BIO 8105)**Advances in Applied Ecology**

The application of ecological and evolutionary principles in addressing resource management challenges and environmental problems.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5514 [0.5 credit] (BIO 5314)**Advances in Aquatic Sciences**

Advanced theoretical and applied aquatic sciences including current topics in limnology and oceanography (e.g. impacts of climate change, invasive species, atmospheric pollution) with implications for lake, river, coastal and wetland management.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5515 [0.5 credit] (BNF 5106)**Bioinformatics**

Major concepts and methods of bioinformatics. Topics may include genetics, statistics and probability theory, alignments, phylogenetics, genomics, data mining, protein structure, cell simulation and computing.

Includes: Experiential Learning Activity

BIOL 5516 [0.5 credit] (BNF 5107)**Applied Bioinformatics**

Introduction to programming for students in the life sciences. Through lectures, assignments, and independent projects, students will learn about basic concepts and techniques in programming, including variables, control structures, subroutines, and input/output. No previous knowledge of bioinformatics or programming is required.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of Ottawa-Carleton Institute for Biology.

BIOL 5517 [0.5 credit] (BNF 6100)**Bioinformatics Seminar**

Current topics in bioinformatics. Students must successfully complete a presentation and written report.

BIOL 5518 [0.5 credit] (BNF 5318)**Biostatistics II**

Application of multivariate methods to biological data, including methods such as discriminant functions analysis, cluster analysis, MANOVA, principle components analysis. Includes: Experiential Learning Activity
Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5520 [0.5 credit] (BIO 5320)**Advances in Conservation Biology**

Interdisciplinary exploration of the science of scarcity and diversity in a human dominated world. Includes: Experiential Learning Activity
Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5521 [0.5 credit] (BIO 5321)**Evolutionary Genetics**

Genetic mechanisms and processes responsible for variation and evolutionary change in natural populations. Topics may include population and quantitative genetics as applied to protein and genome evolution, molecular phylogenies, DNA sequences in population biology, and the evolution of multigene families. Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5526 [0.5 credit]**Analysis of Next-generation Sequence Data**

Assembly and analysis of next-generation sequence (NGS) data. Through hands-on exercises and independent projects, students will learn to use tools for quality control, assembly, mutation calling, and other NGS applications. No previous knowledge of bioinformatics or programming is required. Includes: Experiential Learning Activity
Prerequisite(s): permission of the Director or Associate Director of OCIB.

BIOL 5605 [0.5 credit] (BIO 5102)**Advanced Field Ecology**

Field experience in a new environment (e.g., local, national, international) to learn about ecological processes (note - extra fees associated with course). Includes: Experiential Learning Activity
Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5709 [0.5 credit] (BIO 8113)**Chemical Toxicology**

An introduction to modeling chemical hazards and exposures at the cellular level. The properties of toxic substances are compared to the responses of enzymatic systems. These interactions are defined as Quantitative Structure-Activity Relationships and used to interpret hazardous materials under regulations such as WHMIS. Also listed as CHEM 5709/CHM 8157. Prerequisite(s): BIOL 6402/CHEM 5708 (BIO 9101/CHM 8156), and permission of the director or associate director of OCIB.

BIOL 5801 [0.5 credit] (BIO 5105)**Advanced Neuroethology**

A comparative and evolutionary approach to studying neural mechanisms underlying animal behaviour, including genetic, neural and hormonal influences on behaviour. Includes: Experiential Learning Activity
Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 5802 [0.5 credit] (BIO 8365)**Advanced Behavioural Ecology**

Recent advances in behavioural ecology including topics such as the evolution of tactics and strategies of group living, foraging, anti-predation, resource use and defence, cooperation, reproduction, and parental care. Prerequisite(s): Either BIOL 3802 or BIOL 3804 or equivalent AND permission of the director or associate director of OCIB.

BIOL 5810 [0.5 credit]**Education Research in Biology**

Introduction to the science of teaching and learning in biology. Students will be introduced to the foundational concepts in, and tools of, Discipline-Based Education Research (DBER) and will conduct their own DBER research project. Includes: Experiential Learning Activity
Also offered at the undergraduate level, with different requirements, as BIOL 4810, for which additional credit is precluded.

BIOL 5909 [4.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

BIOL 6001 [0.5 credit] (BIO 8109)**Advanced Molecular Biology**

In-depth coverage of the structure, function, and synthesis of DNA, RNA, and proteins. Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6002 [0.5 credit] (BIO 8116)**Advances in Plant Molecular Biology**

Use of molecular genetics in general plant biology and the contribution of plant genomics to our understanding of plant metabolism, plant development, and plant interactions with the environment at the molecular, genome, and cellular levels. Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6102 [0.5 credit]**Seminar in Biochemistry II**

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry. Includes: Experiential Learning Activity
Also listed as CHEM 6800.

BIOL 6201 [0.5 credit] (BIO 8117)**Advanced Cell Biology**

Recent advances in cell biology, including such topics as membranes, signalling, the cytoskeleton and control of the cell cycle.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6202 [0.5 credit] (BIO 8118)**Advanced Cell Biology II**

Topics for discussion may include: the structure, composition and three-dimensional organization of the nucleus, mechanisms and regulation of genome replication, structure organization of transcription. Nuclear reorganization during gamete development, fertilization, viral infection and the mitotic cell cycle. Normally offered in alternate years.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6203 [0.5 credit] (BIO 6103)**Special Topics in Neuroscience**

In-depth study of current topics in neuroscience. Course content varies yearly and has recently included cognitive neuroscience, neuropharmacology, neurodegeneration, and behavioural medicine.

Also listed as NEUR 5800.

BIOL 6204 [0.5 credit] (BIO 6304)**Techniques in Neuroscience**

Completion of a research project carried out under the supervision of a neuroscience faculty member, normally not the current supervisor. The student will learn a new neuroscience technique and apply it to a research objective. Students must obtain prior approval from the graduate committee.

Also listed as NEUR 6301, NEUR 6302.

Precludes additional credit for PSYC 6204.

BIOL 6300 [0.5 credit] (BIO 8320)**Advanced Plant Biology**

Recent developments in plant biology. Topics may include plant anatomy, systematics, evolution, genetics, ecology, ethnobotany, cell biology, and/or biotechnology.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6304 [0.5 credit] (BIO 8361)**Advanced Animal Physiology**

Recent advances in animal physiology, emphasizing comparative, evolutionary and environmental approaches. Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6305 [1.0 credit] (BIO 6305)**Advanced Seminar in Neuroscience**

A comprehensive pro-seminar series, covering issues ranging from cellular and molecular processes through to neural systems and behaviours as well as psychopathology. Students will also be required to attend the neuroscience colloquia series as part of this course. Also listed as NEUR 6100.

Precludes additional credit for PSYC 6200, PSYC 6202, PSYC 6203, BIOL 6303.

Prerequisite(s): BIOL 5304 or equivalent.

BIOL 6306 [0.5 credit]**Adv Seminar in Neuroscience II**

A comprehensive pro-seminar series, covering issues ranging from cellular and molecular processes through to neural systems and behaviours as well as psychopathology.

Precludes additional credit for BIOL 6303.

Prerequisite(s): BIOL 6305.

BIOL 6402 [0.5 credit] (BIO 9101, CHM 8156, TOX 8156)**Principles of Toxicology**

The basic theorems of toxicology with examples of current research problems. The concepts of exposure, hazard and risk assessment will be defined and illustrated with experimental material from some of the more dynamic areas of modern research.

Also listed as CHEM 5708.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6403 [0.5 credit] (BIO 9104, CHM 9109, TOX 9104)**Ecotoxicology**

Advances in ecotoxicology. Biological effects of contaminants. Potential for biotic perturbation from chronic and acute exposure of ecosystems to selected toxicants. Pesticide, herbicide and pollutant residue analysis and the concept of bound residues.

Also listed as CHEM 5705.

Prerequisite(s): BIOL 6402/CHEM 5708 (BIO 9101/CHM 8156), permission of the director or associate director of OCIB.

BIOL 6404 [0.5 credit] (BIO 8938)**Plant: Animal Interactions**

The biology of co-evolutionary relationships between plants and phytophagous animals.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6405 [0.5 credit] (BIO 9105)**Seminar in Toxicology**

A seminar course highlighting current topics in toxicology. The student will present a seminar and submit a report on the seminar topic. Student, faculty and invited seminar speakers.

Includes: Experiential Learning Activity

Also listed as CHEM 5805.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6406 [0.5 credit] (BIO 9106)**Genetic Toxicology**

Topics in mutagenesis and DNA repair, including spontaneous and induced mutagenesis, genetic toxicology testing, the genetics and biochemistry of replication, DNA repair and recombination, and the role of mutagens in the development of genetic disease and cancer.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6500 [0.5 credit]**Advanced Science Communication**

The theory and practice of effective science communication. Topics may include: writing for, presenting to, and engaging with diverse audiences, as well as graphic design and data visualization, social and digital media, and knowledge mobilization.

Includes: Experiential Learning Activity

BIOL 6505 [0.5 credit] (BIO 8108)**Advanced Topics in Development**

Recent advances in developmental biology. Topics may include embryonic induction, regulation of morphogenesis and differentiation, mechanisms of regional specification and pattern formation, and developmental genetics.

Offered in alternate years.

Prerequisite(s): permission of the director or associate director of OCIB.

BIOL 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Biomedical Engineering (BIOM)

Biomedical Engineering (BIOM) Courses

BIOM 5010 [0.5 credit]**Introduction to Biomedical Engineering**

Research ethics and methods. Engineering systems approach to analysis and modelling of human anatomy and physiology. Introduction to topics including biomechanics, electrophysiology, and computational biology. Biomedical technologies. Impact of technology on society.

BIOM 5100 [0.5 credit] (BMG 5103)**Biomedical Instrumentation**

Instrumentation designed to measure physiological variables related to the function of the heart, lungs, kidney, nervous and musculo-skeletal system; emergency, critical care, surgery and anaesthesia equipment.

Also listed as SYSC 5302 (ELG 6320).

Prerequisite(s): permission of the instructor.

BIOM 5101 [0.5 credit] (BMG 5104)**Biological Signals**

Modeling of neuromuscular biological signals, including subthreshold phenomena, active behaviour of cell membranes, and innervation processes. Measurement of biological signals, including electrode effects. Time domain, frequency domain, and adaptive filtering techniques for noise reduction.

Also listed as SYSC 5307 (ELG 6307).

BIOM 5106 [0.5 credit] (BMG 5109)**Advanced Topics in Medical Instrumentation**

Recent and advanced topics in the field of medical instrumentation and its related areas.

BIOM 5200 [0.5 credit] (BMG 5105)**Medical Imaging Modalities**

Mathematical models of image formation based on the image modality and tissue properties. Linear models of image degradation and reconstruction. Inverse problems, regularization for image reconstruction. Image formation in radiology, computed tomography, MRI, nuclear medicine, ultrasound, positron emission tomography.

Also listed as SYSC 5304 (ELG 5127).

BIOM 5201 [0.5 credit] (BMG 5106)**Introduction to Medical Imaging Principles and Technology**

Basic principles and technological implementation of x-ray, nuclear medicine, magnetic resonance imaging (MRI), and other imaging modalities used in medicine. Contrast, resolution, storage requirements for digital images. Applications outside medicine, future trends.

Also listed as PHYS 5201.

Prerequisite(s): permission of the Physics department.

BIOM 5202 [0.5 credit] (BMG 5107)**Applications in Biomedical Image Processing**

Image processing methods applied to biomedical images. Overview of medical imaging modalities. Image enhancement, segmentation, registration and fusion. Image quality metrics. Image formats. Application examples.

Includes: Experiential Learning Activity

Also listed as SYSC 5202.

BIOM 5203 [0.5 credit] (BMG 5108)**Advanced Topics in Biomedical Image Processing**

Recent and advanced topics in the field of biomedical image processing and its related areas.

Prerequisite(s): permission of the instructor.

BIOM 5300 [0.5 credit] (BMG 5300)**Biological and Engineering Materials**

Properties of structural biological materials (bone, tendon, ligament, skin, cartilage, muscle, and blood vessels) from an engineering materials viewpoint. Selection of engineering materials as biomaterials. Introduction to biocompatibility. Histology of soft tissues. Viscoelasticity, mechanical properties and models of muscles, ligaments and tendons.

Prerequisite(s): permission of the instructor.

BIOM 5301 [0.5 credit] (BMG 5301)**Biomechanics of Skeletal System, Motion and Tissue**

Analysis of human motion. Kinematics and kinetics of various activities. Engineering analysis and modeling techniques applied to human motion. Injury mechanics, treatment, prosthetic replacements. Fracture behaviour and healing processes.

Prerequisite(s): permission of the instructor.

BIOM 5302 [0.5 credit] (BMG 5302)**Biofluid Mechanics**

Properties of blood. Blood flow models for vessels, circulation systems and the heart. Artificial blood vessels. Kidney flow and exchange. Modeling of perfused tissues and cells. Transport phenomena across membranes. Molecular and ionic transport. Other body fluids.

Prerequisite(s): permission of the instructor.

BIOM 5303 [0.5 credit] (BMG 5303)**Ergonomics and Design**

Review of ergonomic issues encountered in engineering design, including biomechanical, physical and physiological issues. Strategies for human interaction with complex systems, such as aircraft cockpits, equipment control consoles, human-robotic interactions, and tele-operated equipment.

Prerequisite(s): permission of the instructor.

BIOM 5304 [0.5 credit] (BMG 5110)**Advanced Topics in Biomechanics and Biomaterials**

Recent and advanced topics in the field of biomechanics and biomaterials and its related areas.

BIOM 5306 [0.5 credit] (BMG 5306)**Special Topics in Mechanical and Aerospace Engineering: Biomechanics**

Overview of human anatomy and physiology with emphasis on artificial organ and prosthetic device design requirement. Application of engineering principles to cells and tissues, biofluid mechanics, human body energetics, measurement techniques, mechanics of human body systems, with emphasis on the artificial heart.

Also listed as MECH 5801 (MCG 5489).

Precludes additional credit for MCG 5489/MECH 5801.

Also offered at the undergraduate level, with different requirements, as MAAE 4906, for which additional credit is precluded.

BIOM 5311 [0.5 credit] (BMG 5311)**Design of Medical Devices and Implants**

Solutions to clinical problems through the use of implants and medical devices. Pathology of organ failure and bioengineering and clinical aspects of artificial organs.

Examples: blood substitutes, oxygenators, cardiac support, vascular substitutes, pacemakers, ventricular assist devices, artificial hearts and heart valves.

Prerequisite(s): permission of the instructor.

BIOM 5312 [0.5 credit] (BMG 5312)**Design of Orthopaedic Implants and Prostheses**

Anatomy of the musculo-skeletal system.

Electromyography. Static and dynamic analysis of the human skeleton. Materials and manufacturing considerations for orthopaedic devices. Strength and failure theories. Implant fatigue, fracture and corrosion.

Prerequisite(s): permission of the instructor.

BIOM 5314 [0.5 credit] (BMG 5314)**Biocontrols**

Application of traditional control system principles to the human body. Functionality of sample actuators and sensors. Characterization of human body control loops with emphasis on system stability, robustness, and effect of adverse external disturbance.

Prerequisite(s): permission of the instructor.

BIOM 5315 [0.5 credit] (BMG 5315)**Biorobotics**

Interpretation of physical laws as applied to human motion, kinematics and dynamics of humanoid robots, modeling of biological sensors and actuators, artificial muscles, tele-manipulation, robot assisted surgery, and multi-fingered end-effectors. Design of mechatronic devices including rehabilitators, extenders, haptic devices, and minimally invasive surgery systems.

Prerequisite(s): permission of the instructor.

BIOM 5316 [0.5 credit] (BMG 5316)**Biotransport Processes**

Application of chemical engineering principles to medicine and biology. Principles of mass transfer and fluid dynamics in topics such as hemodialysis, artificial kidney, diffusion in blood, mass transfer in the eye, drug distribution in the body, and advanced life support systems.

Prerequisite(s): permission of the instructor.

BIOM 5323 [0.5 credit] (BMG 5323)**Rehabilitation Engineering**

Multidisciplinary approach to assistive-device design. Biomechanics applied to rehabilitation. Gait, neurological disorders, pathological gait, prosthetics, orthotics, seating, and mobility. Transducers, bio-instrumentation, EMG, FES. Augmentive communication and sensory aids. Human-assistive device interfaces, human-robot interfaces, computer-vision-guided rehabilitation aids, telerehabilitation.

Prerequisite(s): permission of the instructor.

BIOM 5330 [0.5 credit] (BMG 5330)**Electromagnetic Fields and Biological Systems**

Review of electromagnetic waves at radio and microwave frequencies. Electrical and magnetic properties of tissue. Impact of electromagnetic waves on tissue. Cellular effects.

Prerequisite(s): permission of the instructor.

BIOM 5400 [0.5 credit] (BMG 5317)**Medical Computing**

Introduction to information technology research used in the medically related fields such as biotechnology, cancer treatment, and biometric. Topics may include: medical imaging, telemedicine, telesurgery, DNA analysis, and medical information systems.

Prerequisite(s): permission of the instructor.

BIOM 5401 [0.5 credit] (BMG 5318)**Advanced Health Care Engineering**

Healthcare and technology; overview of medical devices and sensors; safe and effective use and management of technology; telemedicine; medical databases, data collection, storage, retrieval and computers in medicine; electronic patient records, PACS; clinical decision-support systems.

Also listed as SYSC 5300 (ELG 6130), EACJ 5303 (ELG 5123).

Prerequisite(s): permission of the instructor.

BIOM 5402 [0.5 credit] (BMG 5304)**Interactive Networked Systems and Telemedicine**

Telemanipulator; human motoring and sensory capabilities; typical interface devices; mathematical model of haptic interfaces; haptic rendering; stability and transparency; remote control schemes; time delay compensation; networking and real-time protocols, history and challenges of telemedicine; telemedicine applications: telesurgery, tele-monitoring, tele-diagnosis and tele-homecare.

Also listed as SYSC 5303 (ELG 6133).

Prerequisite(s): permission of the instructor.

BIOM 5403 [0.5 credit] (BMG 5111)**Advanced Topics in Medical Informatics and Telemedicine**

Recent and advanced topics in the field of medical informatics and telemedicine and its related areas.

BIOM 5405 [0.5 credit] (BMG 5305)**Pattern Classification and Experiment Design**

Introduction to a variety of supervised and unsupervised pattern classification techniques with emphasis on correct application. Statistically rigorous experimental design and reporting of performance results. Case studies will be drawn from various fields including biomedical informatics. Includes: Experiential Learning Activity

Also listed as SYSC 5405 (ELG 6102).

Prerequisite(s): undergraduate introductory probability and statistics.

BIOM 5406 [0.5 credit]**Clinical Engineering**

Overview of the Canadian health care system; brief examples of other countries; clinical engineering and the management of technologies in industrialized and in developing countries; safety, reliability, quality assurance; introduction to biomedical sensor technologies; applications of telemedicine; impact of technology on health care.

Prerequisite(s): enrolment in M.Eng. Biomedical Engineering with Concentration in Clinical Engineering. Also offered at the undergraduate level, with different requirements, as SYSC 4202, for which additional credit is precluded.

BIOM 5800 [0.0 credit] (BMG 6996)**Biomedical Engineering Seminar**

This course is in the form of seminars presented by graduate students and other researchers in the area of Biomedical Engineering. To complete this course, a student must attend at least ten seminars and make one presentation in the context of this seminar series.

Includes: Experiential Learning Activity

BIOM 5801 [1.0 credit]**Clinical Engineering Internship**

Internship placements are set in an institutional setting outside of the University. Students must complete a formal written paper in addition to their internship activities.

Includes: Experiential Learning Activity

BIOM 5900 [1.5 credit]**Biomedical Engineering Project**

Students pursuing the project-based M.Eng. completion option conduct a biomedical engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity

BIOM 5901 [1.5 credit]**Clinical Engineering Project**

Students pursuing the M.Eng. Clinical Engineering completion option conduct a clinical engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity

BIOM 5906 [0.5 credit] (BMG 7199)**Directed Studies in Biomedical Engineering**

Various possibilities exist for pursuing directed studies on topics approved by a course supervisor, including the above-listed course topics where they are not offered on a formal basis.

BIOM 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

BIOM 6800 [0.0 credit]**Biomedical Engineering PhD Seminar**

This course is in the form of seminars presented by graduate students and other researchers in the area of Biomedical Engineering.

BIOM 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Business (BUSI)

Business (BUSI) Courses**BUSI 5080 [0.5 credit]****Seminar in Accounting I**

Foundations in accounting theory and research methods in financial accounting, management accounting, taxation and assurance.

Also offered, with different requirements, as BUSI 6000, for which additional credit is precluded.

BUSI 5081 [0.5 credit]**Seminar in Accounting II**

Research methods, theory and practice in reporting, performance measurement, control, risk management and governance.

Also offered, with different requirements, as BUSI 6001, for which additional credit is precluded.

BUSI 5106 [0.25 credit]**Business Case Analysis and Presentations**

Introduction to, and practical application of, the methods and tools of rigorous business case analysis and the design of strategic responses, including the preparation and delivery of presentations designed to convince decision makers of the validity of the analysis and strategic response.

Includes: Experiential Learning Activity

BUSI 5108 [0.25 credit]**Sustainable Business Development**

An integration of sustainable business strategies examining corporate perspectives on environmental and social issues, and the implications on stakeholder management strategies. Students will apply concepts of sustainable business development in analyzing successful and flawed organizational strategies drawn from current business literature.

Includes: Experiential Learning Activity

BUSI 5180 [0.5 credit]**Seminar in Management I: Modern Organization Theory**

The development of post-structuralist organization theory is examined. Theories of organizational culture and symbolism, political theories of organization, ethnomethodological, decision-based and population ecology approaches are investigated. The social, economic, and intellectual forces shaping organization theory provides a major focus.

Also offered, with different requirements, as BUSI 6100, for which additional credit is precluded.

BUSI 5181 [0.5 credit]**Seminar in Management II: Current Topics in Organizational Behaviour**

Current topics and debates in the research on organizational behaviour. Potential topics include motivation, learning, communication, decision-making, small group behaviour, leadership, careers, power and conflict.

Also offered, with different requirements, as BUSI 6101, for which additional credit is precluded.

BUSI 5280 [0.5 credit]**Seminar in Marketing I: Management and Strategy**

Marketing theory, history, and developments through the analysis, synthesis, and extension of theoretical and empirical papers on marketing management and strategy including all aspects of the marketing mix plus alliances, competitive advantage, global marketing strategies and segmenting, targeting and positioning.

Also offered, with different requirements, as BUSI 6200, for which additional credit is precluded.

BUSI 5281 [0.5 credit]**Seminar in Marketing II: Consumer Behaviour**

Consumer decision making theory and practice including information processing, behavioural decision theory and consumer culture theory perspectives.

Also offered, with different requirements, as BUSI 6201, for which additional credit is precluded.

BUSI 5380 [0.5 credit]**Seminar in Management of Production/Operations I: Strategic Management of Production Systems**

Developing a firm's strategies with respect to facilities, locations, technologies, vertical integration and sourcing arrangements. Recent developments in management policies and practices that enable production systems to excel and grow in the era of innovation-, cost-, time- and quality-based competition.

Also offered, with different requirements, as BUSI 6300, for which additional credit is precluded.

BUSI 5381 [0.5 credit]**Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface**

The evolution and management of process innovation; management of productivity and sustainability using process technologies; integration of production strategy and technology; and supply chain interactions with development chain. Topics include process re-engineering, quality function deployment, supply chain restructuring and the deployment of process innovations. Also offered, with different requirements, as BUSI 6301, for which additional credit is precluded.

BUSI 5383 [0.5 credit]**Systems Optimization: Methods and Models**

Management science approaches in modeling systems for decision-making under certainty and uncertainty. Linear programming, network flows problems and applications, discrete optimization models, heuristics and metaheuristics, dynamic programming, nonlinear programming, simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Also offered, with different requirements, as BUSI 6303, for which additional credit is precluded.

BUSI 5480 [0.5 credit]**Seminar in Information Systems I: Research Issues**

Research themes, approaches, and methods prevalent in the Information Systems area. Students will engage in examining research issues in IS and perform critical analyses of the research methodologies used to investigate and report on them.

Includes: Experiential Learning Activity

Also offered, with different requirements, as BUSI 6400, for which additional credit is precluded.

BUSI 5481 [0.5 credit]**Seminar in Information Systems II: Current Trends**

Theory and practice in current information systems research.

Also offered, with different requirements, as BUSI 6401, for which additional credit is precluded.

BUSI 5580 [0.5 credit]**Seminar in Finance I: Topical Issues in Investments**

Selected topics in financial theory. Topics chosen according to new developments in theory and with the interests of the students in mind and may include theory of derivatives, pricing theory, information asymmetries, agency theory, economic efficiency, and empirical methods.

Also offered, with different requirements, as BUSI 6500, for which additional credit is precluded.

BUSI 5581 [0.5 credit]**Seminar in Finance II: Theories and Empirical Methods in Corporate Finance**

Foundations for empirical research methodologies used in selected papers in finance; informational issues and their impact on capital market efficiency; economics of mergers and acquisitions, dividend and information; and emerging areas in finance such as market failures, corporate governance, financial crisis, and behavioural finance.

Also offered, with different requirements, as BUSI 6501, for which additional credit is precluded.

BUSI 5780 [0.5 credit]**Seminar in International Business I: International Markets and Strategy**

An advanced examination of contemporary theory on the international expansion of the firm: Globalization, trade and investment flows, trade blocs, and free trade zones; consumers and culture; key actors in global markets; sequential internationalization, expansion modes, and location theory; strategy by firm size.

Also offered, with different requirements, as BUSI 6700, for which additional credit is precluded.

BUSI 5781 [0.5 credit]**Seminar in International Business II: Managing in a Global Environment**

The role of culture, cognition, and behaviour as it relates to management theory and practices. Issues related to globalization, technology, and workplace diversity are explored through an investigation of cultural theories and their implications for cognition, behaviour, and management.

Also offered, with different requirements, as BUSI 6705, for which additional credit is precluded.

BUSI 5801 [0.25 credit]**Statistics for Managers**

Techniques for using data to make an informed use of statistics. Applications, interpretation and limitations of results. Sampling, descriptive statistics, probability concepts, estimation and testing of hypotheses and regression, using practical business situations.

Precludes additional credit for BUSI 5904.

BUSI 5802 [0.25 credit]**Business Ethics**

Impact of corporate decisions on society. Models and standards of business ethics and corporate social responsibility (CSR). Methods of measuring and reporting. The rise of corporate power, stakeholder analysis, corporate governance, sustainability, national and international pressures on CSR.

BUSI 5900 [0.5 credit]**Tutorials/Directed Studies in Business**

Tutorials or directed readings in selected areas of business, involving presentation of papers as the basis for discussion with the tutor.

Prerequisite(s): GPA of 10.0 or higher and permission of the School.

BUSI 5905 [0.5 credit]**Special Topics**

At the discretion of the School, a course dealing with selected topics of interest to students in the MBA Program. Topics will vary from year to year, and will be announced in advance of the registration period.

Prerequisite(s): Permission of the School.

BUSI 5906 [0.25 credit]**Special Topics**

At the discretion of the School, a course dealing with selected topics of interest to students in the MBA program. Topics will vary from year to year, and will be announced in advance of the registration period.

Prerequisite(s): permission of the School.

BUSI 5907 [0.5 credit]**M.B.A. Thesis Tutorial**

A seminar designed to help the student formulate and evaluate specific research topics. The successful submission of a thesis proposal is necessary for the completion of the course.

Prerequisite(s): admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5908 [1.0 credit]**M.B.A. Research Project**

Includes: Experiential Learning Activity

Prerequisite(s): admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5909 [1.5 credit]**M.B.A. Thesis Research**

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5907 and admission to the program prior to the fall term of 2008 and permission of the M.B.A. Program Director.

BUSI 5980 [0.5 credit]**Foundations of Management Theory and Research**

Exploration of foundational works in management theory and research. Review of the foundational thinking of scholars that influenced and shaped the management discipline.

Also offered, with different requirements, as BUSI 6910, for which additional credit is precluded.

BUSI 5981 [0.5 credit]**Statistics for Business Research**

In-depth examination and critique of statistical inference. Linear regression. Statistical computing software will be used.

BUSI 5982 [0.5 credit]**Research Methodology in Business**

The study of research techniques commonly used in research on business and management issues. The development of knowledge of these methodologies and their application, and their possible use in the thesis research of the student.

Also offered, with different requirements, as BUSI 6902, for which additional credit is precluded.

BUSI 5983 [0.5 credit]**Qualitative Research Design**

The use of qualitative data in business research. Discussion of research design, data collection, analysis and interpretation techniques; overview of philosophy of science debates regarding epistemological and ontological stance, with practical experience.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5982.

Also offered, with different requirements, as BUSI 6903, for which additional credit is precluded.

BUSI 5984 [0.5 credit]**Quantitative Research Design**

In-depth study of theories and assumptions of quantitative research design methodologies in management; exploration of alternative research designs; conceptual understanding and application of statistical methods for data analysis; critique of research from a variety of practice settings applying quantitative design methods; design a research project.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 5982.

Also offered, with different requirements, as BUSI 6904, for which additional credit is precluded.

BUSI 5989 [2.0 credits]**M.Sc. Thesis**

M.Sc. Thesis.

Includes: Experiential Learning Activity

BUSI 5992 [0.25 credit]**Tutorials/Directed Studies in Business**

Tutorials or directed readings in selected areas of business, involving presentation of papers as the basis for discussion with the tutor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School of Business.

BUSI 5997 [0.5 credit]**Project Based Service Learning**

An experiential work environment in which students serve as consultants for a real-world client. Various types of projects are possible depending on the company and their goals/needs. Clients may be internal (Carleton, Sprott) or external (large firm, start-up, individual entrepreneur, not-for-profit).

Includes: Experiential Learning Activity

Prerequisite(s): Permission of the School of Business.

Also offered at the undergraduate level, with different requirements, as BUSI 4800, for which additional credit is precluded.

BUSI 5998 [0.0 credit]**MBA Skills Workshop**

Provides preparation for the MBA program, as well as professional and career development. The course is graded SAT/UNSAT based on attendance and engagement.

Includes: Experiential Learning Activity

BUSI 5999 [1.0 credit]**Internship**

A degree requirement for students with less than two years of relevant experience within a professional environment. Focus on the application of MBA course knowledge and building management skills in a business environment.

Includes: Experiential Learning Activity

Prerequisite(s): successful completion of two academic terms; subject to approval by the MBA Office.

Minimum 480 hours.

BUSI 6000 [0.5 credit]**Seminar in Accounting I**

Foundations in accounting theory and research methods in financial accounting, management accounting, taxation and assurance.

Also offered, with different requirements, as BUSI 5080, for which additional credit is precluded.

BUSI 6001 [0.5 credit]**Seminar in Accounting II**

Research methods, theory and practice in reporting, performance measurement, control, risk management and governance.

Also offered, with different requirements, as BUSI 5081, for which additional credit is precluded.

BUSI 6009 [0.5 credit]**Special Topics in Accounting**

Designed to expose students to new and emerging issues in selected areas of accounting research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6100 [0.5 credit]**Seminar in Management I: Modern Organization Theory**

The development of post-structuralist organization theory is examined. Theories of organizational culture and symbolism, political theories of organization, ethnomethodological, decision-based and population ecology approaches are investigated. The social, economic, and intellectual forces shaping organization theory provides a major focus.

Also offered, with different requirements, as BUSI 5180, for which additional credit is precluded.

BUSI 6101 [0.5 credit]**Seminar in Management II: Current Topics in Organizational Behaviour**

Current topics and debates in the research on organizational behaviour. Potential topics include motivation, learning, communication, decision-making, small group behaviour, leadership, careers, power and conflict.

Also offered, with different requirements, as BUSI 5181, for which additional credit is precluded.

BUSI 6103 [0.5 credit]**Seminar in Strategic Management**

Current topics and debates in the research on strategic management, sustainable business development and corporate governance. Foundational theories to be reviewed may include agency, institutional, network, resource-based view, resource dependence, stakeholder, stewardship and transaction cost economics theories. Precludes additional credit for BUSI 6803 (no longer offered).

BUSI 6104 [0.5 credit]**Managing the Change Process**

The process of organizational change and the external forces which drive such changes. Topics include both micro and macro theories of change and issues around change management such as leadership and resistance to change.

Precludes additional credit for BUSI 6704 (no longer offered).

BUSI 6105 [0.5 credit]**Women in Management**

An exploration of the research and organizational challenges arising from changing gender roles. Topics include: the sex segregation of work, gender differences in management styles, work-family conflict, women's careers, managing sexual harassment, employment equity and pay equity.

Precludes additional credit for BUSI 6802 (no longer offered).

BUSI 6109 [0.5 credit]**Special Topics in Management**

Designed to expose students to new and emerging issues in selected areas of management research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6200 [0.5 credit]**Seminar in Marketing I: Management and Strategy**

Marketing theory, history, and developments through the analysis, synthesis, and extension of theoretical and empirical papers on marketing management and strategy including all aspects of the marketing mix plus alliances, competitive advantage, global marketing strategies and segmenting, targeting and positioning.

Also offered, with different requirements, as BUSI 5280, for which additional credit is precluded.

BUSI 6201 [0.5 credit]**Seminar in Marketing II: Consumer Behaviour**

Consumer decision making theory and practice including information processing, behavioural decision theory and consumer culture theory perspectives.

Also offered, with different requirements, as BUSI 5281, for which additional credit is precluded.

BUSI 6209 [0.5 credit]**Special Topics in Marketing**

Designed to expose students to new and emerging issues in selected areas of marketing research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6300 [0.5 credit]**Seminar in Management of Production/Operations I: Strategic Management of Production Systems**

Developing a firm's strategies with respect to facilities, locations, technologies, vertical integration and sourcing arrangements. Recent developments in management policies and practices that enable production systems to excel and grow in the era of innovation-, cost-, time- and quality-based competition.

Also offered, with different requirements, as BUSI 5380, for which additional credit is precluded.

BUSI 6301 [0.5 credit]**Seminar in Management of Production/Operations II: Production/Technology/Strategy Interface**

The evolution and management of process innovation; management of productivity and sustainability using process technologies; integration of production strategy and technology; and supply chain interactions with development chain. Topics include process reengineering, quality function deployment, supply chain restructuring and the deployment of process innovations.

Also offered, with different requirements, as BUSI 5381, for which additional credit is precluded.

BUSI 6303 [0.5 credit]**Systems Optimization: Methods and Models**

Management science approaches in modeling systems for decision-making under certainty and uncertainty.

Linear programming, network flows problems and applications, discrete optimization models, heuristics and metaheuristics, dynamic programming, nonlinear programming, simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 6703.

Prerequisite(s): permission of the School.

Also offered, with different requirements, as BUSI 5383, for which additional credit is precluded.

BUSI 6304 [0.5 credit]**Management of Innovation and Technology**

Introduction to issues in the management of technology. Topics include: technology strategy and policy, technology forecasting and planning, the process of technology innovation from concept to market, research and development management, technology adoption, diffusion and implementation, technology transfer, and technology and social issues.

Precludes additional credit for BUSI 6801 (no longer offered).

BUSI 6306 [0.5 credit]**Advanced Methods and Models of Management Science**

Advanced study of decision-making under certainty and uncertainty. Preprocessing and reformulation methods, optimization theory for large scale problems; stochastic programming; metaheuristics; multicriteria analysis; simulation. Links between theory and application will be illustrated through case studies and applied modeling.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 6906 (no longer offered).

Prerequisite(s): BUSI 6303 or permission of the School.

BUSI 6309 [0.5 credit]**Special Topics in Operations Management**

Designed to expose students to new and emerging issues in selected areas of operations management research.

The topics covered vary from year to year according to varied research expertise among the area faculty.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

BUSI 6400 [0.5 credit]**Seminar in Information Systems I: Research Issues**

Research themes, approaches, and methods prevalent in the Information Systems area. Students will engage in examining research issues in IS and perform critical analyses of the research methodologies used to investigate and report on them.

Also offered, with different requirements, as BUSI 5480, for which additional credit is precluded.

BUSI 6401 [0.5 credit]**Seminar in Information Systems II: Current Trends**

Theory and practice in current information systems research.

Also offered, with different requirements, as BUSI 5481, for which additional credit is precluded.

BUSI 6409 [0.5 credit]**Special Topics in Information Systems**

Designed to expose students to new and emerging issues in selected areas of information systems research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6500 [0.5 credit]**Seminar in Finance I: Topical issues in Investments**

Selected topics in financial theory. Topics chosen according to new developments in theory and with the interests of the students in mind and may include theory of derivatives, pricing theory, information asymmetries, agency theory, economic efficiency, and empirical methods.

Prerequisite(s): graduate-level finance courses or permission of the School.

Also offered, with different requirements, as BUSI 5580, for which additional credit is precluded.

BUSI 6501 [0.5 credit]**Seminar in Finance II: Theories and Empirical Methods in Corporate Finance**

Foundations for empirical research methodologies used in selected papers in finance; informational issues and their impact on capital market efficiency; economics of mergers and acquisitions, dividend and information; and emerging areas in finance such as market failures, corporate governance, financial crisis, and behavioural finance.

Prerequisite(s): graduate-level finance courses or permission of the School.

Also offered, with different requirements, as BUSI 5581, for which additional credit is precluded.

BUSI 6509 [0.5 credit]**Special Topics in Finance**

Designed to expose students to new and emerging issues in selected areas of finance research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6600 [0.5 credit]**Entrepreneurship**

An examination of research in entrepreneurship focusing on theory building and empirical testing of factors that shapes the identification, evaluation and exploitation of opportunities and the creation of new organizations. Precludes additional credit for BUSI 6806 (no longer offered).

BUSI 6700 [0.5 credit]**Seminar in International Business I: International Markets and Strategy**

An advanced examination of contemporary theory on the international expansion of the firm: Globalization, trade and investment flows, trade blocs, and free trade zones; consumers and culture; key actors in global markets; sequential internationalization, expansion modes, and location theory; strategy by firm size.

Precludes additional credit for BUSI 6804 (no longer offered).

Also offered, with different requirements, as BUSI 5780, for which additional credit is precluded.

BUSI 6705 [0.5 credit]**Seminar in International Business II: Managing in a Global Environment**

The role of culture, cognition, and behaviour as it relates to management theory and practices. Issues related to globalization, technology, and workplace diversity are explored through an investigation of cultural theories and their implications for cognition, behaviour, and management.

Also offered, with different requirements, as BUSI 5781, for which additional credit is precluded.

BUSI 6709 [0.5 credit]**Special Topics in International Business**

Designed to expose students to new and emerging issues in selected areas of international business research. The topics covered vary from year to year according to varied research expertise among the area faculty.

Prerequisite(s): permission of the School.

BUSI 6900 [0.5 credit]**Directed Readings**

Directed readings in selected areas of business, involving presentation of papers as the basis for discussion. A part of the requirement for the course may be participation in an advanced course at the undergraduate/graduate level.

Prerequisite(s): permission of the School.

BUSI 6901 [0.5 credit]**Special Topics**

Designed to expose students to new and emerging issues in selected areas of business research. Integrative problems involving two or more areas of business research are also explored. The topics covered may vary from year to year.

Prerequisite(s): permission of the School.

BUSI 6902 [0.5 credit]**Research Methodology in Business**

Research techniques commonly used in research on business and management issues. The development of knowledge of these methodologies and their application, and their possible use in the thesis research of the student.

Also offered, with different requirements, as BUSI 5982, for which additional credit is precluded.

BUSI 6903 [0.5 credit]**Qualitative Research Design**

The use of qualitative data in business research. Discussion of research design, data collection, analysis and interpretation techniques; overview of philosophy of science debates regarding epistemological and ontological stance; with practical experience.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 6902.

Also offered, with different requirements, as BUSI 5983, for which additional credit is precluded.

BUSI 6904 [0.5 credit]**Quantitative Research Design**

In-depth study of theories and assumptions of quantitative research design methodologies in management; exploration of alternative research designs; conceptual understanding and application of statistical methods for data analysis; critique of research from a variety of practice settings applying quantitative design methods; design a research project.

Includes: Experiential Learning Activity

Prerequisite(s): BUSI 6902.

Also offered, with different requirements, as BUSI 5984, for which additional credit is precluded.

BUSI 6905 [0.5 credit]**Advanced Statistical Methods for Business Research**

A practical introduction to advanced statistical methods used in business research, with particular focus on discrete categorical data. Topics include the analysis of two-way and three-way tables; loglinear modeling; logistic regression; generalized linear models. Students will analyze real data using appropriate software packages.

Includes: Experiential Learning Activity

BUSI 6907 [0.5 credit]**Ph.D. Thesis Tutorial**

An intensive preparation for Ph.D. thesis research, under the direction of one or more members of the School. The successful submission of a thesis proposal is necessary for the completion of the course.

BUSI 6908 [0.0 credit]**Ph.D. Comprehensives**

Preparation for comprehensive examinations.

BUSI 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

BUSI 6910 [0.5 credit]**Foundations of Management Theory and Research**

Exploration of foundational works in management theory and research. Review of the foundational thinking of scholars that influenced and shaped the management discipline.

Also offered, with different requirements, as BUSI 5980, for which additional credit is precluded.

Canadian Studies (CDNS)

Canadian Studies (CDNS) Courses**CDNS 5001 [0.5 credit]****M.A. Core Seminar: Conceptualizing Canada**

Interdisciplinary perspectives on theoretical and methodological approaches to Canadian Studies.

Prerequisite(s): Graduate standing in the School.

CDNS 5002 [0.5 credit]**Interdisciplinary Methods**

A survey of the issues raised by problem-directed methodologies; critiques of existing methodology including from the standpoints of feminist and Aboriginal scholarship.

CDNS 5003 [0.5 credit]**Selected Topics in Canadian Studies**

Topic varies from year to year.

CDNS 5101 [0.5 credit]**Indigenous Peoples, Canada and the North**

Interdisciplinary seminar exploring selected Indigenous issues as they relate to historical and ongoing changes in material, social, and cultural phenomena and relationships.

Precludes additional credit for CDNS 5100.

CDNS 5102 [0.5 credit]**Indigenous Politics and Resurgence in Canada**

Interdisciplinary seminar exploring selected themes in Indigenous politics, experience, and philosophy since the 1960s.

Precludes additional credit for CDNS 5100.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 5201 [0.5 credit]**Critical Perspectives on Canadian Feminism**

Interdisciplinary seminar examining Canadian contributions to feminist and gender theory as well as developments in women's movements in a Canadian context.

Precludes additional credit for CDNS 5200.

CDNS 5202 [0.5 credit]**Gendering Canada: Selected Contemporary Debates**

Interdisciplinary seminar focusing on specific themes that define Canadian women's and gender studies. Themes change yearly but past topics have included sexuality and sexual practices, health and reproductive rights, the body, motherhood and work.

Precludes additional credit for CDNS 5200.

CDNS 5301 [0.5 credit]**Canadian Cultural Studies**

The arts, belief systems, institutions and communicative practices in Canada in relation to other social and historical structures.

Precludes additional credit for CDNS 5300.

CDNS 5302 [0.5 credit]**Canadian Cultural Policy**

Evolution of Canadian cultural policy from its origins through to the contemporary search for cultural cohesion within a global context, emphasizing developments since the Massey Commission.

Precludes additional credit for CDNS 5300.

CDNS 5401 [0.5 credit]**Heritage Conservation I: History, Principles, and Concepts**

History of heritage conservation theory in Canada and abroad, as it affects both tangible and intangible heritage; development of the field's conceptual frameworks and operational principles for understanding, evaluating, conserving and managing significant Canadian places of heritage value.

Precludes additional credit for CDNS 5400.

Prerequisite(s): students registering in this course are strongly encouraged to register in CDNS 5402.

CDNS 5402 [0.5 credit]**Heritage Conservation II: Theory in Practice**

Application of heritage conservation theory to practice. Models for conservation and management of heritage resources in Canada. Research, planning, development, interpretation and the interplay of disciplines within these conservation domains. Frameworks for evaluating programs and policies. Field exercises and visits.

Includes: Experiential Learning Activity

Precludes additional credit for CDNS 5400.

Prerequisite(s): CDNS 5401 or permission of the School of Indigenous and Canadian Studies.

CDNS 5403 [0.5 credit]**Heritage Conservation and Sustainability**

Exploration of the recent shift in heritage conservation discourse that embraces objectives of environmental, social, and economic sustainability. Investigation of synergies and gaps between natural and cultural conservation ideas. Introduction to theory, principles and practices through analysis of Canadian and international research, policy and projects.

Also offered at the undergraduate level, with different requirements, as CDNS 4403, for which additional credit is precluded.

Seminar three hours per week.

CDNS 5501 [0.5 credit]**Decolonizing Canada: Cultural Politics and Collective Identities**

Interdisciplinary examination of the politics of race, gender, class and cultural pluralism in Canada. Critical theoretical exploration of nationalism, regionalism, multiculturalism, neoliberalism, Aboriginal politics, diaspora and global human rights regimes and claims.

CDNS 5601 [0.5 credit]**Constructing Canada: The Politics of National Identity**

Interdisciplinary examination of national identity, public opinion, and public policy; the intersection of national visions of Canada and public policy; and the articulation of Canadian distinctiveness and sovereignty on the world stage. Topics include nationalism and national identity, branding Canada, and selected policy fields.

CDNS 5700 [0.5 credit]**Arctic Passages: The Changing Dynamics of Canada's North**

Interdisciplinary exploration of changing political, economic, and cultural relationships between Inuit and non-Inuit interests in the Canadian Arctic. Emphasis on the role of global processes, such as the rise of the circumpolar movement and environmental change, in mediating these relationships.

CDNS 5800 [1.0 credit]**Internship/Practicum**

Internships or practicum placements are set in an institutional setting outside of the University. Students in the research essay option are restricted to a maximum of 0.5 credits in an Internship/Practicum. Students must complete a formal written paper in addition to their internship/practicum activities.

Includes: Experiential Learning Activity

Prerequisite(s): completion of one full credit of coursework in Canadian Studies and prior approval of the School of Indigenous and Canadian Studies. For students in the coursework option only.

CDNS 5801 [0.5 credit]**Internship/Practicum**

Internships or practicum placements are set in an institutional setting outside of the University. Students in the research essay option are restricted to a maximum of 0.5 credits in an Internship/Practicum. Students must complete a formal written paper in addition to their internship/practicum activities.

Includes: Experiential Learning Activity

Prerequisite(s): completion of one full credit of coursework in Canadian Studies and prior approval of the School of Indigenous and Canadian Studies. For students in the coursework or research essay option only.

CDNS 5900 [1.0 credit]**Directed Studies**

Reading and research tutorials supervised by a qualified adviser, in an area not covered by an existing seminar. Directed Studies are organized by individual students with a faculty member.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 5901 [0.5 credit]**Directed Studies**

Reading and research tutorials supervised by a qualified adviser, in an area not covered by an existing seminar. Directed Studies are organized by individual students with a faculty member.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 5908 [1.0 credit]**Research Essay**

Approval of the Research Essay Proposal is required prior to registration in this course.

CDNS 5909 [2.0 credits]**M.A. Thesis**

Approval of the Thesis Proposal is required prior to registration in this course.

Includes: Experiential Learning Activity

CDNS 6900 [1.0 credit]**Ph.D. Core Seminar: Interdisciplinarity in Canadian Studies: Concepts, Theories and Methods**

Available only to Ph.D. students in Canadian Studies.

An examination of the complex theoretical and methodological issues associated with the discourse on an interdisciplinary study of Canada. Offered at Carleton and Trent through a combination of joint sessions at both universities and regular electronic communication.

Prerequisite(s): enrolment in the Canadian Studies Ph.D. program.

CDNS 6901 [0.5 credit]**Ph.D. Tutorial**

Available only to Ph.D. students in Canadian Studies. Reading and research tutorials. A program of research and written work in an area not covered by an existing graduate seminar.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6902 [0.5 credit]**Ph.D. Tutorial**

Available only to Ph.D. students in Canadian Studies. Reading and research tutorials. A program of research and written work in an area not covered by an existing graduate seminar.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6905 [0.5 credit]**Ph.D. Comprehensive Examination**

Available only to Ph.D. students in Canadian Studies. Students will receive a grade of Satisfactory, Unsatisfactory or Pass with Distinction.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6907 [0.5 credit]**Ph.D. Comprehensive Examination**

Available only to Ph.D. students in Canadian Studies. Students will receive a grade of Satisfactory, Unsatisfactory or Pass with Distinction.

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

CDNS 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School of Indigenous and Canadian Studies.

Chemistry (CHEM)

Chemistry (CHEM) Courses**CHEM 5001 [0.25 credit] (CHM 8301)****Analytical Mass Spectrometry**

The principles of ion sources and mass spectrometers and their applications to problems in chemistry and biochemistry. Introduction to the chemistry of gaseous ions. Ion optics. Special emphasis on interpreting mass spectra.

CHEM 5002 [0.25 credit] (CHM 8301)**Multinuclear Magnetic Resonance Spectroscopy**

Principles of Nuclear Magnetic Resonance (NMR). NMR parameters studied: chemical shift, spin-spin coupling, electric quadrupole coupling, spin-spin, spin-lattice relaxation rates. NMR and the periodic table. Dynamic NMR. Applications in chemistry and biochemistry. The Fourier Transform technique. Pulse sequences. Basic principles/applications of two-dimensional NMR.

CHEM 5003 [0.25 credit] (CHM 8325)**Solid State NMR Spectroscopy**

Brief introduction to solid state NMR spectroscopy. Topics include dipolar coupling interactions, chemical shielding anisotropy, the quadrupolar interaction and averaging techniques such as magic angle spinning.

CHEM 5004 [0.25 credit] (CHM 8326)**NMR Spectroscopy**

Advanced NMR techniques for both proton and carbon spectra, various decoupling and related experiments. Interpretation of NIOSY, COSY and related data.

CHEM 5005 [0.25 credit] (CHM 8327)**Physical Organic Chemistry**

Hammett functions, transition state energies, stereochemistry of organic compounds, and mechanisms of organic reactions and their determination.

CHEM 5007 [0.25 credit] (CHM 8310)**Introduction to Photochemistry**

Basic principles of photochemistry including selection rules, energy transfer processes and the properties of excited state reactions. Lasers and their applications to measurements of the dynamics of elementary reactions.

CHEM 5102 [0.25 credit] (CHM 8346)**Supercritical Fluids**

Fundamental and practical aspects of the uses of supercritical fluids in the chemistry laboratory. Thermodynamic treatment of high pressure multicomponent phase equilibria, transport properties, solubilities, supercritical fluid extraction and chromatography for analytical purposes, reactions in supercritical fluids, equipment considerations, new developments.

Includes: Experiential Learning Activity

CHEM 5108 [0.5 credit] (CHM 8302)**Surface Chemistry and Nanostructures**

Surface structure, thermodynamics and kinetics, specifically regarding adsorption/desorption and high vacuum models. Nanoscale structures and their formation, reactivity and characterization. Thin films, carbon nanotubes, self-assembled monolayers and supramolecular aggregates.

Also offered at the undergraduate level, with different requirements, as CHEM 4103, for which additional credit is precluded.

CHEM 5109 [0.5 credit] (CHM 8302)**Advanced Applications in Mass Spectrometry**

Detailed breakdown of the physical, electrical and chemical operation of mass spectrometers. Applications in MS ranging from the analysis of small molecules to large biological macromolecules. Descriptions of the use of mass spectrometry in industry as well as commercial opportunities in the field.

Also offered at the undergraduate level, with different requirements, as CHEM 4304, for which additional credit is precluded.

CHEM 5110 [0.25 credit] (CHM 8176)**Chemistry Education and Chemistry Education Research**

Chemistry education including theories of learning, aligning intended outcomes with course activities and assessment, and troublesome areas of learning and teaching in chemistry. Key educational research areas are addressed, including types evidence, research methods, and central publications.

CHEM 5111 [0.25 credit] (CHM 8358)**Advanced Topics in Biomolecular Sciences**

Topics of current interest in biomolecular sciences and biological chemistry. Variable content from year to year.

CHEM 5112 [0.25 credit] (CHM 8359)**Advanced Topics in Materials Chemistry**

Topics of current interest in materials chemistry. Variable content from year to year.

CHEM 5113 [0.25 credit] (CHM 8165)**Stereoselective Synthesis**

Fundamentals of stereoselective synthesis and catalysis, including conformational analysis, substrate and catalyst control. Includes the use of allylic, chiral auxiliaries, directed reactions and chiral catalysts.

CHEM 5114 [0.25 credit] (CHM 8173)**Introduction to Molecular Simulation and Statistical Mechanics (Part A)**

Modern molecular simulation techniques including classical molecular dynamics and Monte Carlo simulations with the necessary statistical mechanics required to understand and interpret the results. Introduction to modern scientific computing environments via the Linux operating system.

CHEM 5115 [0.25 credit] (CHM 8175)**Introduction to Molecular Simulation and Statistical Mechanics (Part B)**

Modern molecular simulation techniques including classical molecular dynamics and Monte Carlo simulations with the necessary statistical mechanics required to understand and interpret the results. Introduction to modern scientific computing environments via the Linux operating system.

Prerequisite(s): CHEM 5114.

CHEM 5116 [0.25 credit] (CHM 8360)**Characterization Methods and Applications of Advanced Materials**

Physico-chemical techniques including thermal analysis, optical spectroscopy, electrochemistry, X-ray and electron diffraction, electron microscopy, electron spectroscopies, magnetic resonance, and general instrumental methods. Applications may include: field effect transistors, photovoltaics, light emitting devices, batteries and fuel cells.

CHEM 5117 [0.25 credit] (CHM 8361)**Chemical Biology (Part A)**

Chemical Biology of modern molecular science with applications to understanding biological mechanisms. Chemical and genetically encoded probes for genomics, proteomics, metabolomics as well as biorthogonal chemistry, chemical genetics and expanded genetic codes and alphabets in the context of understanding and engineering living systems.

CHEM 5118 [0.25 credit] (CHM 8363)**Chemical Biology (Part B)**

Chemical Biology of modern molecular science with applications to understanding biological mechanisms. Chemical and genetically encoded probes for genomics, proteomics, metabolomics as well as biorthogonal chemistry, chemical genetics and expanded genetic codes and alphabets in the context of understanding and engineering living systems.

Prerequisite(s): CHEM 5117.

CHEM 5119 [0.25 credit] (CHM 8362)**Molecular Magnetism I**

Introduction to the principals (Molecular Magnetism I) and advanced characterization of paramagnetic molecules (Molecular Magnetism II). Emphasis will be made on structure-property relationship. This course will contain variable content from year to year by discussing recent progress on molecular magnetism.

CHEM 5120 [0.25 credit] (CHM 8330)**Heterocyclic Chemistry**

Properties of heterocycles. Synthesis and reactivity of heterocyclic systems, with examples relevant to the synthesis of pharmaceuticals and natural products. Includes metal-catalyzed reactions.

CHEM 5121 [0.25 credit] (CHM 8364)
Molecular Magnetism II

Introduction to the principals (Molecular Magnetism I) and advanced characterization of paramagnetic molecules (Molecular Magnetism II). Emphasis will be made on structure-property relationship. This course will contain variable content from year to year by discussing recent progress on molecular magnetism.

CHEM 5202 [0.25 credit] (CHM 8323)
Chemistry of the Main Group Elements

Fundamental and applied aspects of main group element chemistry. Topics may include non-metal chemistry, main group organometallic chemistry, application of main group element compounds to solid state synthesis (e.g. CVD and/or sol gel processes), uses of main group element compounds in synthesis.

CHEM 5206 [0.5 credit] (CHM 8302)
Physical Methods of Nanotechnology

An overview of methods used in nanotechnology. Principles of scanning probe techniques ranging from surface physics to biology. State of the art methods to create nanostructures for future applications in areas such as nanolithography, nanoelectronics, nano-optics, data storage and bio-analytical nanosystems.

CHEM 5207 [0.25 credit] (CHM 8302)
Macromolecular Nanotechnology

Fundamentals of synthetic macromolecules related to nanoscale phenomena. Challenges and opportunities associated with polymers on the nanoscale. Topics include molecular recognition, self-assembled nanostructures, functional nanomaterials, amphiphilic architectures, nanocomposites, and nanomachines. Applications to sensing, drug delivery, and polymer based devices. Also offered at the undergraduate level, with different requirements, as CHEM 4201, for which additional credit is precluded.

CHEM 5208 [0.25 credit] (CHM 8302)
Bio Macromolecular Nanotechnology

Fundamentals of biological macromolecules related to nanoscale phenomena. Challenges and opportunities associated with natural polymers on the nanoscale. Topics include molecular recognition, self-assembled nanostructures, scaffolds and templates, functional nanomaterials, amphiphilic architectures, nanocomposites, and nanomachines. Applications to sensing, biomaterials, drug delivery, and devices. Also offered at the undergraduate level, with different requirements, as CHEM 4201, for which additional credit is precluded.

CHEM 5304 [0.25 credit] (CHM 8349)
Free Radicals in Chemistry and Biology

Oxidative stress induced by free radicals plays a significant role in fatal and chronic diseases. The chemistry of bio-radicals will be described and related to pathobiological processes such as lipid peroxidation and atherosclerosis, protein nitration and cross linking, and DNA scission.

CHEM 5306 [0.25 credit] (CHM 8338)
Unimolecular Reaction Dynamics: Experiment and Theory

Theoretical models that have been developed for the understanding of unimolecular reactions; statistical theories such as RRKM theory. Experimental techniques for exploring the kinetics and mechanism of unimolecular reactions, including mass spectrometry, coincidence spectroscopy and ZEKE spectroscopy.

CHEM 5406 [0.5 credit] (CHM 8164)
Organic Polymer Chemistry

Basic principles of industrial and synthetic polymers. Polymerization and polymer characterization. Topics to cover some important polymers with emphasis on synthesis, commodity plastics, engineering thermoplastics and specialty polymers. Prerequisite(s): CHEM 3201 and CHEM 3202 and/or CHEM 4203 or the equivalent. Students should have a basic knowledge of organic reaction mechanisms and stereochemistry.

Also offered at the undergraduate level, with different requirements, as CHEM 4204, for which additional credit is precluded.

CHEM 5407 [0.5 credit] (CHM 8134)
Spectroscopy for Organic Chemists

Use of NMR spectroscopy in the elucidation of organic structures, interpretation of ¹H, ¹³C and ¹⁹F NMR. Use of NMR in determining relative and absolute stereochemistry. Two-dimensional NMR. Also offered at the undergraduate level, with different requirements, as CHEM 4202, for which additional credit is precluded.

CHEM 5500 [0.25 credit] (CHM 8348)
Analytical Instrumentation

Principles of modern electronics, devices and instruments. Measurement of photonic and electrochemical signals. Conditioning of signals for feedback control and microcomputer interfacing. Computational data analysis techniques such as simplex optimization. Applications in chemical analysis include amperometric detector for capillary electrophoresis, and surface plasmon resonance immunosensor.

CHEM 5501 [0.25 credit] (CHM 8352)
Analytical Approach to Chemical Problems

Case study of analytical approach to various chemical problems in agricultural, biochemical, environmental, food processing, industrial, pharmaceutical and material sciences. Analytical methods include capillary electrophoresis, chemiluminescence, Fourier transform infrared spectroscopy, inductively coupled plasma emission spectroscopy, mass spectrometry, biochemical sensors, and fibre optics for remote sensing. Includes: Experiential Learning Activity

CHEM 5600 [0.25 credit] (CHM 8323)
Quantum Mechanical Methods - Theory
A course dealing with the theory behind quantum mechanical methods (HF, MP2, CI, DFT).

CHEM 5606 [0.5 credit] (CHM 5606)
Environmental Chemistry and Toxicology
Overview of environmental chemistry and toxicology principles including chemical sources, fate, and effects in the environment. Examining organic reactions occurring in abiotic environments and biological systems, study aspects of toxicant disposition and biotransformation. Emphasis on contemporary problems in human health and the environment.
Also offered at the undergraduate level, with different requirements, as CHEM 4305, for which additional credit is precluded.

CHEM 5705 [0.5 credit] (CHM 9109)
Ecotoxicology
Concepts of ecotoxicology, emphasizing whole ecosystem response to hazardous contaminants. Impacts of chronic and acute exposure of ecosystems to toxicants, the methods of pesticide, herbicide and pollutant residue analysis and the concept of bound residues.
Also listed as BIOL 6403 [BIO 9104].
Prerequisite(s): BIOL 6402 (BIO 9101)/CHEM 5708 (CHM 8156).

CHEM 5708 [0.5 credit] (CHM 8156)
Principles of Toxicology
Basic theorems of toxicology with examples of current research problems. Toxic risk is defined as the product of intensive hazard and research problems. Each factor is assessed in scientific and social contexts and illustrated with many types of experimental material.
Also listed as BIOL 6402 [BIO 9101].

CHEM 5709 [0.5 credit] (CHM 8157)
Chemical Toxicology
Introduction to modeling chemical hazards and exposures at the cellular level. The properties of toxic substances are compared to the responses of enzymatic systems. These interactions are defined as Quantitative Structure-Activity Relationships and used to interpret hazardous materials under regulations such as WHMIS.
Also listed as BIOL 5709 [BIO 8113].
Prerequisite(s): BIOL 6402/CHEM 5708 (BIO 9101/CHM 8156).

CHEM 5800 [0.5 credit]
Seminar in Biochemistry I
A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.
Includes: Experiential Learning Activity
Also listed as BIOL 5002.

CHEM 5801 [1.0 credit] (CHM 8256)
Seminar I
A seminar course in which students are required to present a seminar on a topic not related to their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.
Includes: Experiential Learning Activity
Also listed as FOOD 5801.

CHEM 5802 [1.0 credit] (CHM 8257S)
Seminar II
A seminar course in which students are required to present a seminar on their Ph.D. research topic in their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.
Includes: Experiential Learning Activity
Also listed as FOOD 5802.

CHEM 5805 [0.5 credit] (CHM 8167)
Seminar in Toxicology
This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in toxicology.
Includes: Experiential Learning Activity
Also listed as BIOL 6405.

CHEM 5806 [0.5 credit]
Advances in Applied Biochemistry
A practical hands-on course in the field of Biochemistry. This course is run in a laboratory and will train students in highly specialized technique(s) in Biochemistry. The students will run experiments, gather data, assess and analyze the results and present the findings as a seminar.
Includes: Experiential Learning Activity
Also listed as BIOL 5004.

CHEM 5900 [0.5 credit] (CHM 8158)
Directed Special Studies
Under the direction of an approved member of Faculty, the student will undertake advanced study of a field of chemistry unrelated to their thesis topic. Approval of the Associate Chair, Graduate and Postdoctoral Affairs Chemistry is required and will only be granted under unusual conditions.

CHEM 5901 [0.25 credit] (CHM 8304)
Advanced Topics in Organic Chemistry
Topics of current interest in organic chemistry. The content of this course may vary from year to year.

CHEM 5902 [0.25 credit] (CHM 8302)
Advanced Topics in Inorganic Chemistry
Topics of current interest inorganic chemistry. The content of this course may vary from year to year.

CHEM 5903 [0.25 credit] (CHM 8309)
Advanced Topics in Physical/Theoretical Chemistry
Topics of current interest in physical/theoretical chemistry. The content of this course may vary from year to year.

CHEM 5904 [0.5 credit] (CHM 8104)**Scientific Data Processing and Evaluation**

Optimization of scientific measurements, calibration, uni-variate and multi-variate analysis of scientific data, "intelligent" spreadsheets for scientific data processing and presentation, noise reduction using spreadsheets, correction for signal drifts; examples from chemistry, spectroscopy and other scientific disciplines.

Prerequisite(s): CHEM 4301, or permission from the Department.

Also offered at the undergraduate level, with different requirements, as CHEM 4303, for which additional credit is precluded.

CHEM 5905 [0.5 credit] (CHM 5105)**Radiochemistry**

A study of nuclear stability and decay; chemical studies of nuclear phenomena. Applications of radioactivity.

Prerequisite(s): permission of the Department.

Also offered at the undergraduate level, with different requirements, as CHEM 4502, for which additional credit is precluded.

CHEM 5909 [3.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

CHEM 6800 [0.5 credit]**Seminar in Biochemistry II**

A graduate seminar on current topics in the field of Biochemistry. This course introduces the seminar format and involves student, faculty and invited seminar speakers. The student will present a seminar and submit a report on a current topic in Biochemistry.

Includes: Experiential Learning Activity

Also listed as BIOL 6102.

Lecture three hours a week.

CHEM 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Civil Engineering - Joint (CIVJ)

Civil Engineering - Joint (CIVJ) Courses**CIVJ 5000 [0.5 credit] (CVG 5100)****Deep Foundations****CIVJ 5003 [0.5 credit]****Dam Engineering****CIVJ 5005 [0.5 credit]****Adsorption Separation Process****CIVJ 5006 [0.5 credit] (CVG 5106)****Site Improvements****CIVJ 5008 [0.5 credit] (CVG 5108)****Pile Dynamics****CIVJ 5102 [0.5 credit]****Behaviour of Soil and Rock****CIVJ 5104 [0.5 credit]****Soil Plasticity****CIVJ 5105 [0.5 credit] (CVG 5175)****Numerical Methods for Geotechnical Engineering****CIVJ 5106 [0.5 credit] (CVG 5161)****Mechanics of Unsaturated Soils****CIVJ 5107 [0.5 credit] (CVG 5177)****Offshore Geotechnique****CIVJ 5108 [0.5 credit] (CVG 5178)****Ice Mechanics****CIVJ 5109 [0.5 credit] (CVG 5109)****Geotechnical Hazards****CIVJ 5110 [0.5 credit] (CVG 5187)****Rock Mechanics**

Rock exploration, laboratory and in-situ testing, rock mass classification, deformation and strength, failure criteria, stresses in rock, foundations on rock.

CIVJ 5182 [0.5 credit] (CVG 5182)**Water Resources Management**

Global water supply and demand, integrated water resources management, modeling and optimization of water resources systems, reservoir management, uncertainty modeling, climate change and water, decision under uncertainty.

Also listed as ENVJ 5182.

CIVJ 5184 [0.5 credit] (CVG 5184)**Construction Cost Estimating**

General overview of construction cost estimating. Techniques and construction cost estimating process; elements of project cost; conceptual and detailed cost estimation methods; risk assessment and range estimating; work breakdown structure applied in building projects. Computer applications in building construction cost estimating and infrastructure projects.

CIVJ 5185 [0.5 credit] (CVG 5185)**Construction Life Cycle Analysis**

General overview of analyzing the economics of construction projects by applying the concept of time value of money. Financing strategies for construction projects and profitability analysis; correlation between value engineering, life cycle cost analysis and assessment for construction projects. Breakeven, sensitivity and risk analysis.

CIVJ 5186 [0.5 credit] (CVG 5186)**Project Information Management**

Topics in contractual relationships between construction project teams. Different type of construction contracts and their application. Preparation of project documents. Evaluation of different types of project organization structure and associated project delivery systems. Bidding strategies. Network analysis using deterministic and stochastic methods for construction-time.

CIVJ 5188 [0.5 credit] (CVG 5188)**Loads on structures**

Overview of loads on buildings according to Canadian codes and standards. Dead and live loads, snow loads, wind loads, earthquake loads, loads on non-structural components; vibrations. Selected topics in the practical design of building structures.

CIVJ 5189 [0.5 credit] (CVG5189)**Blast Engineering**

Overview of explosives and blast loads on structural and non-structural infrastructure components; dynamic analysis of elements under blast-induced shock waves and dynamic pressures; elastic and inelastic response; incremental equation of motion and nonlinear analysis; development of resistance functions; pressure-impulse (P-I) diagrams; blast-resistant building design.

CIVJ 5190 [0.5 credit] (CVG 5190)**Rehabilitation of Concrete Structures**

Durability of concrete bridges and building structures in Canada; assessment and evaluation of damaged concrete structures; repair, rehabilitation and strengthening techniques; applicable design codes and guidelines; monitoring technologies for structures; implications for infrastructure management.
Lecture three hours a week

CIVJ 5191 [0.5 credit] (CVG 5191)**Diagnosis and Prognosis of Concrete Infrastructure**

Condition assessment of concrete infrastructure using experimental (i.e. visual, nondestructive, microscopic and mechanical) and analytical approaches; overview of repair and maintenance techniques according to damage type and extent; Serviceability performance and appraisal guides for aging infrastructure; design for durability through performance based design approaches.
Lecture three hours a week

CIVJ 5192 [0.5 credit] (CVG 5192)**Characterization Methods for Materials**

Modern materials characterization techniques especially with respect to civil engineering materials. Choosing the right characterization methods in order to determine the properties of materials such as chemical composition, atomic structure, and surface properties used in their research. Interpreting the results of each method.

CIVJ 5193 [0.5 credit] (CVG 5193)**Instrumentation and Experimental Design for Civil Engineering**

Introduction to instrumentation in civil engineering applications. Instrument types and performance, strain gauges, transducers, measurement of position, velocity, acceleration, force, pressure, temperature and flow. Data collection and data acquisition systems; diagnostics and calibration, closed versus open-loop control; servomotor types and servo-valves.

CIVJ 5201 [0.5 credit] (CVG 5142)**Advanced Structural Dynamics****CIVJ 5202 [0.5 credit] (CVG 5143)**
Advanced Structural Steel Design**CIVJ 5203 [0.5 credit] (CVG 5145)**
Theory of Elasticity**CIVJ 5204 [0.5 credit] (CVG 5147)**
Theory of Plates and Shells**CIVJ 5206 [0.5 credit] (CVG 5150)**
Advanced Concrete Technology**CIVJ 5209 [0.5 credit] (CVG 5153)**
Wind Engineering**CIVJ 5300 [0.5 credit] (CVG 5144)**
Advanced Reinforced Concrete Design**CIVJ 5301 [0.5 credit] (CVG 5156)**
Finite Element Methods I**CIVJ 5302 [0.5 credit] (CVG 5146)**
Numerical Methods of Structural Analysis**CIVJ 5303 [0.5 credit] (CVG 5157)**
Finite Element Methods II**CIVJ 5304 [0.5 credit] (CVG 5149)**
Structural Stability**CIVJ 5305 [0.5 credit] (CVG 5148)**
Prestressed Concrete Design**CIVJ 5306 [0.5 credit] (CVG 5155)**
Earthquake Engineering**CIVJ 5307 [0.5 credit] (CVG 5158)**
Elements of Bridge Engineering**CIVJ 5308 [0.5 credit] (CVG 5154)**
Random Vibrations**CIVJ 5309 [0.5 credit] (CVG 5159)**
Long Span Structures
Includes: Experiential Learning Activity**CIVJ 5310 [0.5 credit] (CVG 5311)**
Bridge Design**CIVJ 5311 [0.5 credit] (CVG 5312)**
Durability of Concrete Structures**CIVJ 5312 [0.5 credit] (CVG 5313)**
Seismic Analysis and Design of Concrete Structures
Includes: Experiential Learning Activity**CIVJ 5500 [0.5 credit]**
Deep Foundations**CIVJ 5501 [0.5 credit] (CVG 5111)**
Hydraulic Structures**CIVJ 5502 [0.5 credit] (CVG 5112)**
Computational Hydrodynamics

CIVJ 5503 [0.5 credit] (CVG 5160)
Sediment Transport

CIVJ 5504 [0.5 credit] (CVG 5162)
River Hydraulics

CIVJ 5506 [0.5 credit] (CVG 5120)
Water Resources Systems
Includes: Experiential Learning Activity

CIVJ 5508 [0.5 credit]
Groundwater and Seepage

CIVJ 5509 [0.5 credit] (CVG 5123)
Advanced Topics in Hydrology

CIVJ 5601 [0.5 credit] (EVG 5125)
Statistical Methods in Hydrology

CIVJ 5602 [0.5 credit] (CVG 5126)
Stochastic Hydrology

CIVJ 5603 [0.5 credit] (CVG 5127)
Hydrologic Systems Analysis

CIVJ 5604 [0.5 credit] (CVG 5128)
Water Resources Planning and Policy

CIVJ 5605 [0.5 credit] (CVG 5124)
Coastal Engineering

CIVJ 5607 [0.5 credit]
Irrigation and Drainage

CIVJ 5803 [0.5 credit] (CVG 5119)
Computational Hydraulics

CIVJ 5901 [0.5 credit]
Unit Op of Water Treatment

CIVJ 5904 [0.5 credit]
Water and Wastewater Labs

CIVJ 5905 [0.5 credit]
Water and Wastewater Proc

CIVJ 5906 [0.5 credit]
Solid Waste Disposal

CIVJ 5907 [0.5 credit]
Chemistry of Enviro Engin

CIVJ 6000 [0.5 credit] (CVG 6300)
Special Topics in Civil Engineering

CIVJ 6001 [0.5 credit] (CVG 6301)
Special Topics in Civil Engineering

CIVJ 6002 [0.5 credit] (CVG 6302)
Special Topics in Civil Engineering

CIVJ 6003 [0.5 credit] (CVG 6303)
Special Topics in Civil Engineering

CIVJ 6004 [0.5 credit] (CVG 6304)
Special Topics in Civil Engineering

CIVJ 6005 [0.5 credit] (CVG 6305)
Special Topics in Civil Engineering

CIVJ 6006 [0.5 credit] (CVG 6306)
Special Topics in Civil Engineering

CIVJ 6007 [0.5 credit] (CVG 6307)
Special Topics in Civil Engineering

CIVJ 6008 [0.5 credit] (CVG 6308)
Special Topics in Civil Engineering

CIVJ 6009 [0.5 credit] (CVG 6309)
Special Topics in Civil Engineering

CIVJ 6010 [0.5 credit] (CVG 6310)
Special Topics in Civil Engineering

CIVJ 6011 [0.5 credit] (CVG 6311)
Special Topics in Civil Engineering

CIVJ 6012 [0.5 credit] (CVG 6312)
Special Topics in Civil Engineering

CIVJ 6013 [0.5 credit] (CVG 6313)
Special Topics in Civil Engineering

CIVJ 6014 [0.5 credit] (CVG 6314)
Special Topics in Civil Engineering

CIVJ 6015 [0.5 credit] (CVG 6315)
Special Topics in Civil Engineering

CIVJ 6016 [0.5 credit] (CVG 6316)
Special Topics in Civil Engineering

CIVJ 6017 [0.5 credit] (CVG 6317)
Special Topics in Civil Engineering

CIVJ 6018 [0.5 credit] (CVG 6318)
Special Topics in Civil Engineering

CIVJ 6019 [0.5 credit] (CVG 6019)
Special Topics in Civil Engineering

CIVJ 6020 [0.5 credit] (CVG 6320)
Special Topics in Civil Engineering

Climate Change (CLIM)

Climate Change (CLIM) Courses

CLIM 5000 [1.0 credit]
Climate Collaboration

A seminar on the climate crisis from an interdisciplinary perspective. Drawing on a range of disciplinary approaches from the humanities, social sciences, public policy, engineering and natural science, students will engage with the many factors bearing on the climate crisis and how to address it.

CLIM 5800 [0.0 credit]**Climate Seminar Series**

A series of seminars presented by researchers and practitioners in the area of climate change. To complete this course, a student must attend six seminars.

Cognitive Science (CGSC)

Cognitive Science (CGSC) Courses**CGSC 5001 [0.5 credit]****Cognition and Artificial Cognitive Systems**

An introduction to the contribution of artificial intelligence and computer modeling of cognitive processes to cognitive science.

CGSC 5002 [0.5 credit]**Experimental Research in Cognition**

An introduction to the contribution of experimental psychology to cognitive science.

CGSC 5003 [0.5 credit]**Language and Cognition**

An introduction to the contribution of theoretical linguistics and linguistic research to cognitive science.

Includes: Experiential Learning Activity

Also listed as ALDS 5301 and LING 5608.

CGSC 5004 [0.5 credit]**Cognition and Conceptual Issues**

An introduction to the contribution of philosophy of mind, philosophy of language, and other conceptual investigations to cognitive science.

CGSC 5005 [0.5 credit]**Cognition and Neuroscience**

An introduction to the contribution of neuroscience to cognitive science.

CGSC 5100 [0.5 credit]**Issues in Cognitive Science**

A survey of the central problems and issues of cognitive research to start the process of acquiring the interdisciplinary breadth required to understand research in cognitive science.

CGSC 5101 [0.5 credit]**Experimental Methods and Statistics**

An introduction to the design of experiments and the statistics needed to interpret data in cognitive science.

Also listed as HCIN 5400.

CGSC 5103 [0.5 credit]**Formal Methods**

The class introduces students to various formal methods relevant to cognitive science, possibly including (but not limited to) formal logic, the theory of computation, probability theory, decision theory.

Precludes additional credit for CGSC 5102.

Prerequisite(s): permission of the department.

Seminar.

CGSC 5303 [0.5 credit]**Linguistic Analysis, Culture and Cognition**

Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

CGSC 5601 [0.5 credit]**Cognitive Modelling for Cognitive Science**

Introduction to the field of cognitive modelling. Different modelling systems and how to evaluate them against human data; how to create cognitive models using the ACT-R cognitive architecture.

Precludes additional credit for CGSC 5106 (no longer offered), CGSC 6004 (no longer offered).

CGSC 5901 [0.5 credit]**Special Topics in Cognitive Science**

Seminar on current, important issues related to Cognition and Neuroscience, Philosophy, Computer Science, Linguistics and/or Psychology. Topics will vary from year to year.

CGSC 5907 [0.5 credit]**Independent Research**

Permission to register and approval of research plan must be obtained from the graduate supervisor. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

Includes: Experiential Learning Activity

CGSC 5908 [1.0 credit]**Research Project**

Students may enroll in multiple sections of this course (as necessary) to complete their Research credits.

Includes: Experiential Learning Activity

CGSC 5909 [2.5 credits]**M. Cog. Thesis**

Includes: Experiential Learning Activity

CGSC 6002 [0.5 credit]**Methodology Rotation I**

Students spend one term in a laboratory or other research venue using a method for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific). Assignments will be as specified by each rotation supervisor.

Includes: Experiential Learning Activity

CGSC 6003 [0.5 credit]**Methodology Rotation II**

Students spend one term in a laboratory or other research venue using a different method for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific). Assignments will be as specified by each rotation supervisor.

Includes: Experiential Learning Activity

CGSC 6501 [0.5 credit]**Special Topics in Cognitive Science**

Seminar course on a topic of interest to students in Cognitive Science. Topics will vary from year to year. Lectures three hours per week.

CGSC 6801 [0.5 credit]**Proseminar in Cognitive Science**

A survey of the central problems and issues of natural and artificial cognition and a brief examination of contemporary neuroscience. Compulsory in the first year of registration. Precludes additional credit for CGSC 6800 (no longer offered).

CGSC 6901 [0.5 credit]**Directed Studies in Cognitive Science I****CGSC 6902 [0.5 credit]****Directed Studies in Cognitive Science II****CGSC 6909 [0.0 credit]****Ph.D. Thesis**

Includes: Experiential Learning Activity

Civil Engineering (CIVE)

Civil Engineering (CIVE) Courses**CIVE 5101 [0.5 credit] (CVG 7120)****Solid Mechanics**

Cartesian tensor notation; stresses and strains in a continuum; transformations, invariants; equations of motion; constitutive relations; generalized Hooke's Law, bounds for elastic constant: strain energy, superposition, uniqueness; formulation of plane stress and plane strain problems; energy principles, variational methods; plasticity.

CIVE 5102 [0.5 credit] (CVG 7121)**Advanced Elasticity**

Continuation of topics introduced in CIVE 5101. Complex variable solutions: torsional and thermal stresses; axially symmetric three-dimensional problems, Love's strain potential, Boussinesq-Galerkin stress functions; problems related to infinite and semi-infinite domains. Introduction to numerical methods of stress analysis, comparison of solutions.

Prerequisite(s): CIVE 5101 or permission of the Department.

CIVE 5103 [0.5 credit] (CVG 7122)**Finite Element Analysis 1**

Advanced finite element methods for linear systems. The relationship with variational and Galerkin formulations, system of linear equations, polynomial interpolation, numerical integration, and theory of elasticity is explored. Isoparametric formulations for structural and continuum elements are examined. Introduction to linear dynamics and nonlinear problems.

CIVE 5104 [0.5 credit] (CVG 7123)**Earthquake Engineering and Analysis**

Advanced vibration analysis techniques; Rayleigh-Ritz procedure; subspace iteration; derived Ritz coordinates; proportional and non-proportional damping; introduction to seismology; earthquake response analysis via time and frequency domain; response spectrum approach; multiple input excitations; design considerations and code requirements; other advanced topics in earthquake engineering.

Prerequisite(s): CIVE 5106 or permission of the Department.

CIVE 5105 [0.5 credit] (CVG 7124)**Finite Element Analysis 2**

Variational and Galerkin formulations: assumed displacement, assumed stress and hybrid elements; plate bending: convergence, completeness and conformity, patch test, Kirchhoff and Mindlin plate theories, nonlinear elasticity and plasticity; geometric non-linearity, Eulerian and Lagrangian formulations; incremental and iterative schemes, finite elements in dynamics.

Prerequisite(s): CIVE 5103 or permission of the Department.

CIVE 5106 [0.5 credit] (CVG 7137)**Dynamics of Structures**

Structural dynamics, single and multi-degree-of-freedom systems, formulation of equations of motion, methods of analytical mechanics, free and forced vibrations, normal mode analysis, numerical methods for the response analyses of single and multiple-degree-of-freedom systems.

CIVE 5107 [0.5 credit] (CVG 5321)**Finite Elements in Field Problems**

Use of Galerkin and Ritz finite element formulation to solve one and two dimensional field problems. Steady state and time-dependent phenomena involving potentials, heat transfer, fluid flow, diffusion, and dispersion with emphasis on practical applications. Basic knowledge of third year-level undergraduate engineering mathematics/physics required.

Also listed as ENVE 5402.

CIVE 5108 [0.5 credit] (CVG 7181)**Nonlinear Analysis and Design of Advanced Earthquake-Resistant Structures**

Design and construction of nonlinear structural models. Accounting for mass, material behaviour, damping, and nonlinear geometry. Use of pushover and time history analysis methods. Design and modelling of structural systems using passive damping devices and isolation systems.

CIVE 5200 [0.5 credit] (CVG 7138)**Masonry Behaviour and Design**

Properties of masonry materials and assemblages. Behaviour and design of walls, columns and lintels. Treatment of specialized design and construction topics. Design of lowrise and highrise structures. Discussion of masonry problems. Emphasis on a practice-oriented approach.

Also offered at the undergraduate level, with different requirements, as CIVE 4403, for which additional credit is precluded.

CIVE 5203 [0.5 credit] (CVG 7125)**Theory of Structural Stability**

Elastic and inelastic behaviour of beam-columns; elastic and inelastic buckling of frames; application of energy methods to buckling problems; lateral-torsional buckling of columns and beams; buckling of plates; local buckling of columns and beams.

Prerequisite(s): CIVE 5205 or equivalent.

CIVE 5204 [0.5 credit] (CVG 7126)**Advanced Steel Structures**

Limit states design philosophy; material behaviour; tension members; plate buckling; torsion; lateral torsional buckling; beams, axially loaded columns and beam-column behaviour; brittle fracture and fatigue; frame stability and second order effects.

CIVE 5205 [0.5 credit] (CVG 7127)**Advanced Structural Analysis**

Matrix structural analysis; force and displacement method of analysis for planar and space structures; symmetric and anti-symmetric structures; analysis of nonlinear structures: geometric and material nonlinearities; large displacement theory and iteration strategy.

CIVE 5206 [0.5 credit] (CVG 7128)**Prestressed Concrete**

Behaviour and analysis of prestressed concrete elements subjected to axial loads, flexure and shear: material properties; prestressing systems; linear and non-linear behaviour; deflections; compression-field approaches; disturbed regions; restraint of deformations; design requirements; applications to pressure vessels, bridges and frames.

CIVE 5208 [0.5 credit] (CVG 7130)**Advanced Reinforced Concrete**

The research background, development, and limitations in current building code provisions for reinforced concrete; yield line theory of slabs; safety and limit state design; computer design of concrete structures.

CIVE 5209 [0.5 credit] (CVG 7100)**Geotechnical Case Studies**

The critical study of case histories relating to current procedures of design and construction in geotechnical engineering. The importance of instrumentation and monitoring field behaviour will be stressed. In-situ testing. Includes: Experiential Learning Activity

CIVE 5300 [0.5 credit] (CVG 7101)**Advanced Soil Mechanics**

Effective stress, pore pressure parameters, saturated and partially saturated soils; seepage; permeability tensor, solutions of the Laplace equation; elastic equilibrium; anisotropy, non-homogeneity, consolidation theories; shear strength of cohesive and cohesionless soils; failure and yield criteria.

CIVE 5303 [0.5 credit] (CVG 7103)**Pavements and Materials**

An analysis of the interaction of materials, traffic, and climate in the planning, design construction, evaluation, maintenance, and rehabilitation of highway and airport pavements.

CIVE 5304 [0.5 credit] (CVG 7150)**Intercity Transportation**

Current modal and intermodal issues, including energy. Framework and process of intercity transport planning and management. Recent trends and system development. Passenger and freight demand and service characteristics. Future prospects and possibilities.

CIVE 5305 [0.5 credit] (CVG 7151)**Traffic Engineering**

Introduction to principles of traffic engineering. Basic characteristics of drivers, vehicles, and traffic. Volume, speed, and delay studies. Traffic stream characteristics and queuing theory. Capacity analysis of roads and intersections. Safety.

CIVE 5306 [0.5 credit] (CVG 7152)**Highway Materials**

Materials characterization and strength evaluation of soils, stabilized soils, aggregates, and asphalt concrete. Effects of low temperatures and frost on materials behaviour.

CIVE 5307 [0.5 credit] (CVG 7153)**Urban Transportation**

Urban transportation systems, planning and management. Urban development models, an introduction. Urban transportation policy.

CIVE 5308 [0.5 credit] (CVG 7154)**Highway Geometric Design**

Principles of highway geometric design. Components of the highway system, their interrelationships, abilities, limitations, and their relations with the design elements. Safety and human factors, and their interaction with the highway elements. New and evolving concepts.

CIVE 5309 [0.5 credit] (CVG 7155)**Transportation Supply**

Advanced treatment of transportation planning and management concepts and techniques: transport supply issues, capacity and costs, evaluation of system improvements and extensions, transportation and development, policy impact analysis.

CIVE 5310 [0.5 credit]**Road Safety Analysis**

Fundamental analytical techniques for road safety analysis, background of traffic safety analysis, network screening, before and after analysis, and surrogate measures of safety.

CIVE 5401 [0.5 credit] (CVG 7156)**Transportation Economics**

Transportation, economic analysis framework. Transport industry output. Carrier operations. Issue of resource utilization, measurement, economics, supply of infrastructure, pricing; subsidies, externalities. Transport policy in Canada.

CIVE 5402 [0.5 credit] (CVG 7159)**Transportation Terminals**

Framework for passenger terminal planning and design. Theory: the transfer function and network modeling; pedestrian flow characteristics; capacity of corridors, stairs, escalators, and elevators; layout planning. Practical applications: air, rail, metro, bus, ferry, and multi-modal terminals.

CIVE 5403 [0.5 credit] (CVG 7158)**Airport Planning**

Framework for airport planning and design. Aircraft characteristics; demand forecasting; airport site selection; noise, airside capacity; geometric design; the passenger terminal complex; cargo area; general aviation; ground transportation; land use planning.

CIVE 5404 [0.5 credit] (CVG 7182)**Introduction to Infrastructure Management**

Infrastructure management and its relationship to facility and asset management; challenges facing infrastructure managers; tools for effective IM; concept of total quality management; economic analysis of maintenance, rehabilitation and reconstruction; use of life cycle cost analysis in decision making, development and use of IM systems.

CIVE 5500 [0.5 credit] (CVG 7104)**Earth Retaining Structures**

Approaches to the theoretical and semi-empirical analysis of earth retaining structures. Review of the earth pressure theories. Analysis and design methods for rigid and flexible retaining walls, braced excavations, and tunnels. Instrumentation and performance studies.

CIVE 5501 [0.5 credit] (CVG 7105)**Advanced Foundation Engineering**

Review of methods of estimating compression and shear strength of soils. Bearing capacity of shallow and deep foundations. Foundations in slopes. Pile groups. Use of in-situ testing for design purposes.

CIVE 5502 [0.5 credit] (CVG 7106)**In-Situ Geotechnique**

Subsurface exploration program. Soil and rock sampling. Geo-physical methods. Mechanical and hydraulic properties of soil and rock. Determination of strength and deformability. Critical evaluation of vane, pressuremeter, screw plate, dilatometer, borehole shear and plate load tests. Pumping, recharge and packer tests. In-situ stress measurements.

CIVE 5503 [0.5 credit] (CVG 7107)**Numerical Methods in Geomechanics**

Advanced theories of soil and rock behaviour. Plasticity models. Generalized failure criteria. Critical state and cap models. Dilatancy effects. Associative and non-associative flow rules. Hardening rules. Consolidation, visco-elasticity, creep behaviour. Finite element formulation. Iterative schemes. Time marching schemes. Solution of typical boundary value problems.

Prerequisite(s): CIVE 5101, CIVE 5103, or permission of the Department.

CIVE 5504 [0.5 credit] (CVG 7183)**Seepage Through Soils**

Surface-subsurface water relations. Steady flow. Flownet techniques. Numerical techniques. Seepage analogy models. Anisotropic and layered soils. Water retaining structures. Safety against erosion and piping. Filter design. Steady and non-steady flow towards wells. Multiple well systems. Subsidence due to ground water pumping. Precludes additional credit for ENVE 5301.

CIVE 5505 [0.5 credit] (CVG 7109)**Geotechnical Earthquake Engineering**

Seismic hazards, earthquakes and ground motion, wave propagation, ground response analysis, soil properties for dynamic analysis: laboratory tests, in-situ tests, modulus and damping curves, liquefaction susceptibility, post liquefaction response, seismic effects on slope stability, retaining structures.

Precludes additional credit for CIVE 5801 (2001-2003).

CIVE 5507 [0.5 credit] (CVG 7184)**Blast Load Effects on Structures**

Threats, risk analysis, vulnerability assessment; explosives: types and mechanisms; load determination; response of structural elements under blast loads, analysis and design for blast loads; blast mitigation, retrofit of structures; post-event assessment.

Also listed as IPIS 5507.

CIVE 5600 [0.5 credit] (CVG 7131)**Project Management**

Managing building development, design, and construction including interrelationships among owners, developers, financing sources, designers, contractors, and users; project manager role and tasks; project objectives; feasibility analyses; budgets and financing; government regulations; environmental and social constraints; cost, time, and content quality controls and processes; human factors.

CIVE 5601 [0.5 credit] (CVG 7140)**Engineering, Statistics, and Probabilities**

Review of basic concepts in statistics and probabilities. Bayes' Theorem. Distributions. Parameter estimation. Goodness-of-fit. Regression and correlation. OC curves. Monte Carlo simulation. ANOVA. Probability-based design criteria. System reliability. Selected applications in structures, transportation and geomechanics. Use of computer software. Emphasis on problem solving.

CIVE 5602 [0.5 credit] (CVG 7141)**Advanced Computer-Aided Design**

Representation and processing of design constraints (such as building codes and other design rules); decision tables; constraint satisfaction. Automatic integrity and consistency maintenance of design databases; integrated CAD systems. Introduction to geometric modeling. Introduction to artificial intelligence.

Also offered at the undergraduate level, with different requirements, as CIVE 4500, for which additional credit is precluded.

CIVE 5603 [0.5 credit]**Advanced Building Characterization, Conservation and Rehabilitation**

Supporting concepts and techniques for the identification, documentation, and conservation of heritage and existing buildings; advanced workshops by experts from key disciplines and practice areas in heritage conservation. Includes: Experiential Learning Activity

CIVE 5604 [0.5 credit]**Probability, Statistics, Stochastic Processes and Statistical Inference in Engineering**

Fundamental of probability and statistics, (robust and ridge) regression, generalised linear models, sparse models, mixture models, stochastic processes, statistical inference and applications.

Includes: Experiential Learning Activity

CIVE 5605 [0.5 credit] (CVG 7143)**Design of Steel Bridges**

Basic features of steel bridges, design of slab-on-girder, box girder and truss bridges. Composite and non-composite design. Introduction to long span suspension and cable-stayed bridges. Discussion of relevant codes and specifications.

CIVE 5606 [0.5 credit] (CVG 7144)**Design of Concrete Bridges**

Concrete and reinforcing steel properties, basic features of concrete bridges, design of superstructure in reinforced concrete slab, slab-on-girder and box girder bridges, introduction to prestressed concrete bridges, design of bridge piers and abutments. In all cases the relevant provisions of Canadian bridge codes are discussed.

CIVE 5607 [0.5 credit] (CVG 7145)**Introduction to Bridge Design**

Limit states design of highway bridges; methods of analysis, design and evaluation procedures of superstructure components; design codes; design loads and load factors; concrete deck design; load distributions; computer analysis; impact and dynamics; fatigue and brittle fracture; construction bracing; load capacity rating of existing bridges.

CIVE 5609 [0.5 credit] (CVG 7170)**Fundamentals of Fire Safety Engineering**

The fire safety system, including social, economic and environmental issues; description of the fire safety regulatory system and the governing building codes and standards. This includes the global fire safety system in a facility and active fire protection systems; detection, suppression, smoke management.

Precludes additional credit for CIVE 5707 (2001-2002).

CIVE 5610 [0.5 credit] (CVG 7171)**Fire Dynamics I**

Fundamentals of combustion including material and energy balances, chemical thermodynamics, kinetics, premixed and diffusive burning. Advanced topics in the theory of combustion, flame propagation, efficiency of combustion, and the physico-chemical properties of combustible material.

Precludes additional credit for CIVE 5705 (2001-2003).

CIVE 5611 [0.5 credit] (CVG 7173)**People in Fires**

Review of the work presented by the founders in the field of human behaviour in fire. Introduction to the basic notions of perception, cognition, information processing, decision-making and problem solving. Behavioural concepts such as panic, commitment, affiliation, familiarity and role are discussed.

Precludes additional credit for CIVE 5708 (2001-2003).

CIVE 5612 [0.5 credit] (CVG 7174)**Fire Modeling**

Fire modeling and its role in fire safety engineering. Review of the main modeling techniques used in Fire Safety Engineering: network, zone and Computational Fluid Dynamics (CFD).

Precludes additional credit for CIVE 5802 (2002-2003).

CIVE 5613 [0.5 credit] (CVG 7172)**Fire Dynamics II**

Fire dynamics from ignition through heat transfer to growth and spread of fires and their suppression. Factors such as containment and its role in the dynamics of fires and explosions are covered.

Precludes additional credit for CIVE 5803 (2002-2003).

Prerequisite(s): CIVE 5610 Fire Dynamics I.

CIVE 5614 [0.5 credit] (CVG 7175)**Design for Fire Resistance**

Behaviour of materials and structures at elevated temperatures; fire-resistance tests; fire-resistance ratings; building code requirements; real-world fires; assessing the fire resistance of steel, concrete and wood building assemblies.

Precludes additional credit for CIVE 5709 (2001-2003).

CIVE 5615 [0.5 credit] (CVG 5320)**Fire Behaviour of Materials**

Fundamentals and scientific aspects of materials behaviour during fires, material specifications, thermal and mechanical properties, fire hazards of materials, structural fire response, residual strength, failure criteria, mechanisms of flame retardancy, and standards and testing protocols.

CIVE 5616 [0.5 credit]**Wood Structures and Fire**

Introduction to fire-safe design of wood buildings, brief review of wood products and wood design, prescriptive code requirements, determination of fire-resistance of wood structures through different methods.

Includes: Experiential Learning Activity

CIVE 5617 [0.5 credit]**Practical Applications of Fire Protection**

Introduction to the practical application of fire protection engineering from a consulting and a regulatory perspective. Main highlights include performance-based design, fire forensics, emergency preparedness and firefighting.

Includes: Experiential Learning Activity

CIVE 5705 [0.5 credit] (CVG 7300)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5706 [0.5 credit] (CVG 7301)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5707 [0.5 credit] (CVG 7302)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5708 [0.5 credit] (CVG 7303)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5709 [0.5 credit] (CVG 7304)**Topics in Structures**

Courses in special topics related to building design and construction, not covered by other graduate courses.

CIVE 5800 [0.5 credit] (CVG 7305)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5801 [0.5 credit] (CVG 7306)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5802 [0.5 credit] (CVG 7307)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5803 [0.5 credit] (CVG 7308)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5804 [0.5 credit] (CVG 7309)**Topics in Geotechnique**

Courses in special topics in geotechnical engineering, not covered by other graduate courses.

CIVE 5805 [0.5 credit] (CVG 7310)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5806 [0.5 credit] (CVG 7311)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5807 [0.5 credit] (CVG 7312)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5808 [0.5 credit] (CVG 7313)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5809 [0.5 credit] (CVG 7314)**Topics in Transportation**

Courses in special topics in transportation engineering, not covered by other graduate courses.

CIVE 5810 [0.5 credit] (CVG 7185)**Topics in Fire Safety**

Courses in special topics related to fire safety, not covered by other graduate courses.

CIVE 5900 [1.0 credit] (CVG 6000)**Civil Engineering Project**

Students enrolled in the program M.Eng. by project will conduct an engineering study, analysis, or design project under the general supervision of a member of the Department.

Includes: Experiential Learning Activity

CIVE 5901 [0.0 credit] (CVG 7314)**Master's Seminar**

The series consists of presentations by graduate students or external speakers. Graduate students in the Civil Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

CIVE 5906 [0.5 credit] (CVG 6108)**Directed Studies 1**

Prerequisite(s): open only to students in a Civil Engineering Master's program.

CIVE 5909 [2.5 credits] (CVG 5909)**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

CIVE 6901 [0.0 credit]**Ph.D. Seminar**

The series consists of presentations by graduate students or external speakers. Graduate students in the Civil Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

CIVE 6902 [0.0 credit] (CVG 9998)**Ph.D. Comprehensive Examination**

Graduate students at the Doctoral level in the Civil Engineering program are required to successfully complete written and oral comprehensive examinations in subject areas determined by the student's advisory committee.

CIVE 6906 [0.5 credit] (CVG 6109)**Directed Studies 2**

Prerequisite(s): open only to students in the Civil Engineering Ph.D. program.

CIVE 6909 [0.0 credit] (CVG 9999)**Ph.D. Thesis**

Includes: Experiential Learning Activity

Communication and Media Studies (COMS)

Communication and Media Studies (COMS) Courses

COMS 5101 [1.0 credit]**Foundations of Communication Studies**

Origins and traditions of modern communication studies with attention to theoretical and methodological aspects of developments and debates shaping current communication research.

Precludes additional credit for COMM 5101 (no longer offered).

COMS 5200 [0.5 credit]**Civic Media**

The role of communication in relation to the emergence, development, and problematization of citizenship within civil society and the public sphere. Topics to be covered include the communicative strategies of NGOs, the aesthetics of protest, and alternative forms of journalism, among others.

Precludes additional credit for COMM 5200 (no longer offered).

COMS 5202 [0.5 credit]**Persuasion**

Examines various efforts to discover and apply techniques of successful persuasion from classical rhetoric to scientific public opinion research with attention to contemporary political, public information, and corporate campaigns.

Precludes additional credit for COMM 5202 (no longer offered).

COMS 5203 [0.5 credit]**Communication, Technology, Society**

Critically examines the technological context of social communication in terms of human agency, medium theory, and the idea of progress.

Precludes additional credit for COMM 5203 (no longer offered).

COMS 5206 [0.5 credit]**Communication, Culture, Regulation**

Contemporary and historical modes of regulating and governing media and communication, including policy-making, moral regulation, markets, code and so on. Topics may include the regulation of ownership, content, production, circulation, and consumption.

Precludes additional credit for COMM 5206 (no longer offered).

COMS 5207 [0.5 credit]**Communication and Racialization**

Provides theoretical and methodological foundations for graduate students studying the constructs of race, ethnicity, and indigeneity in communication and media contexts, particularly from a critical/cultural perspective.

Precludes additional credit for COMM 5207 (no longer offered).

COMS 5208 [0.5 credit]**Audiences, Consumption, Reception**

How audiences and users consume, interact with, deploy and shape media; how they receive and interpret information; and the impacts of these practices on social relations and institutions. Consumerism, entertainment, and "sites" of consumption, including information technologies, space, and built environments.

Precludes additional credit for COMM 5208 (no longer offered).

COMS 5212 [0.5 credit]**History, Time, Memory**

Interactions among notions of time, environments, media technologies and artifacts, and the production of memory and history. Topics may include practices of memorialization through historical monuments or museums, contemporary challenges of data storage and media archiving, issues of technological obsolescence and waste, and more.

Precludes additional credit for COMM 5212 (no longer offered).

COMS 5214 [0.5 credit]**The Local and the Global**

Communicative aspects of globalization in the context of the local. Among the areas to be addressed include global communication history, cultural imperialism, international regulation, transnational networking, cultural industries, media integration, diasporic communication, and the translocal circulation of content.

Precludes additional credit for COMM 5214 (no longer offered).

COMS 5218 [0.5 credit]**Special Studies of Media and Communication**

Examines a specific traditional or non-traditional medium or practice of communication. Topics will vary from year to year.

Precludes additional credit for COMM 5218 (no longer offered).

COMS 5219 [0.5 credit]**Regional Studies of Media**

An exploration of the media landscape of specific region or geographical/political territory. Attention will be given to understanding specific conditions of reception, the character of media industries, and the historical development of media forms. Topics will vary from year to year.

COMS 5220 [0.5 credit]**Visual Culture**

The role of image in (re)producing culture. Diverse practices of visual communication such as photography, built environments, screen culture, and image sharing through virtual social networks.

COMS 5221 [0.5 credit]**Science and the Making of Knowledge**

Issues related to science and communication. Topics may include: contemporary issues such as public health risks, climate change, science as ideology, the relationship between science and politics; historical considerations of the relationship between knowledge and expertise.

COMS 5222 [0.5 credit]**Cultural Intersections**

Critically examines the engagement of cultures with each other in contexts such as the constructions of self and other, settler-colonial relations, postcolonial discourses, multiculturalism, cosmopolitanism, communication between groups and across borders, and the roles of media in cultural intersections .

COMS 5223 [0.5 credit]**Work in the Contemporary Media Environment**

Modes of media work and labour. Topics may include studies of immaterial labour, emotional labour, user-generated content and active audiences, labour and labour relations in digitizing media industries.

COMS 5224 [0.5 credit]**Internet, Infrastructure, Materialities**

The internet as infrastructure; how the technical characteristics of the internet influence our experience and use of this medium. Questions addressing the physical structures, power and control, and ecological impacts of the internet are also considered.

COMS 5225 [0.5 credit]**Critical Data Studies**

Theoretical debates, research approaches and discursive regimes pertaining to the datafication of everyday life, data and living environments, and the quantified control of the future. Emphasis on the production of databased knowledge and the influence data have on the material and social world.

COMS 5509 [0.5 credit]**Gender, Sexuality, Culture**

Theoretical debates and current research in the production and reproduction of gender, sexual and sexualized relations through communication processes, practices and institutions.

Precludes additional credit for COMM 5509 (no longer offered).

COMS 5605 [0.5 credit]**Approaches to Communication Research**

Processes of conducting communication research in the context of writing a thesis or research essay. Topic selection, question framing, research design, the use of theory; specific methodologies such as content analysis, discourse analysis, survey research, ethnography, semiotics, and historical analysis.

Includes: Experiential Learning Activity

Precludes additional credit for COMM 5605 (no longer offered).

COMS 5808 [0.5 credit]**Directed Studies**

Directed research or readings on a topic area not covered in that year's course offerings.

Precludes additional credit for COMM 5808 (no longer offered).

COMS 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity
 Precludes additional credit for COMM 5908 (no longer offered).

COMS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity
 Precludes additional credit for COMM 5909 (no longer offered).

COMS 6000 [1.0 credit]**Doctoral Seminar in Communication Studies**

A seminar leading to the first comprehensive encompassing the program's three fields of concentration: the history of communication as object and field of study, the political economy of communication, and socio-cultural analysis of communication.
 Precludes additional credit for COMM 6000 (no longer offered).

COMS 6001 [0.5 credit]**Selected Topics in Communication**

Examines a newly emerging issue, research method, or theory related to communication. Topic will vary from year to year.
 Precludes additional credit for COMM 6001 (no longer offered).

COMS 6005 [0.5 credit]**Communication and History**

The history of communication and its conceptualization from various perspectives as well as the way in which historical events arise through communication.
 Precludes additional credit for COMM 6005 (no longer offered).

COMS 6006 [0.5 credit]**Political Economy of Communication**

The history of political economy with attention to applications in the field of communication.
 Precludes additional credit for COMM 6006 (no longer offered).

COMS 6007 [0.5 credit]**Communication, Discourse, and Representation**

The processes and practices of representation through which meanings arise.
 Precludes additional credit for COMM 6007 (no longer offered).

COMS 6010 [0.5 credit]**Directed Studies**

Directed research or readings on a topic area not covered in that year's course offerings.
 Precludes additional credit for COMM 6010 (no longer offered).

COMS 6900 [1.0 credit]**Comprehensive Examination I**

Examination normally conducted in May of each year in connection with COMS 6000 and covering the program's three fields of concentration: history of communication as object and field of study; political economy of communication; socio-cultural analysis of communication. Graded as Satisfactory or Unsatisfactory.
 Precludes additional credit for COMM 6900 (no longer offered).

COMS 6901 [1.0 credit]**Comprehensive Examination II**

Examination by the student's thesis supervisor and committee of an approved project related to a particular field of communication research; the field may or may not be related to the student's thesis. Graded as Satisfactory or Unsatisfactory.
 Precludes additional credit for COMM 6901 (no longer offered).

COMS 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Computer Science (COMP)

Computer Science (COMP) Courses**COMP 5001 [0.5 credit] (CSI 5113)****Foundations of Programming Languages**

Advanced study of programming paradigms from a practical perspective. Paradigms may include functional, imperative, concurrent, distributed, generative, aspect- and object-oriented, and logic programming. Emphasis on underlying principles. Topics may include: types, modules, inheritance, semantics, continuations, abstraction and reflection.

COMP 5002 [0.5 credit] (CSI 5128)**Swarm Intelligence**

Collective computation, collective action, and principles of self-organization in social agent systems. Algorithms for combinatorial optimization problems, division of labour, task allocation, task switching, and task sequencing with applications in security, routing, wireless and ad hoc networks and distributed manufacturing.

COMP 5003 [0.5 credit] (CSI 5308)**Principles of Distributed Computing**

Formal models of distributed environment; theoretical issues in the design of distributed algorithms; message and time complexity; problem solving in distributed settings. Problems discussed may include: coordination and control, information diffusion, leader election, consensus, distributed data operations, computing by mobile entities.

COMP 5004 [0.5 credit] (CSI 5134)**Fault Tolerance**

Hardware and software techniques for fault tolerance. Topics include modeling and evaluation techniques, error detecting and correcting codes, module and system level fault detection mechanisms, design techniques for fault-tolerant and fail-safe systems, software fault tolerance through recovery blocks, N-version programming, algorithm-based fault tolerance, checkpointing.

COMP 5005 [0.5 credit] (CSI 5390)**Learning Systems for Random Environments**

Computerized adaptive learning for random environments and its applications. Topics include a mathematical review, learning automata which are deterministic/stochastic, with fixed/variable structures, of continuous/discretized design, with ergodic/absorbing properties and of estimator families.

Prerequisite(s): SYSC 5503 or equivalent.

COMP 5007 [0.5 credit] (CSI 5149)**Graphical Models and Applications**

Bayesian networks, factor graphs, Markov random fields, maximum a posteriori probability (MAP) and maximum likelihood (ML) principles, elimination algorithm, sum-product algorithm, decomposable and non-decomposable models, junction tree algorithm, completely observed models, iterative proportional fitting algorithm, expectation-maximization (EM) algorithm, iterative conditional modes algorithm.

COMP 5008 [0.5 credit] (CSI 5164)**Computational Geometry**

Study of design and analysis of algorithms to solve geometric problems; emphasis on applications such as robotics, graphics, and pattern recognition. Topics include: visibility problems, hidden line and surface removal, path planning amidst obstacles, convex hulls, polygon triangulation, point location.

COMP 5100 [0.5 credit] (CSI 5180.)**Topics in Artificial Intelligence**

Areas in knowledge-based systems including recent approaches to machine learning and data mining, inference methods, knowledge-based and fuzzy systems, heuristic search, and natural language processing. Precludes additional credit for COMP 4106 (no longer offered).

COMP 5101 [0.5 credit] (CSI 5311)**Distributed Databases and Transaction Processing Systems**

Principles in the design and implementation of distributed databases and distributed transaction processing systems. Topics include: distributed computing concepts, computing networks, distributed and multi-database system architectures and models, atomicity, synchronization and distributed concurrency control algorithms, data replication, recovery techniques, reliability in distributed databases.

COMP 5102 [0.5 credit] (CSI 5312)**Distributed Operating Systems**

Design issues of advanced multiprocessor distributed operating systems: multiprocessor system architectures; process and object models; synchronization and message passing primitives; memory architectures and management; distributed file systems; protection and security; distributed concurrency control; deadlock; recovery; remote tasking; dynamic reconfiguration; performance measurement, modeling, and system tuning.

COMP 5103 [0.5 credit] (CSI 5148)**Wireless Ad Hoc Networking**

Self-organized, mobile, and hybrid ad hoc networks. Physical, medium access, networks, transport and application layers, and cross-layering issues. Power management. Security in ad hoc networks. Topology control and maintenance. Data communication protocols, routing and broadcasting. Location service for efficient routing.

COMP 5104 [0.5 credit] (CSI 5314)**Object-Oriented Software Development**

Issues in modeling and verifying quality and variability in object-oriented systems. Testable models in model-driven and test-driven approaches. System family engineering. Functional conformance: scenario modeling and verification, design by contract. Conformance to non functional requirements: goals, forces and tradeoffs, metrics.

COMP 5107 [0.5 credit] (CSI 5185)**Statistical and Syntactic Pattern Recognition**

Topics include a mathematical review, Bayes decision theory, maximum likelihood and Bayesian learning for parametric pattern recognition, non-parametric methods including nearest neighbor and linear discriminants. Syntactic recognition of strings, substrings, subsequences and tree structures. Applications include speech, shape and character recognition.

COMP 5108 [0.5 credit] (CSI 5126)**Algorithms in Bioinformatics**

Fundamental mathematical and algorithmic concepts underlying computational molecular biology; physical and genetic mapping, sequence analysis (including alignment and probabilistic models), genomic rearrangement, phylogenetic inference, computational proteomics and systemics modelling of the whole cell.

COMP 5110 [0.5 credit] (CSI 5136)**Computer Security and Usability**

This course focuses on designing and evaluating security and privacy software with particular attention to human factors and how interaction design impacts security. Topics include current approaches to usable security, methodologies for empirical analysis, and design principles for usable security and privacy.

COMP 5111 [0.5 credit] (CSI 5153)**Data Management for Business Intelligence**

Application of computational techniques to support business such as decision making, business understanding, data analysis, business process automation, learning from data, producing and using business models, data integration, data quality assessment and cleaning, use of contextual data, etc. Also offered at the undergraduate level, with different requirements, as COMP 4111, for which additional credit is precluded.

COMP 5112 [0.5 credit] (CSI 5154)**Algorithms for Data Science**

Algorithmic techniques to handle (massive/big) data arising from, for example, social media, mobile devices, sensors financial transactions. Algorithmic techniques may include locality-sensitive hashing, dimensionality reduction, streaming, clustering, VC-dimensions, external memory, core sets, link analysis and recommendation systems.

COMP 5113 [0.5 credit]**Machine Learning for Healthcare**

Principles, techniques, technology and applications of machine learning for medical data such as medical imaging data, genomic data, physiological signals, speech and language.

COMP 5114 [0.5 credit]**Quantum Communications and Networking**

Quantum communications and networking; the use of individual photons and teleportation to represent and transmit information. Theoretical (mathematical) principles. Practical aspects (implementation and software simulation) of quantum communications and networking.

COMP 5115 [0.5 credit] (CSI 5344.)**Geometry Processing**

Concepts, representations, and algorithms for processing 3D geometric datasets. Topics include shape representations (e.g., triangle meshes and implicit functions), and the geometry processing pipeline covering the acquisition (e.g., with laser scanning or depth cameras), reconstruction, manipulation, editing, analysis, and fabrication (3D printing) of geometric models.

COMP 5116 [0.5 credit] (CSI 5155.)**Machine Learning**

This course provides a broad introduction to the fundamental concepts, techniques and algorithms in machine learning.

Prerequisite(s): Familiarity with probability and statistics; familiarity with linear algebra and calculus; programming skills at a level sufficient to write a reasonably non-trivial computer program.

COMP 5117 [0.5 credit] (CSI 5346.)**Mining Software Repositories**

Introduction to the methods and techniques of mining software engineering data. Software repositories and their associated data. Data extraction and mining. Data analysis and interpretation (statistics, metrics, machine learning). Empirical case studies.

COMP 5118 [0.5 credit] (CSI 5347.)**Trends in Big Data Management**

In-depth study of recent research articles in the field of data management, with focus on data integration, Internet of Things, large scale data management, recommendation systems, text processing, and question answering. Students will work on a term-long project.

Prerequisite(s): Upper level undergraduate course work in operating systems, database management systems, algorithm design and analysis; or permission of the instructor.

COMP 5119 [0.5 credit] (CSI 5345.)**Internet of Things Security**

Security issues related to the Internet of Things (IoT). IoT device software design and device lifecycle, device pairing and configuration, management and security infrastructure, smarthome platforms, data and communication protocol security, IoT operating systems, malware, firmware in embedded systems, security administration and best practices.

COMP 5201 [0.5 credit] (CSI 5147)**Computer Animation**

Theories and techniques in 3D modeling and animation. Animation principles, categories, and history. Forward and inverse kinematics. Motion capture, editing and retargeting. Flexible bodies. Particle animation. Behavioral animation. Human modeling. Facial animation. Cloth animation and other sub-topics.

COMP 5202 [0.5 credit] (CSI 5146)**Computer Graphics**

Principles and advanced techniques in rendering and modelling. Research field overview. Splines, subdivision surfaces and hierarchical surface representations. Physics of light transport, rendering equation and Bidirectional Reflectance Distribution Function. Classical ray tracing, radiosity, global illumination and modern hybrid methods. Plenoptic function and image-based rendering.

COMP 5203 [0.5 credit] (CSI 5173)**Data Networks**

Mathematical and practical aspects of design and analysis of communication networks. Topics include: basic concepts, layering, delay models, multi-access communication, queuing theory, routing, fault-tolerance, and advanced topics on high-speed networks, ATM, mobile wireless networks, and optical networks.

COMP 5204 [0.5 credit] (CSI 5124)**Computational Aspects of Geographic Information Systems**

Through recent advances in navigation systems, mobile devices, and new software such as Mapquest and Google Earth, GIS is becoming increasingly important and exciting from a CS perspective. This course lays the algorithmic foundations to understand, use and further this technology. Also offered at the undergraduate level, with different requirements, as COMP 4202, for which additional credit is precluded.

COMP 5205 [0.5 credit] (CSI 5151)**Virtual Environments**

Basic concepts. Virtual worlds. Hardware and software support. World modeling. Geometric modeling. Light modeling. Kinematic and dynamic models. Other physical modeling modalities. Multi-sensor data fusion. Anthropomorphic avatars. Animation: modeling languages, scripts, real-time computer architectures. Virtual environment interfaces. Case studies.

COMP 5206 [0.5 credit] (CSI 5183)**Evolutionary Computation and Artificial Life**

Study of algorithms based upon biological theories of evolution, applications to machine learning and optimization problems. Possible topics: Genetic Algorithms, Classifier Systems, and Genetic Programming. Recent work in the fields of Artificial Life (swarm intelligence, distributed agents, behavior-based AI) and of connectionism. Precludes additional credit for COMP 4107.

COMP 5207 [0.5 credit] (CSI 5112)**Software Engineering**

Topics of current interest in Software Engineering, such as requirements engineering, precise and advanced modelling, development processes, change management, standards, and emerging types of applications.

COMP 5209 [0.5 credit] (CSI 5135)**Visual Analytics**

Principles, techniques, technology and applications of information visualization for data analysis. Topics include human visual perception, cognitive processes, static and dynamic models of image semantics, interaction paradigms, big data visual analysis case studies. Includes: Experiential Learning Activity

COMP 5210 [0.5 credit] (CSI 5167)**Human-Computer Interaction Models, Theories, and Frameworks**

Emphasis on the application of theory to user interface design. Review of main theories of human behaviour relevant to HCI, including especially cognitive dimensions of notations framework, mental models, distributed cognition, and activity theory, and their application to design and development of interactive systems. Lecture

COMP 5220 [0.5 credit] (CSI 5175)**Mobile Commerce Technologies**

Wireless networks support for m-commerce; m-commerce architectures and applications; mobile payment support systems; business models; mobile devices and their operating systems; mobile content presentation; security issues and solutions; relevant cross layer standards and protocols; case studies.

Includes: Experiential Learning Activity

COMP 5301 [0.5 credit] (CSI 5122)**Software Usability**

Design principles and metrics for usability. Qualitative and quantitative methods for evaluation of software system usability: Heuristic evaluation, usability testing, usability inspections and walkthroughs, cognitive walkthroughs, formal usability experimentation. Ethical concerns. Economics of usability. Integration of usability engineering lifestyle.

COMP 5302 [0.5 credit] (CSI 5118)**Automated Verification & Validation of Software**

Topics in formal test derivation methods, test management, high-level, CASE-based verification and validation, data-flow and control-flow measures and metrics for assessing quality of designs and code, regression analysis and testing.

COMP 5304 [0.5 credit] (CSI 5169)**Wireless Networks and Mobile Computing**

Computational aspects and applications of design and analysis of mobile and wireless networking. Topics include Physical, Link Layer, Media Access Control, Wireless, Mobile LANs, Ad-Hoc, Sensor Networks, Power Consumption optimization, Routing, Searching, Service Discovery, Clustering, Multicasting, Localization, Mobile IP/TCP, File Systems, Mobility Models, Wireless Apps.

COMP 5305 [0.5 credit] (CSI 5129)**Advanced Database Systems**

In-depth study on developments in database systems shaping the future of information systems, including complex object, object-oriented, object-relational, and semi-structured databases. Data structures, query languages, implementation and applications.

COMP 5306 [0.5 credit] (CSI 5100)**Data Integration**

Materialized and virtual approaches to integration of heterogeneous and independent data sources. Emphasis on data models, architectures, logic-based techniques for query processing, metadata and consistency management, the role of XML and ontologies in data integration; connections to schema mapping, data exchange, and P2P systems.

COMP 5307 [0.5 credit] (CSI 5101)**Knowledge Representation**

KR is concerned with representing knowledge and using it in computers. Emphasis on logic-based languages for KR, and automated reasoning techniques and systems; important applications of this traditional area of AI to ontologies and semantic web.

COMP 5308 [0.5 credit] (CSI 5102)**Topics in Medical Computing**

Introductory course on data structures, algorithms, techniques, and software development related to medical computing (in particular spatial modeling). Topics may include: computational geometry algorithms for cancer treatment, medical imaging, spatial data compression algorithms, dynamic programming for DNA analysis.

COMP 5309 [5.0 credits] (CSI 5168)**Digital Watermarking**

Overview of recent advances in watermarking of image, video, audio, and other media. Spatial, spectral, and temporal watermarking algorithms. Perceptual models. Use of cryptography in steganography and watermarking. Content authentication, copy control, intellectual property, digital rights management and other applications.

COMP 5310 [0.5 credit] (CSI 5152)**Evolving Information Networks**

Convergence of social and technological networks with WWW. Interplay between information content, entities creating it and technologies supporting it. Structure and analysis of such networks, models abstracting their properties, link analysis, search, mechanism design, power laws, cascading, clustering and connections with work in social sciences.

Also offered at the undergraduate level, with different requirements, as COMP 4206, for which additional credit is precluded.

COMP 5401 [0.5 credit] (CSI 5389)**Electronic Commerce Technologies**

Introduction to business models and technologies. Search engines. Cryptography. Web services and agents. Secure electronic transactions. Value added e-commerce technologies. Advanced research questions.

COMP 5402 [0.5 credit] (CSI 5142)**Protocols for Mobile and Wireless Networks**

Link and network layer protocols of wireless networks; applications of wireless networks may be discussed.

Topics may include: protocol implementation, mobile IP, resource discovery, wireless LANs/PANs, and Spread spectrum.

Precludes additional credit for SYSC 5306.

COMP 5405 [0.5 credit] (CSI 5380)**Systems and Architectures for Electronic Commerce****COMP 5406 [0.5 credit] (CSI 5105)****Network Security and Cryptography**

Advanced methodologies selected from symmetric and public key cryptography, network security protocols and infrastructure, identification, anonymity, privacy technologies, secret-sharing, intrusion detection, firewalls, access control technologies, and defending network attacks.

Prerequisite(s): COMP 3203 and COMP 4109, or equivalent, or permission of the instructor.

COMP 5407 [0.5 credit] (CSI 5116)**Authentication and Software Security**

Specialized topics in security including advanced authentication techniques, user interface aspects, electronic and digital signatures, security infrastructures and protocols, software vulnerabilities affecting security, untrusted software and hosts, protecting software and digital content.

COMP 5408 [0.5 credit] (CSI 5121)**Advanced Data Structures**

Simple methods of data structure design and analysis that lead to efficient data structures for several problems.

Topics include randomized binary search trees, persistence, fractional cascading, self-adjusting data structures, van Emde Boas trees, tries, randomized heaps, and lowest common ancestor queries.

COMP 5409 [0.5 credit] (CSI 5127)**Applied Computational Geometry**

Computer-based representation and manipulation of geometric objects. Design and analysis of efficient algorithms for solving geometric problems in applied fields such as Computer-Aided Design and Manufacturing, Cartography, Materials Science, and Geometric Network Design.

COMP 5500 [0.5 credit]**Internet Measurements and Security**

Measurement methodologies for understanding complex Internet phenomena and behaviors including: spread of vulnerabilities, remote network topologies, attack patterns, content popularity, Internet censorship, service quality, and adoption of security systems. Tools for efficient measurements, large-scale data analysis, stats, reproducibility of results. Ethical considerations.

COMP 5501 [0.5 credit] (CSI 5111)**Software Quality Engineering**

Software quality issues. Quality components and metrics. Software process quality. Software reliability engineering. Software process design for testability. Requirements capture and validation. Systematic design validation; grey-box approach, test design, implementation and management, case studies in validation and verification of communications software. Object-oriented design and test.

COMP 5503 [0.5 credit] (CSI 5115)**Database Analysis & Design**

The dimensional and multidimensional data models for data warehousing. Data dependencies and decomposition. Structure and use of data definition and manipulation languages. Database economics, engineering, deployment and evolution. Issues in integrity, security, the Internet and distributed databases. Relationships to decision support systems.

COMP 5505 [0.5 credit] (CSI 5386)**Natural Language Processing**

Overview of both rule-based or symbolic methods and statistical methods as approaches to Natural Language Processing (NLP), with more emphasis on the statistical ones. Applications such as information retrieval, text categorization, clustering, and statistical machine translation could be discussed.

COMP 5604 [0.5 credit] (CSI 5174)**Validation Methods for Distributed Systems**

Review of formal specification and description techniques for distributed and open systems. Verification techniques. Correctness proofs. Verification of general properties of distributed systems. Analysis and relief strategies. Testing techniques. Test generation strategies. Test architectures.

COMP 5606 [0.5 credit] (CSI 5161)**Principles of Distributed Simulation**

Distributed simulation principles and practices. Synchronization protocols: Optimistic vs Conservative, Deadlock detection in conservative simulations, Time warp simulation. Distributed interactive simulation: Data distribution management, Interest management, High Level Architectures (HLA), Run Time Infrastructure (RTI). Distributed web-based and agent based simulation. Real time applications.

COMP 5703 [0.5 credit] (CSI 5163)**Algorithm Analysis and Design**

Topics of current interest in the analysis and design of sequential and parallel algorithms for non-numerical, algebraic and graph computations. Lower bounds on efficiency of algorithms. Complexity classes.

COMP 5704 [0.5 credit] (CSI 5131)**Parallel Algorithms and Applications in Data Science**

Multiprocessor architectures from an application programmer's perspective: programming models, processor clusters, multi-core processors, GPU's, algorithmic paradigms, efficient parallel problem solving, scalability and portability. Projects on high performance computing in Data Science, incl. data analytics, bioinformatics, simulations. Programming experience on parallel processing equipment.

Includes: Experiential Learning Activity

COMP 5706 [0.5 credit] (CSI 5387)**Data Mining & Concept Learning**

Concepts and techniques of data mining. Methods for data summarization and data preprocessing. Algorithms for finding frequent patterns and association analysis; classification; cluster analysis and anomaly detection. Model selection, model evaluation and statistical significance testing. Applications of data mining and coping with Big Data.

COMP 5707 [0.5 credit] (CSI 5110)**Principles of Formal Software Development**

Methodologies in formal software specification, development, and verification. The use of theorem proving, automated deduction, and other related formal methods for software correctness. Applications in program verification and secure computation.

COMP 5709 [0.5 credit] (CSI 5165.)**Combinatorial Algorithms**

Design of algorithms for solving problems that are combinatorial in nature, involving exhaustive generation, enumeration, search and optimization. Algorithms for generating basic combinatorial objects and for solving hard optimization problems. Metaheuristic search, backtracking, branch-and-bound. Computing isomorphism of combinatorial objects.

COMP 5801 [0.5 credit] (CSI 5388)**Topics in Machine Learning****COMP 5805 [0.5 credit] (CSI 5166)****Applications of Combinatorial Optimization**

Topics in combinatorial optimization with emphasis on applications in Computer Science. Topics include network flows, various routing algorithms, polyhedral combinatorics, and the cutting plane method.

COMP 5900 [0.5 credit] (CSI 5140)**Selected Topics in Computer Science**

Selected topics, not covered by other graduate courses. Details will be available from the School at the time of registration.

COMP 5901 [0.5 credit] (CSI 5901)**Directed Studies (M.C.S.)**

A course of independent study under the supervision of a member of the School of Computer Science.

COMP 5903 [1.0 credit] (CSI 6900)**Graduate Project (M.C.S.)**

A one- or two-session course. For M.C.S. non-thesis option students only.

COMP 5905 [2.5 credits] (THM 7999)**M.C.S. Thesis****COMP 5913 [0.0 credit] (CGI 6001/CGI 6002)****Master's Co-operative Work Term****COMP 6100 [0.5 credit] (CSI 7131)****Advanced Parallel and Systolic Algorithms**

Continuation of COMP 5704.

COMP 6104 [0.5 credit] (CSI 7314)**Advanced Topics in Object-Oriented Systems**

Advanced object-oriented software engineering, in particular the issues of reuse and testing. Sample topics include: interaction modeling; class and cluster testing; traceability; design patterns and testing; the C++ standard template library. Students will carry out research.

COMP 6601 [0.5 credit] (CSI 7160)**Advanced Topics in the Theory of Computing****COMP 6602 [0.5 credit] (CSI 7170)****Advanced Topics in Distributed Computing****COMP 6603 [0.5 credit] (CSI 7161, CSI 7561)****Advanced Topics in Programming Systems and Languages****COMP 6604 [0.5 credit] (CSI 7162)****Advanced Topics in Computer Applications****COMP 6605 [0.5 credit] (CSI 7163)****Advanced Topics in Computer Systems****COMP 6901 [0.5 credit] (CSI 7901)****Directed Studies (Ph.D.)****COMP 6902 [0.5 credit] (CSI 7900)****Graduate Project (Ph.D.)****COMP 6907 [0.0 credit] (CSI 9998)****Doctoral Comprehensive**

Committee assembled approves at least 3 topics for written examination: typically, a major and two minor areas. An oral examination occurs if the written exam is passed. Both elements must take place within the first 4 terms following initial registration in the program. The comprehensive may be failed, passed conditionally (i.e., with extra course requirements) or passed unconditionally. If failed this course may be retaken at most one time.

COMP 6908 [0.0 credit] (CSI 9997)**Doctoral Proposal**

Within 8 terms following initial registration in the program, a document generally defining the problem addressed, relating it to the literature, and outlining the hypotheses, goals, research methodology, initial results and validation approach must be submitted to an examination committee and successfully defended.

COMP 6909 [0.0 credit] (THD 9999)**Ph.D. Thesis**

Cultural Mediations (CLMD)

Cultural Mediations (CLMD) Courses**CLMD 6101 [1.0 credit]****Perspectives on Interdisciplinarity in Cultural Theory**

Theory and practice of interdisciplinary studies of culture. Attention will be paid to those issues in cultural theory of the twentieth century that inform interdisciplinary work today in literature, film, music, art and new media.

CLMD 6102 [0.5 credit]**Issues in Transnationalism**

This course will consider cultural production in the context of global exchange, examining the processes of mediation -- conflict, collaboration, transformation and hybridization -- that govern the movement of populations, objects, and ideas as they travel across borders and between societies.

CLMD 6103 [0.5 credit]**Issues of Cultural Mediation and Representation**

This course will examine how works from different cultures or works in the same or different media from the same culture pose questions about the nature of representation, interpretation, meaning and affect. Emphasis will be upon the relation between social intelligibility and textual features.

CLMD 6104 [0.5 credit]**Issues in Cultural Politics**

The theory of the subject and its relations, with examples from specific cultural practices in literary studies, film, music, art, popular culture and new media.

CLMD 6105 [0.5 credit]**Issues in the Technologies of Culture**

The role that technology plays in changing models of literacy, visuality and aurality. The technologies of the cultures of print, vision and sound will be discussed through specific examples of cultural practices in various media.

CLMD 6106 [0.5 credit]**Issues in History and Culture**

History as an object of representation and a condition of human experience. Historical approaches to print, visual, and auditory culture in relation to theoretical texts and specific periods and genres. Topics may include history and the novel, visual culture in history, and historiography.

CLMD 6900 [0.5 credit]**Research and Professional Development**

Students develop research methods to prepare for their second comprehensive examination and to write and defend the doctoral dissertation successfully. Practices of academic publishing, conference presentations and academic articles; grant writing, ethical conduct in research and private and public sector employment opportunities.

CLMD 6901 [0.5 credit]**Directed Readings in Cultural Mediations**

This tutorial is designed to permit students to pursue research on topics chosen in consultation with members of faculty and the graduate supervisor.

CLMD 6902 [0.5 credit]**Special Topic in Cultural Mediations**

This in-class course offers selected topics in interdisciplinary studies of culture not available in the regular course offerings.

CLMD 6903 [0.5 credit]**Special Topic in Cultural Mediations**

This in-class course offers selected topics in interdisciplinary studies of culture not available in the regular course offerings.

CLMD 6904 [0.5 credit]**Special Topic in Cultural Mediations**

This in-class course offers selected topics in interdisciplinary studies of culture not available in the regular course offerings.

CLMD 6907 [1.0 credit]**Comprehensive I**

A general examination of the broad range of cultural theory of the twentieth century as it informs interdisciplinary work today and the historical, intellectual and cultural frames of reference that this work invokes.

CLMD 6908 [1.0 credit]**Comprehensive II**

A discipline-specific examination in a specialized area of study chosen by the student in consultation with the graduate supervisor. Students will choose from one of the following comprehensive areas: Literary Studies; Visual Culture; Musical Culture; New Technologies.

CLMD 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Curatorial Studies (CURA)

Curatorial Studies (CURA) Courses**CURA 5000 [0.5 credit]****Curatorial Studies Proseminar**

This proseminar explores a range of historical, social, economic, educational, ethical, legal, technological and administrative issues concerning the world of museums and related institutions.

CURA 5001 [0.5 credit]**Curatorial Studies Pro-seminar: Visual Arts Stream**

Practical examination of art exhibition practices; site visits and workshops designed to help students develop curatorial skills and navigate the museum world. This course trains students in the core competencies of curatorial practice.

Includes: Experiential Learning Activity

CURA 5002 [0.5 credit]**Curatorial Studies Pro-seminar: Material and Intangible Cultures Stream**

Taught in collaboration with an institution in the National Capital Region. Development of practical and professional competencies with focus on issues specific to curatorial practice in natural and cultural history museums, interpretation/discovery centres, and science centres.

CURA 5003 [0.5 credit]**Special Topics in Curatorial Studies**

Analysis of selected topics relevant to theory, research, and practice in Curatorial Studies. The choice of topics will vary and will be announced in advance of the registration period.

CURA 5011 [0.5 credit]**Curatorial Studies Practicum 1**

Practical on-site work in the collecting and programming institutions of the National Capital Region (as available), including a written assignment.

Includes: Experiential Learning Activity

CURA 5012 [0.5 credit]**Curatorial Studies Practicum 2**

Practical on-site work in the collecting and programming institutions of the National Capital Region (as available), including a written assignment.

Includes: Experiential Learning Activity

CURA 5013 [0.5 credit]**Directed Exhibition Proposal**

Project-oriented course focused on an immersive engagement with institutional curatorial practices. Completion and presentation of an individual exhibition proposal for submission to a professional institution. Stage-by-stage approach covering all required aspects of proposal development. Seminar format with thematic workshops, guest interventions, group discussions, progress reports.

Includes: Experiential Learning Activity

Data Science (DATA)

Data Science (DATA) Courses**DATA 5000 [0.5 credit]****Data Science Seminar**

Cloud based distributed systems, statistics, machine learning, use of complex ecosystems of tools and platforms, and communication skills to explain advanced analytics. Students choose a project in Big Data management and/or analysis, deliver a paper and give a class presentation on their findings.

Digital Humanities (DIGH)

Digital Humanities (DIGH) Courses

DIGH 5000 [0.5 credit]

Issues in the Digital Humanities

Introduction to the theoretical and practical aspects of the Digital Humanities, including the historical and ongoing debates over its boundaries, methodologies, objectives and values.

Includes: Experiential Learning Activity

DIGH 5011 [0.5 credit]

Graduate Practicum in Digital Humanities

Practical on-site work in a public institution or private sector company (as available), including a written assignment or equivalent project in alternative format. In collaborating programs with practicum programs, a maximum of 1.0 practicum credit may be applied towards degree requirements.

Includes: Experiential Learning Activity

DIGH 5012 [0.5 credit]

Directed Readings and Research in Digital Humanities

Students pursue topics in the Digital Humanities, which they select in consultation with a member of the graduate faculty of the program.

Includes: Experiential Learning Activity

DIGH 5800 [0.0 credit]

Digital Humanities: Professional Development

This course allows students to participate with Digital Humanities scholars and professionals in public discussions of topics in the Digital Humanities, as both presenter and audience member. The course is graded satisfactory/unsatisfactory based on attendance and engagement.

DIGH 5902 [0.5 credit]

Special Topics in Digital Humanities

This course offers selected topics in Digital Humanities not available in the regular course offerings.

Earth Sciences (ERTH)

Earth Sciences (ERTH) Courses

ERTH 5001 [0.5 credit] (GEO 5301)

Seminars in Earth Sciences I

One-term modular courses covering a spectrum of Earth Science topics and current research problems, ranging from the geology and geophysics of the solid Earth, to its surface environment and crustal resources. Course complements EARTH 5002.

Precludes additional credit for Students may not take a module for credit that is offered by their supervisor, but may do so with the permission of the OCGC Director.

A minimum of four modules offered per term, three must be completed to obtain course credit. Choice of modules must be approved by the OCGC Director.

ERTH 5002 [0.5 credit] (GEO 5302)

Seminars in Earth Sciences II

One-term modular courses covering a spectrum of Earth Science topics and current research problems, ranging from the geology and geophysics of the solid Earth, to its surface environment and crustal resources. Course complements EARTH 5001.

Precludes additional credit for Students may not take a module for credit that is offered by their supervisor, but may do so with the permission of the OCGC Director. A minimum of four modules offered per term, three must be completed to obtain course credit. Choice of modules must be approved by the OCGC Director.

ERTH 5104 [0.5 credit] (GEO 5114)

Mineralogy

An advanced course covering selected topics in mineralogy, such as crystallography, crystal chemistry, crystal structure, mineralogy of rock-forming mineral groups, and instrumental methods in mineralogical research, such as use of electronic optical instruments, spectroscopy, and X-ray crystallography; seminar presentations and practical exercises.

ERTH 5105 [0.5 credit] (GEO 5105)

Thermodynamics, Kinetic Theory, and Metamorphic Petrology

Phase equilibria, phase diagrams, and the kinetics of mineral reactions; mass transfer; regional and global aspects of metamorphic petrogenesis. Course may include one or two weeks of field-based instruction with costs borne by students.

Includes: Experiential Learning Activity

ERTH 5202 [0.5 credit] (GEO 5122)

Advanced Igneous Petrology

Integrates physical and chemical processes with the dynamics of magmatic systems to understand igneous processes. Course may involve a field trip with costs to be paid by students.

Includes: Experiential Learning Activity

ERTH 5204 [0.5 credit] (GEO 5124)

Geology and Geochemistry of Ore Deposits

An advanced course in ore deposits examining aspects of their geology, geochemistry, and exploration. Topics will be selected from a range of different deposit types, including hydrothermal and magmatic ore deposits, as well as laboratory and field examination of different ores and their host rocks.

Includes: Experiential Learning Activity

ERTH 5206 [0.5 credit] (GEO 5306)

Hydrothermal Ore Deposits

Advanced economic geology course on hydrothermal ore deposits including geology and geochemistry, physical and chemical controls on mineralization, recognition and characterization of ore-fluid reservoirs, nature of large-scale fluid flow and alteration, and applications to exploration.

ERTH 5215 [0.5 credit] (GEO 5115)**Natural Hazards in Canada - Risk and Impact**

Overview of natural hazards and severe weather phenomena in Canada. Notions of risk, return period, and probability of occurrence of natural disasters. Impact on society and infrastructure. Mitigation policies and strategies.

Also listed as IPIS 5505.

Also offered at the undergraduate level, with different requirements, as ERTH 4815, for which additional credit is precluded.

ERTH 5301 [0.5 credit] (GEO 5131)**Siliciclastic Sedimentology**

Origin and significance of physical sedimentary processes and structures. Analysis of ancient siliciclastic depositional environments in a facies model and sequence stratigraphic framework. Course involves lectures, seminars and field excursions.

Includes: Experiential Learning Activity

ERTH 5305 [0.5 credit] (GEO 5135)**Carbonate Sedimentology**

Aspects of modern depositional systems, dynamic facies models, sequence stratigraphy, mineralogy, and diagenesis of carbonate sediments. The practical part of the course will consist of a field-laboratory project that integrates various techniques in carbonate sedimentology (mapping, petrography, staining, cathodoluminescence, fluorescence, SEM).

Includes: Experiential Learning Activity

ERTH 5306 [0.5 credit] (GEO 5136)**Paleobiology**

Extinctions, micro- and macro-evolutionary processes, long-term trends and cycles in the Phanerozoic; functional morphology; application of invertebrates to biostratigraphy, paleoceanography and paleolimnology. May include one or two weeks of field-based instruction with costs borne by the student.

ERTH 5307 [0.5 credit] (GEO 5137)**Evolutionary Developmental Biology**

This course explores the mechanistic basis of organismic evolution from genetic, morphogenetic and epigenetic perspectives, within a phylogenetic context of living and extinct vertebrates.

Includes: Experiential Learning Activity

ERTH 5308 [0.5 credit] (GEO 5138)**Advanced Micropaleontology**

Paleobiology, biostratigraphy and paleoecology of microfossils in the context of paleoceanography, paleolimnology and paleoclimatology. Course may involve a field trip with costs to be paid by students.

Includes: Experiential Learning Activity

ERTH 5403 [0.5 credit] (GEO 5143)**Environmental Isotopes and Groundwater Geochemistry**

Geochemistry and environmental isotopes in studies of groundwater dynamics, age and contaminant hydrogeology. Environments from shallow groundwater and surface water to deep crustal brines are examined. Low temperature aqueous geochemistry and mineral solubility with emphasis on the carbonate system.

ERTH 5407 [0.5 credit] (GEO 5147)**Aqueous Inorganic Geochemistry and Modelling**

Covers concepts in aqueous geochemistry including ion hydration and hydrolysis, aqueous activity, complexation, mineral solubility, carbonate system, redox, adsorption/surface complexation and reaction kinetics. Bi-weekly assignments provide an introduction to equilibrium geochemical modelling.

ERTH 5409 [0.5 credit]**Reactive Transport Modelling**

Introduction to the theory of numerical models and application of reactive transport models in hydrogeology. Focus will be on development of appropriate conceptual models of flow, transport and bio- and geochemical reactions and simulation of these conceptual models using reactive transport codes.

ERTH 5414 [0.5 credit] (GEO 5144.)**Isotope Mapping and Provenance Applications**

Isotopes are used to trace provenance of organic and inorganic materials. This course will discuss how traditional isotope systems vary in the environment at different spatiotemporal scales and how mapping their variations can solve problems in hydrology, climatology, ecology, and archeology.

Includes: Experiential Learning Activity

ERTH 5501 [0.5 credit] (GEO 5151)**Precambrian Geology**

Geology of the main Archean cratons and Proterozoic belts with emphasis on North America. Formation of the Earth, composition and evolution of the crust and mantle during the first 4 billion years of Earth's history, from its formation to the end of the Proterozoic.

Includes: Experiential Learning Activity

ERTH 5503 [0.5 credit] (GEO 5153)**Computer Techniques in the Earth Sciences**

A practical course for mapping; quantitative analysis, integration and modeling of spatial data related to geosciences and engineering applications using a combination of GIS, statistical and geostatistical analysis techniques.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ERTH 5505 [0.5 credit] (GEO 5155.)**Climate Change**

Considers climate changes and their driving mechanisms over a broad range of timescales based on observations from geological archives and more recent instrumented evidence. Future climate projections and their accuracy are also considered.

Includes: Experiential Learning Activity

ERTH 5507 [0.5 credit] (GEO 5157)**Tectonic Processes Emphasizing Geochronology and Metamorphism**

Applications of empirical, analytical and quantitative techniques to problems in regional geology and crustal tectonics; orogenic processes; heat and metamorphism; isotopic geochronology as applied to thermal history.

ERTH 5600 [0.5 credit] (GEO 5160)**Chemistry of the Earth**

An examination of the composition of the mantle and crust in selected tectonic settings, such as subduction zones and hot spots. Topics may include how geochemical data constrain geodynamic settings of study areas.

ERTH 5603 [0.5 credit] (GEO 5163)**Stable Isotope Geochemistry**

Mechanisms of isotope fractionation in nature; physical and chemical isotope fractionation, kinetic isotope effects. Variation of stable isotope ratios (hydrogen/carbon/oxygen/sulphur) in nature. Preparation techniques of natural samples for isotope analysis. Applications of stable isotopes to study magma genesis, ore genesis, nature.

ERTH 5609 [0.5 credit] (GEO 5169)**Radiogenic Isotope Geochemistry**

Radiogenic isotope systematics applied to the solid Earth and their use to understand various geological processes. Evolution of large-scale isotopic reservoirs throughout Earth's history. Application of different radiometric dating techniques, assessment of geochronological data, models and interpretations.

ERTH 5701 [0.5 credit] (GEO 5171)**Physics of the Earth**

The physics and dynamics of the solid Earth: seismology; gravitational and magnetic fields, thermal state.

Geophysical constraints on the structure and composition of the interior. Geodynamic processes.

Also offered at the undergraduate level, with different requirements, as EARTH 4801, for which additional credit is precluded.

ERTH 5703 [0.5 credit] (GEO 5173)**Structural Geology**

Deformation processes and the analysis of geological structures at all scales.

ERTH 5704 [0.5 credit] (GEO 5174)**Tectonics**

Dynamic and geological aspects of plate tectonics throughout Earth history.

ERTH 5707 [0.5 credit] (GEO 5177)**Engineering Seismology**

Seismological topics with engineering applications. Characterization of seismicity and seismic sources (areas and faults). Seismic hazard analysis. Empirical and theoretical modeling of strong ground motion in time and frequency domain.

ERTH 5708 [0.5 credit] (GEO 5178)**Earthquake Signal Processing**

Theoretical and practical aspects of earthquake signal processing, seismic instrumentation, instrument response and application of spectral analysis and response spectra.

ERTH 5901 [0.5 credit] (GEO 5191.)**Research Topics in Earth Sciences**

Directed reading/field/laboratory studies unrelated to thesis research, under the guidance of directors other than the thesis supervisor. A written proposal including research plan, deliverables, and evaluation, must be submitted for departmental approval prior to registration. Written report required.

Includes: Experiential Learning Activity

ERTH 5903 [0.5 credit] (GEO 5193)**Field Studies**

Field investigations of geological problems, unrelated to thesis research, under the guidance of directors other than the thesis supervisor. Minimum of fifteen days field work. A written proposal including research plan, deliverables, and evaluation must be submitted for departmental approval prior to registration.

Includes: Experiential Learning Activity

ERTH 5906 [0.0 credit] (GEO 5193)**M.Sc. Geoscience Seminar**

Participation in the Geoscience Seminar Series.

ERTH 5907 [0.0 credit] (GEO 5193)**Ph.D. Geoscience Seminar**

Participation in the Geoscience Seminar Series.

ERTH 5909 [3.5 credits] (GEO 7999)**M.Sc. Thesis**

A thesis proposal must be approved by the research advisory committee by the end of the first year of registration.

Includes: Experiential Learning Activity

ERTH 6908 [0.0 credit] (GEO 9998)**Ph.D. Comprehensive Examination**

The Comprehensive Examination involves a thesis proposal and oral examination in three different areas of specialization. Students will receive a grade of Satisfactory or Unsatisfactory. This exam is taken within the first twelve months of registration in the program.

ERTH 6909 [0.0 credit] (GEO 9999)**Ph.D. Thesis**

A thesis proposal must be approved by the research advisory committee by the end of the first year of registration.

Includes: Experiential Learning Activity

Economics (ECON)

Economics (ECON) Courses**ECON 5020 [0.5 credit] (ECO 6122, ECO 6522)****Microeconomic Theory**

An introduction to graduate-level microeconomic theory, including topics such as utility maximization and individual choice, decision-making under uncertainty, producer theory (technology, costs, and profit maximization), alternative market structures (competition, monopoly, and oligopoly), general equilibrium, and the economics of information.

Precludes additional credit for ECON 5000 (no longer offered) and ECON 5001 (no longer offered).

ECON 5021 [0.5 credit] (ECO 6120, ECO 6520)**Macroeconomic Theory**

An introduction to graduate-level macroeconomic theory, including topics such as economic growth, consumption, investment, real and nominal frictions in the goods, labour, and credit markets, models of short-run economic fluctuations, and monetary and fiscal policy design.

Precludes additional credit for ECON 5002 (no longer offered).

ECON 5027 [0.5 credit] (ECO 5185, ECO 5585)**Econometrics I**

An introduction to econometrics at the graduate level. Topics include the analysis and treatment of univariate and multivariate regression models, GLS, IV, and maximum likelihood estimation, hypothesis testing, seemingly unrelated regression models, and simultaneous equations models, together with relevant economic applications. Precludes additional credit for ECON 5005 (no longer offered).

ECON 5029 [0.5 credit]**Methods of Economic Research**

Formulation, specification, and analysis of economic and econometric models; derivation of policy implications; communication of results and economic methodology. Includes: Experiential Learning Activity

Precludes additional credit for ECON 5006 (no longer offered).

Prerequisite(s): ECON 5020 (ECON 5000 if taken before 2012-2013, ECON 5001 if taken before 2007-2008) and ECON 5027 (ECON 5005 if taken before 2012-2013), or permission of the Department.

ECON 5051 [0.5 credit]**Asset Pricing**

Value, the dynamic optimization problems of firms and investors, risk-neutral pricing, and related topics.

ECON 5052 [0.5 credit]**Financial Markets and Instruments**

Capital structure, debt financing, options, financial planning, corporate governance, and related topics.

ECON 5055 [0.5 credit]**Financial Econometrics**

The econometrics of empirical finance including parametric and nonparametric models of volatility, evaluation of asset-pricing theories, and models for risk management and transactions data.

Prerequisite(s): ECON 5027 (or equivalent).

ECON 5058 [0.5 credit]**Advanced Topics in Financial Economics**

Current research in financial economics. Topics may include theoretical analysis, quantitative methods, policy issues, and applications to the financial industry.

Prerequisite(s): ECON 5051 or ECON 5052, which may be taken concurrently with ECON 5058.

ECON 5060 [0.5 credit]**Economic Analysis of Public Policy**

This course examines how economic theory and empirical analysis are used to design and evaluate public policies.

ECON 5061 [0.5 credit]**Central Banking: Theory, Practice, and Recent Challenges**

Issues related to the formulation and implementation of monetary policy in Canada and other countries. The theoretical basis for such policy. Ways in which policy makers have addressed practical issues of central-bank policy making over the years.

ECON 5062 [0.5 credit]**Fiscal Policy in Canada: Practice and Challenges**

Formulation and implementation of fiscal policy by the Government of Canada over recent decades. Assessment of the inputs (both analytical and political) into decision-making, the importance of public communications, the role of federal-provincial relations, and the roles of the bureaucracy and Cabinet.

ECON 5063 [0.5 credit]**Innovation Policy and Economic Growth**

An overview of the issues facing policy makers in trying to improve the innovative performance of the economy. The links between innovation, productivity, and economic growth. Topics may include private-sector innovation financing and the roles of government laboratories, universities, and intellectual property in promoting innovation.

ECON 5064 [0.5 credit]**Economic Policy Formulation and Evaluation**

Formulation of a policy paradigm based in economic theory and application of it to various relevant and current federal, provincial, and municipal policies, including those relating to health, pensions, income inequality, social assistance, division of powers, education, labour, Indigenous peoples, tax expenditures, and the environment.

ECON 5065 [0.5 credit]**Selected Topics in Economic Policy**

This course provides an overview of selected topics at the forefront of Economic Policy from both a theoretical and empirical perspective. Possible topics include regulation of financial markets, cryptocurrency, competition policy, environmental policy, artificial intelligence and machine learning for public policy, among others.

ECON 5209 [0.5 credit] (ECO 6106, ECO 6506)**Selected Topics in the History of Economic Thought**

The development of economic thought through time in relation to selected economic problems.

Precludes additional credit for ECON 5201 (no longer offered) and ECON 5202 (no longer offered).

Also offered at the undergraduate level, with different requirements, as ECON 4209, for which additional credit is precluded.

ECON 5230 [0.5 credit]**Economic History**

The application of economic theory and quantitative techniques to selected topics in economic history, which may include historical patterns of growth and welfare, nineteenth-century globalization, technological change, the development of agriculture, industrialization, the Great Depression, and the origins of central banks.

Also offered at the undergraduate level, with different requirements, as ECON 4230, for which additional credit is precluded.

ECON 5301 [0.5 credit] (ECO 6140, ECO 6540)**Industrial Organization I**

An examination of theories pertaining to industrial organization and their application by way of empirical studies. Topics include oligopoly theory, product differentiation, and strategic behaviour.

ECON 5303 [0.5 credit] (ECO 6142, ECO 6542)**Industrial Organization II**

Regulation and competition policy as alternative approaches for influencing industry conduct and performance and correcting market failures. Topics may include incentive regulation under asymmetric information, cost-based pricing, second-best pricing, peak-load pricing, rate-of-return regulation, price-cap regulation, access pricing, and regulatory capture.

ECON 5304 [0.5 credit] (ECO 6135, ECO 6535)**Topics in Industrial Organization**

Topics may include vertical restraints and vertical integration, innovation and research and development, network economics, contract theory, search theory and advertising, and industry studies.

ECON 5309 [0.5 credit]**Applied Industrial Economics**

The application of industrial economics, with special emphasis on Canada and the rest of North America. Topics include the structure of consumer demand, firm production and investment, industrial structure and international trade, and the effect of government policies on industrial development.

ECON 5361 [0.5 credit] (ECO 6191, ECO 6591)**Labour Economics I**

The application of microeconomic and macroeconomic theory to the labour market. Topics include labour supply and labour demand, wage determination, human capital, and the economics of education, and unemployment. Precludes additional credit for ECON 5360 (no longer offered) and ECON 5307 (no longer offered).

ECON 5362 [0.5 credit] (ECO 6192, ECO 6592)**Labour Economics II**

Personnel economics and contract theory. Topics include the economics of unions, discrimination, the economics of the household, gender and fertility, and labour mobility.

ECON 5363 [0.5 credit] (ECO 6193, ECO 6593)**Advanced Topics in Labour Economics**

Topics may include program evaluation, inequality, labour markets and health, labour markets and crime, and the structural estimation of labour market models.

Precludes additional credit for ECON 5360 (no longer offered) and ECON 5307 (no longer offered).

ECON 5401 [0.5 credit] (ECO 6130, ECO 6530)**Public Economics: Expenditures**

The theory of public expenditures. Topics may include public goods and externalities, social insurance and redistribution, public provision of health care and education, public pension systems, and unemployment insurance.

ECON 5402 [0.5 credit] (ECO 6131, ECO 6531)**Public Economics: Taxation**

The study of tax systems. Concepts of equity and efficiency in taxation. The optimal design of tax structures using commodity, income, and capital taxes. Additional topics may include political economy of taxation, low-income support, environmental taxes, and tax evasion.

ECON 5403 [0.5 credit] (ECO 6133, ECO 6533)**Topics in the Theory of Public Economics**

Topics may include political economy, tax incidence in general equilibrium, the theory and practice of tax reform, normative approaches to income redistribution, the theory of non-market decision-making, the non-profit sector, and social choice theory.

ECON 5404 [0.5 credit]**Fiscal Federalism**

Economic aspects of federalism, including efficiency, redistribution, consideration of a federal system of government, intergovernmental grants, and problems of stabilization policy in a federal context.

ECON 5407 [0.5 credit]**Cost-Benefit Analysis and Project Evaluation**

Techniques and problems in cost-benefit analysis and the evaluation of public and private projects. Topics may include surplus measurement, investment decision rules, shadow pricing, the valuation of non-marketed goods, distributive weights, and the evaluation of projects involving uncertainty, loss of life, and/or population change.

ECON 5460 [0.5 credit] (ECO 6174, ECO 6574)**Health Economics**

Review of both classic and frontier work in the field of health and health care economics. Empirical work with an emphasis on the theory and methodology. This course is also relevant to students interested in broader empirical microeconomic research.

ECON 5500 [0.5 credit] (ECO 6170, ECO 6570)**Development Economics I**

Topics at the forefront of development economics, combining theoretical and empirical analysis. Topics may include economic growth, firm behaviour, institutions, and political economy.

ECON 5504 [0.5 credit] (ECO 6171, ECO 6571)**Development Economics II**

A selection of topics currently at the forefront of research in development economics. Topics may include poverty and income distribution, labour markets, financial markets, and education.

ECON 5505 [0.5 credit] (ECO 6172, ECO 6572)**Selected Topics in Development Economics**

Overview of selected topics of current interest in the field of development economics from both a theoretical and empirical perspective.

ECON 5507 [0.5 credit] (ECO 6173, ECO 6573)**Environmental Aspects of Economic Development**

Policy aspects of sustainable economic development and environmental quality in developing countries. Topics may include energy use, deforestation, drought and desertification, depletion of natural resources, debt, environment and poverty, sustainable industrial and agricultural development, conservation policies, pollution control, and global environmental issues.

ECON 5601 [0.5 credit] (ECO 6160, ECO 6560)**International Trade: Theory and Policy**

International trade theory and its implications for economic policy, with emphasis on topics such as determinants of trade and specialization, gains from trade and commercial policy, international factor mobility, growth, and development.

ECON 5602 [0.5 credit] (ECO 6161, ECO 6561)**International Monetary Theory and Policy**

International monetary theory and its implications for economic policy, with emphasis on topics such as sources of equilibrium and disequilibrium in the balance of payments, balance-of-payments adjustment under fixed versus flexible exchange rates, international capital movements, and recent issues in the international monetary system.

ECON 5603 [0.5 credit] (ECO 6162, ECO 6562)**Topics in International Economics**

Selected topics in international economics, including theoretical analysis, quantitative methods, and policy formulation, implementation, and evaluation.

ECON 5606 [0.5 credit] (ECO 6180, ECO 6580)**Foundations of Monetary Economics**

Microeconomic foundations of monetary theory. Alternative theories of the existence of money and the micro-foundations for how money is integrated into aggregate macroeconomic models.

ECON 5607 [0.5 credit] (ECO 6181, ECO 6581)**Topics in Monetary Economics**

Coverage of one or more areas of current research on the frontiers of monetary economics.

ECON 5608 [0.5 credit] (ECO 6182, ECO 6582)**Monetary Economics and Financial Intermediation**

The evolution of the financial system and its interrelationship with the money supply process. Monetary and finance theory and empirical research applied to institutional problems in both historical and contemporary settings. Topics may include credit markets, financial instability, bubbles, and links to central bank policy.

ECON 5609 [0.5 credit] (ECO 6183, ECO 6583)**Explorations in Monetary Economics**

Explorations in the theory, policy and empirics of monetary economics.

ECON 5700 [0.5 credit]**Social and Economic Measurement**

Index number theory and national accounting. Topics may include: biases in indexes, inflation accounting, the theory of international comparisons, and the measurement of business and personal income, capital and depreciation, and productivity.

ECON 5712 [0.5 credit] (ECO 6175, ECO 6575)**Micro-Econometrics**

Analysis of the concepts and tools used in micro-econometrics with particular focus on empirical applicability. Topics may include discrete choice models, limited dependent variables, panel data, duration models, and program evaluation, together with relevant economic applications.

Precludes additional credit for ECON 5702 (no longer offered).

Prerequisite(s): ECON 5027 (or equivalent), or permission of the Department.

ECON 5713 [0.5 credit] (ECO 6176, ECO 6576)**Time-Series Econometrics**

Analysis of the concepts and tools used in time-series econometrics with particular focus on empirical applicability. Topics may include cointegration analysis, error-correction models, VAR models, volatility analysis, and non-linear time-series models, together with relevant economic applications.

Precludes additional credit for ECON 5703 (no longer offered).

Prerequisite(s): ECON 5027 (or equivalent), or permission of the Department.

ECON 5801 [0.5 credit]**Regional Economics**

Regional economic disparities in Canada, theories and public policy relating thereto. Consideration will be given to the concept of regions, location of industry and industrial structure, and to growth determinants.

ECON 5802 [0.5 credit]**Urban Economics**

The economic properties of urban areas. Attention will be focused on the macrodynamics of urban development, together with the microstatics of the equilibrium properties of the urban land market.

ECON 5803 [0.5 credit] (ECO 6143, ECO 6543)**Economics of Natural Resources**

The concept of scarcity rents in static and dynamic settings. Basic property regimes: open access, exclusive access and common property. Policy instruments. The importance of transaction costs. General-equilibrium and political-economic aspects of property regimes. Conflict. Elements of dynamic optimization. Renewable and non-renewable resources.

Precludes additional credit for ECON 5305 (no longer offered).

ECON 5804 [0.5 credit] (ECO 6151, ECO 6551)**Economics of the Environment**

Theory of environmental regulation, including command and control, incentive based mechanisms, effects of market structure, and interactions with pre-existing taxes. Valuation of non-marketed goods, including existence value, contingent valuation, hedonic price methods, health impacts, irreversibility, and recreational benefits.

Precludes additional credit for ECON 5306 (no longer offered).

ECON 5805 [0.5 credit] (ECO 6134, ECO 6534)**Topics in Environmental and Resource Economics**

Topics may include: international dimensions of environmental regulation, including treaties, competitiveness, and the effects of trade liberalization; development issues, including fiscal sustainability, Dutch disease, the resource curse, and population growth; resource topics, including optimal taxation, green national accounts, sustainability theory, and scarcity of extractive resources.

ECON 5820 [0.5 credit]**The Canadian Economy**

Aspects and problems of the Canadian economy. Economic theory applied to the workings of the Canadian economy. Topics may include regional development, industrial organization, factor markets, natural resources, income distribution, international trade and capital flows, and macroeconomic stability.

Precludes additional credit for ECON 5101 (no longer offered) and ECON 5102 (no longer offered).

ECON 5840 [0.5 credit]**Law and Economics**

The interrelationships between law and economics, emphasizing transaction costs and property rights. Economic analysis of such topics as the allocative effects of alternative property rights, contract, tort, and nuisance law, and the economics of crime, pollution, pay television, and eminent domain.

Precludes additional credit for ECON 5308 (no longer offered).

ECON 5880 [0.5 credit]**Special Topics**

Topics may vary from year to year and are announced in advance of the registration period.

Prerequisite(s): permission of the Department.

ECON 5902 [0.5 credit]**Internship Placement**

Internship students are required to register in this course during their work term.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ECON 5906 [0.5 credit]**Directed Research**

A substantial research paper is required of any student enrolled in this course, which is designed to facilitate the pursuit of research on a topic chosen in consultation with a faculty member and the relevant Graduate Supervisor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

ECON 5909 [1.5 credit]**M.A. Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): At least A- in each of ECON 5020, ECON 5021, and ECON 5027, and approval of the Department.

ECON 6019 [0.5 credit] (ECO 7119)**Mathematical Foundations for Economic Theory**

Mathematical techniques needed to understand micro- and macro-economic theory at the Ph.D. level, and to carry out research. Real analysis. Review of static optimization. Continuous- and discrete-time dynamic optimization in deterministic and stochastic environments. Applications to economic theory are presented.

Includes: Experiential Learning Activity

Prerequisite(s): ECON 5020 (or equivalent) and ECON 5021 (or equivalent), or permission of the Department.

**ECON 6027 [0.5 credit] (ECO 7126, ECO 7526)
Econometrics II**

Statistical foundations of econometrics: estimation, inference, and decision theory. Topics may include likelihood and moment-based inference, asymptotic theory, semi-parametric and non-parametric models, Bayesian approaches, and structural models, together with relevant economic applications.

Includes: Experiential Learning Activity

Precludes additional credit for ECON 5701 (no longer offered) and ECON 6005 (no longer offered).

Prerequisite(s): ECON 5027 (or equivalent).

ECON 6501 [0.5 credit]**PhD Microeconomic Theory I**

Topics include demand, production, general equilibrium, and welfare economics.

Precludes additional credit for ECON 6020 (no longer offered).

ECON 6502 [0.5 credit]**PhD Microeconomic Theory II**

Topics may include game theory, information economics, externalities and public goods.

Precludes additional credit for ECON 6020 (no longer offered).

ECON 6503 [0.5 credit]**PhD Macroeconomic Theory I**

Analysis of dynamic macroeconomic systems, with applications to economic growth. Micro-foundations of modern macroeconomics, with a focus on solving dynamic optimization problems and applied to consumption, portfolio, and investment decisions, and to micro-founded growth models.

Precludes additional credit for ECON 6021 (no longer offered).

ECON 6504 [0.5 credit]**PhD Macroeconomics Theory II**

Modern dynamic stochastic general equilibrium models, such as real-business-cycle models, models of labour-market and financial frictions, and heterogeneous-agent models. Students also learn computational techniques to solve and estimate these models.

Precludes additional credit for ECON 6021 (no longer offered).

ECON 6513 [0.5 credit]**Second Year Research Paper**

This course aids the transition to the research phase of the program. Students complete a research paper and formally present this paper in a departmental workshop. Includes: Experiential Learning Activity

ECON 6514 [0.25 credit]**Thesis Workshop I**

Students present a research proposal that includes an advanced draft of a substantive chapter of their thesis for evaluation by at least three faculty members.

Includes: Experiential Learning Activity

Prerequisite(s): ECON 6013.

ECON 6515 [0.25 credit]**Thesis Workshop II**

Students present a substantial portion of their thesis for evaluation by at least three faculty members. This must include a revised draft of their first substantive chapter of their thesis, and an advanced draft of their second substantive chapter.

Includes: Experiential Learning Activity

Prerequisite(s): ECON 6014.

ECON 6714 [0.5 credit] (ECO 7177, ECO 7577)**Advanced Topics in Econometrics**

Coverage of one or more areas of current econometric research.

Prerequisite(s): ECON 6027 (ECON 6005 if taken before 2012-2013).

ECON 6904 [0.5 credit] (ECO 7980)**Directed Readings**

This course is designed to permit students to pursue research on topics chosen in consultation with faculty members and the Ph.D. Supervisor.

Prerequisite(s): permission of the Department.

ECON 6909 [0.0 credit] (ECO 9999)**Ph.D. Thesis**

Includes: Experiential Learning Activity

Electrical Engineering - Joint (EACJ)

Electrical Engineering - Joint (EACJ) Courses**EACJ 5002 [0.5 credit]****Advanced Channel Coding****EACJ 5003 [0.5 credit]****Fourier Optics****EACJ 5004 [0.5 credit]****Photonics Networks****EACJ 5005 [0.5 credit]****Knowledge-Based Systems**

Includes: Experiential Learning Activity

EACJ 5006 [0.5 credit]**Topics in Electronics I**

EACJ 5007 [0.5 credit]
Topics in Electronics II

EACJ 5008 [0.5 credit]
Sujets choisis en electronique

EACJ 5009 [0.5 credit]
Survivable Optical Networks

EACJ 5100 [0.5 credit]
Machine Vision

EACJ 5101 [0.5 credit]
Directed Studies

EACJ 5102 [0.5 credit]
Intro to Embedded Systems

EACJ 5103 [0.5 credit]
Parallel Processing with VLSI

EACJ 5104 [0.5 credit]
Distributed Database Systems

EACJ 5105 [0.5 credit]
Secure Comm and Data Encryption

EACJ 5106 [0.5 credit]
Stochastic Systems

EACJ 5107 [0.5 credit]
Multimedia Communications

EACJ 5108 [0.5 credit]
Switching and Traffic Theory

EACJ 5109 [0.5 credit]
Stochastic Processes

EACJ 5131 [0.5 credit]
Topics in Electromagnetics

EACJ 5132 [0.5 credit]
Smart Antennas

EACJ 5133 [0.5 credit]
Intro to Mobile Communications

EACJ 5200 [0.5 credit]
Queuing Systems

EACJ 5201 [0.5 credit]
Optical Communications Systems

EACJ 5202 [0.5 credit]
Analysis/Perf Eval: Comp Comm

EACJ 5203 [0.5 credit]
Distributed System Software

EACJ 5204 [0.5 credit]
Virtual Environments
Includes: Experiential Learning Activity

EACJ 5205 [0.5 credit]
Quality Service Mgmt/Multimed

EACJ 5206 [0.5 credit]
Source Coding and Data Compress.

EACJ 5207 [0.5 credit]
Robotics:Control/Sensing/Intel

EACJ 5208 [0.5 credit]
Wireless Ad Hoc Networking

EACJ 5209 [0.5 credit]
Topics in Systems and Control I

EACJ 5211 [0.5 credit]
Software Engineering Proj Mgmt

EACJ 5300 [0.5 credit]
Topics in Systems and Control II

EACJ 5301 [0.5 credit]
Sujets choisis en systemes

EACJ 5303 [0.5 credit]
Health Care Engineering

EACJ 5305 [0.5 credit]
Electromagnetic Compatibility

EACJ 5308 [0.5 credit]
Sujets choisis electromagnetiq

EACJ 5360 [0.5 credit]
Digital Watermarking

EACJ 5369 [0.5 credit]
Internetworking Technologies

EACJ 5384 [0.5 credit]
Network Security and Cryptography

EACJ 5385 [0.5 credit]
Matrix MethodandAlgor Sign Proce

EACJ 5386 [0.5 credit]
Neural Networks and Fuzzy System

EACJ 5401 [0.5 credit]
Electromagnetic Waves

EACJ 5402 [0.5 credit]
Numerical Methods: Electromag

EACJ 5403 [0.5 credit]
Ondes Electromagnetiques

EACJ 5404 [0.5 credit]
Topics in Electromagnetics I

EACJ 5405 [0.5 credit]
Topics in Electromagnetics II

EACJ 5406 [0.5 credit]
Methodes numeriques en genie

EACJ 5500 [0.5 credit]
Digital Comm by Satellite

EACJ 5501 [0.5 credit]
Information Theory

EACJ 5503 [0.5 credit]
Detection and Estimation

EACJ 5504 [0.5 credit]
Error Control Coding

EACJ 5506 [0.5 credit]
Principles of Digital Comm

EACJ 5507 [0.5 credit]
Digital Signal Processing

EACJ 5508 [0.5 credit]
Traitement numer des signaux

EACJ 5509 [0.5 credit]
Image Proc and Image Comm

EACJ 5600 [0.5 credit]
Topics in Signal Processing I

EACJ 5601 [0.5 credit]
Topics in Signal Processing II

EACJ 5603 [0.5 credit]
Topics in Signal Processing 3

EACJ 5605 [0.5 credit]
Topics in Communications I

EACJ 5606 [0.5 credit]
Topics in Communications II

EACJ 5607 [0.5 credit]
Computer-Communication Network

EACJ 5702 [0.5 credit]
Sujets choisis en telecommun

EACJ 5703 [0.5 credit]
Reliable Digital Systems
Includes: Experiential Learning Activity

EACJ 5704 [0.5 credit]
Advanced Digital Communication

EACJ 5705 [0.5 credit]
Digital Logic Design

EACJ 5706 [0.5 credit]
Data Mining and Concept Learning
Also listed as COMP 5706.

EACJ 5709 [0.5 credit]
Neural Networks and Fuzzy System

EACJ 5800 [0.5 credit]
Adaptive Signal Processing

EACJ 5807 [0.5 credit]
Topics in Computers I

EACJ 5808 [0.5 credit]
Topics in Computers II

EACJ 5900 [0.5 credit]
Sujets choisis sur les ordinat

EACJ 7116 [0.5 credit]
Signal Proc: Intr Convex Optim

Electronics (ELEC)

Electronics (ELEC) Courses

Note: The Departments of Electronics and Systems and Computer Engineering offer courses in: Biomedical and Electrical Engineering, Communications Engineering, Computer Systems Engineering, Electrical Engineering, Software Engineering and Engineering Physics.

ELEC 5200 [0.5 credit] (ELG 6320)
Advanced Topics in Integrated Circuits and Devices
Topics vary from year to year.

ELEC 5301 [0.5 credit]
Silicon Photonics
Fundamentals of silicon photonics, advanced electromagnetic theory, guided wave optics, interferometry, silicon-on-insulator (SOI) photonics, silicon based waveguide devices (planar, rib, strip), fabrication of photonic devices, passive and active silicon photonic devices such as modulators, lasers, detectors, silicon opto-electronic integration.

ELEC 5302 [0.5 credit]
Renewable and Distributed Energy Resource Technologies
Topics covered include renewable energy resources, photovoltaic systems, wind generation systems, energy storage units, electric vehicles, grid integration, distributed generation, microgrid, active distribution network, modeling and analysis of power system components, state-of-the-art power system simulation tools.

ELEC 5401 [0.5 credit] (ELG 6341)
Signal Integrity in High-Speed Designs: Modeling and Analysis
Crosstalk, distortion, ground bounce, skin effect. Interconnect modeling/simulation, packages, ground/power planes, Elmore delay, lossy-coupled, frequency-dependent transmission lines, telegraphers equations, extraction, measured parameters, macromodeling: passivity/causality, MoC/MRA, vector fit, model reduction, electromagnetic compatibility/interference, mixed-domain systems, concurrent analysis.
Prerequisites additional credit for ELEC 5704 (ELG 6374).
Prerequisite(s): permission of the Department.

ELEC 5402 [0.5 credit] (ELG 6342)**Introduction to Electronic Design Automation Algorithms and Techniques**

Digital design process; overview of design automation tools/methodologies; theory of computational complexity; layout compaction; placement and partitioning; floorplanning; routing; digital simulation; switch-level simulation; logic synthesis; verification; analog and RF simulation.

Precludes additional credit for ELEC 5704 Section "Y" (ELG 6374 Section "Y").

ELEC 5404 [0.5 credit] (ELG 6344)**Neural Networks for High-Speed/High-Frequency Circuit Design**

Introduction to neural network methodologies for computer-aided design of high-speed/high-frequency circuits, including modeling of passive and active devices/circuits, and their applications in high-level design and optimization in wired and wireless electronic systems.

ELEC 5405 [0.5 credit] (ELG 6340)**Advanced Linear and Nonlinear Circuit Theory and Applications**

Graph theory, incidence matrices, cutset matrices, generalized KCL, topological formulation, state-space equations, Tellegen's theorem, state-transition matrix, multi-port representation, stability, passivity, causality, synthesis of passive circuits, active networks, nonlinear dynamic circuits.

ELEC 5409 [0.5 credit] (ELG 6349)**Microwave and Millimeterwave Integrated Circuits**

Design of communications electronics components with emphasis on GaAs MMIC implementation. Overview of MESFET, HEMT, HBT device modeling. Integrated lumped/ distributed passive element modeling. Broadband impedance matching. Design of direct-coupled amplifiers, distributed amplifiers, power devices and amplifiers, phase shifters, switches, attenuators, mixers, oscillators.

ELEC 5501 [0.5 credit] (ELG 6351)**Passive Microwave Circuits**

Characteristics of homogeneous and inhomogeneous transmission lines and waveguides. Planar transmission lines: stripline, microstrip, coplanar line, slotline. Coupled transmission lines. Modeling of discontinuities. Ferrite components. Microwave network analysis: s-parameters, CAD models. Design of impedance-matching networks, directional couplers, power splitters, filters. Applications in MICs and MMICs.

ELEC 5502 [0.5 credit] (ELG 6352)**Analog Integrated Filters**

The fundamentals and details of analog continuous-time and SAW filters. Comparison to switched-capacitor filters. Review of filter concepts, types of filters, approximations, transformations. Building blocks such as op amps, transconductance amplifiers, and gyrators. Design using cascaded second-order sections, multiple loop feedback and LC ladder simulations.

ELEC 5503 [0.5 credit] (ELG 6353)**Radio Frequency Integrated Circuit Design**

Integrated radio front-end component design. Overview of radio systems, frequency response, gain, noise, linearity, intermodulation, image rejection, impedance matching, stability, and power dissipation. Detailed design of low-noise amplifiers, mixers, oscillators and power amplifiers. Use of on-chip inductors and baluns. Process variations, parasitics, and packaging.

ELEC 5504 [0.5 credit] (ELG 6354)**Analysis of High-Speed Electronic Packages and Interconnects**

Introduction to modeling, simulation and optimization of high-speed VLSI packages; models for packages, interconnects and ground/power planes; lumped, distributed and EM models for interconnects; delay, crosstalk and switching noise; moment matching techniques; concurrent thermal/electrical analysis of IC packages and boards.

ELEC 5506 [0.5 credit] (ELG 6356)**Simulation and Optimization of Electronic Circuits**

Introduction to computer simulation and optimization of electrical circuits. Time- and frequency-domain formulations for sensitivity analysis and optimization. Optimization techniques for performance-, cost- and yield-driven design of electronic circuits. Optimization approaches to modeling and parameter extraction of active and passive elements.

ELEC 5508 [0.5 credit] (ELG 6358)**Computer Methods for Analysis and Design of VLSI Circuits**

Formulation of circuit equations. Sparse matrix techniques. Frequency and time-domain solutions. Relaxation techniques and timing analysis. Noise and distortion analysis. Transmission line effects. Interconnect analysis and crosstalk simulation. Numerical inversion techniques. Asymptotic waveform estimation. Mixed frequency/time domain techniques. Sensitivity analysis.

ELEC 5509 [0.5 credit] (ELG 6359)**Integrated Circuit Technology**

Survey of technology used in silicon VLSI integrated circuit fabrication. Crystal growth and crystal defects, oxidation, diffusion, ion implantation and annealing, gettering, CVD, etching, materials for metallization and contacting, and photolithography. Structures and fabrication techniques required for submicron MOSFETs. Applications in advanced CMOS processes.

ELEC 5600 [0.5 credit] (ELG 6360)**Digital Integrated Circuit Testing**

Production testing of digital integrated circuits. Outline of methods of testing used in production. Testing schemes and design for testability. Faults and fault models, yield estimates, testability measures, fault simulation, test generation methods, sequential testing, scan design, boundary scan, built-in self test, CMOS testing.

ELEC 5602 [0.5 credit] (ELG 6362)**Microwave Semiconductor Devices and Applications**

Theory of operation for microwave diodes (varactor, p-i-n, Gunn, IMPATT) and transistors (BJT, MESFET, HBT, HEMT). Small-signal, large-signal, and noise models for CAD. Diode oscillators and reflection amplifiers. Design of transistor oscillators and amplifiers. Discussion of technology/fabrication issues and MMIC applications.

ELEC 5604 [0.5 credit] (ELG 6364)**Radar Systems**

Fundamentals; range equation, minimum detectable signal, radar cross-section, pulse repetition frequency, range ambiguities. Radar classes: CW, FM-CW, MTI, tracking, air surveillance, SSR, PAR, MLS, SAR, SLAR, OTH, 3D and bistatic radars. Radar subsystems; transmitters, antennas, receivers, processors, displays, detection criteria; CFAR receivers, noise, clutter precipitation.

ELEC 5605 [0.5 credit] (ELG 6365)**Optical Fibre Communications**

Transmission characteristics of and design considerations for multi-mode and single-mode optical fibre waveguides; materials, structures, and device properties of laser light sources; properties and performance of p-i-n and avalanche photodiodes; types of optical fibre signal formats, preamplifier topologies, noise, receiver sensitivity, transmitter design, link design.

ELEC 5606 [0.5 credit] (ELG 6366)**Phase-Locked Loops and Receiver Synchronizers**

Phase-locked loops; components, fundamentals, stability, transient response, sinusoidal operation, noise performance, tracking, acquisition and optimization. Receiver synchronizers: carrier synchronizers including squaring loop, Costas loop, and remodulator for BPSK, QPSK BER performance; clock synchronizers including early-late gate, in-phase/midphase, and delay line multiplier.

ELEC 5607 [0.5 credit] (ELG 6367)**Fundamentals of Antenna Engineering**

Basic properties of antennas (gain, radiation patterns, polarization, antenna temperature). Analysis of common antennas (dipoles, loops, helices, aperture antennas, microstrip, dielectric resonator antennas, reflectors). Analysis and design of linear and planar arrays (array factors, beam scanning, amplitude weighting, feed networks).

ELEC 5608 [0.5 credit] (ELG 6368)**Fourier Optics**

The theory and applications of diffractive and non-diffractive coherent optics, with emphasis on holograms, tomography and high-speed optical computing. Mathematical basis: generalized 2-D Fourier transforms, transfer function of an optical system, 2-D sampling theory, Helmholtz equation, Green's theorem, and the classical diffraction theories.

ELEC 5609 [0.5 credit] (ELG 6369)**Nonlinear Microwave Devices and Effects**

The physical basis and mathematical modeling of a variety of microwave/millimeter-wave devices, (some of which exhibit the most extreme nonlinear behaviour known), how they can be exploited in practical circuits and systems, and how the resulting device/circuit interactions can be analyzed.

ELEC 5701 [0.5 credit] (ELG 6371)**Fibre and Waveguide Components for Communications and Sensors**

Optical wave propagation in dielectric waveguides. Theory and practice for passive photonic devices used for routing, filtering, and signal processing, including structural and biochemical sensors. Directional couplers and splitters, filters (gratings and etalons), Mach-Zehnder interferometers, Arrayed waveguide gratings, and dispersion compensators.

ELEC 5702 [0.5 credit] (ELG 6372)**Principles of Photonics**

Electromagnetic wave propagation in crystals; review of geometric optics; Gaussian beam propagation; optical fibres; dielectric waveguides for optical integrated circuits; optical resonators; optical properties of materials; theory of laser oscillation; specific laser systems; electro-optic modulators; photorefractive materials and applications; holography; optical interconnects.

ELEC 5703 [0.5 credit] (ELG 6373)**Advanced Topics in Solid State Devices and IC Technology**

Recent and advanced topics in semiconductor device physics, modeling, and integrated circuit fabrication technology. Topic varies from year to year according to departmental research interests. Students may be expected to contribute lectures or seminars on selected topics.

ELEC 5704 [0.5 credit] (ELG 6374)**Advanced Topics in CAD**

Recent and advanced topics in computer-aided techniques for the design of VLSI and telecommunications circuits. Topics will vary from year to year according to the departmental research interests. Students may be expected to contribute lectures or seminars on selected topics.

ELEC 5705 [0.5 credit] (ELG 6375)**Advanced Topics in VLSI**

Recent and advanced topics in the design of very large scale integrated circuits, with emphasis on mixed analog/digital circuits for telecommunications applications. Topic varies from year to year according to departmental research interests. Students may be expected to contribute lectures or seminars on selected topics.

ELEC 5706 [0.5 credit] (ELG 6376)**Submicron CMOS and BiCMOS Circuits for Sampled Data Applications**

The analog aspects of digital CMOS and BiCMOS circuit design in submicron technologies including reliability; sampled analog circuits, including amplifier non-ideal characteristics and switch charge injection; CMOS/ BiCMOS amplifier design considerations, leading up to standard folded-cascode and two-stage circuits.

ELEC 5707 [0.5 credit] (ELG 6377)**Microsensors and MEMS**

Physical design of microelectromechanical systems (MEMS) and microfabricated sensors and actuators. An overview of thin and thick film processes and micromachining techniques will provide fabrication background. Device design including piezoresistive, piezoelectric, electromagnetic, thermal, optical, and chemical sensors and actuators.

ELEC 5708 [0.5 credit] (ELG 6378)**ASICs in Telecommunications**

Introduction to modern ASIC technologies for Telecom. Review of circuit-level building blocks for typical wireline and wireless applications, including power/performance tradeoffs. Corresponding FPGA analog and digital IO circuits are discussed. A topical literature study and circuit level design exercises.

ELEC 5709 [0.5 credit] (ELG 6379)**Advanced Topics in Electromagnetics**

Recent and advanced topics in electro-magnetics, antennas, radar systems, microwave devices and circuits, or optoelectronics. The subject material will vary from year to year according to research interests in the department and/or expertise provided by visiting scholars or sessional lecturers.

ELEC 5800 [0.5 credit] (ELG 6380)**Theory of Semiconductor Devices**

Equilibrium and non-equilibrium conditions in a semiconductor. Carrier transport theory. Physical theory of basic semiconductor device structures and aspects of design: PN junctions and bipolar transistors, field effect devices. Current transport relationships for transistors. Charge control theory. Modeling of device mechanisms. Performance limitations of transistors.

ELEC 5801 [0.5 credit] (ELG 6381)**High-Speed and Low-Power VLSI**

High-Speed and Low-Power CMOS VLSI circuit techniques. Low and high levels of abstraction; transistor, switch, logic-gate, module, system levels. State-of-the-art techniques to optimize the performance and energy consumption of a circuit. One or more of these techniques are used in a design project.

Prerequisite(s): ELEC 4708 or ELEC 5804 or the equivalent or permission of the instructor.

ELEC 5802 [0.5 credit] (ELG 6382)**Surface-Controlled Semiconductor Devices**

Fundamentals of the MOS system; MOS capacitors. Long channel behaviour: theory, limitations and performance of the SPICE level 1 and 2 models. Small geometry effects. Subthreshold operation and modeling. Hot electron effects and reliability.

ELEC 5803 [0.5 credit] (ELG 6383)**Behavioural Synthesis of ICs**

Various topics related to computer analysis and synthesis of VLSI circuits including: logic synthesis, finite state machine synthesis, design methodologies, design for reuse, testing, common VLSI functions, a review of Verilog.

Prerequisite(s): Some IC design knowledge such as given in ELEC 4708.

ELEC 5804 [0.5 credit] (ELG 6384)**VLSI Design**

IC design course with strong emphasis on design methodology, to be followed by ELEC 5805 (ELG 6385) in the second term. Design philosophies considered will include Full Custom design, standard cells, gate-arrays and sea-of-gates using CMOS and BiCMOS technology. State-of-the-art computer-aided design tools are used.

ELEC 5805 [0.5 credit] (ELG 6385)**VLSI Design Project**

Using state-of-the-art CMOS and BiCMOS technologies, students will initiate their own design of an integrated circuit using tools in the CAD lab and submit it for fabrication where the design warrants.

ELEC 5808 [0.5 credit] (ELG 6388)**Signal Processing Electronics**

CCDs, transversal filters, recursive filters, switched capacitor filters, with particular emphasis on integration of analog signal processing techniques in monolithic MOS ICs. Detailed op amp design in CMOS technology. Implications of nonideal op amp behaviour in filter performance. Basic sampled data concepts.

ELEC 5809 [0.5 credit] (ELG 6389)**Nonlinear Electronic Circuits**

Introduction to non-linear circuits used in today's telecommunications ICs; CMOS non-linear circuits such as direct-RF-sampling mixers, phase-detectors; digital loop-filters, DCOs, frequency synthesizers and clock-and-data-recovery are introduced. Modeling of these non-linear circuits and existing options for simulations and closed form circuit analysis is presented.

Precludes additional credit for ELEC 5705 (ELG 6375).

Prerequisite(s): permission of the Department.

ELEC 5900 [0.5 credit] (ELG 6389)**Engineering Project I**

A one-term course, carrying 0.5 credit, for students pursuing the course work M.Eng. program. An engineering study, analysis and/or design project under the supervision of a faculty member. Written and oral reports are required. This course may be repeated for credit.
Includes: Experiential Learning Activity

ELEC 5901 [1.0 credit] (ELG 6389)**Engineering Project II**

A one-term course, carrying full-course credit, for students pursuing the course work or co-op M.Eng. program. An engineering study, analysis and/or design project under the supervision of a faculty member. Written and oral reports are required. This course may be repeated for credit.
Includes: Experiential Learning Activity

ELEC 5906 [0.5 credit] (ELG 6389)**Directed Studies**

Various possibilities exist for pursuing directed studies on topics approved by a course supervisor, including the above listed course topics where they are not offered on a formal basis.

ELEC 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

ELEC 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

English (ENGL)

English (ENGL) Courses**ENGL 5002 [0.5 credit]****Studies in Theory I**

Selected topics in literary and cultural theory.

ENGL 5004 [0.5 credit]**Studies in Transnational Literatures**

Topics in transnational, diaspora and postcolonial literatures and theory. Topics vary from year to year.

ENGL 5005 [0.5 credit]**M.A. Seminar**

Examines topics such as research resources and methodologies, current issues in literary theory and professional concerns. Graded Satisfactory/Unsatisfactory.

ENGL 5006 [0.5 credit]**Studies in Theory II**

Selected topics in literary and cultural theory.

ENGL 5007 [0.5 credit]**Studies in Indigenous Literatures**

Selected texts of Indigenous literature and culture. Topics may vary from year to year.

ENGL 5008 [0.5 credit]**Studies in African Literature**

Selected texts of African literature and culture. Topics may vary from year to year.

ENGL 5009 [0.5 credit]**Studies in South Asian Literature**

Selected texts of South Asian literature and culture. Topics vary from year to year and may be organized by theme, author, or genre.

ENGL 5010 [0.5 credit]**Studies in Caribbean Literature**

Topics in Caribbean literatures and theory. Topics vary from year to year.

ENGL 5101 [0.5 credit]**Historical Linguistics: English**

A theory-intensive course that will study the development of English starting with Proto-Indo-European progressing through Common Germanic to the stages of English itself. Topics include phonological sound changes, phonemic inventories, and morphological and syntactic typology. Also listed as LING 5802.
Also offered at the undergraduate level, with different requirements, as LING 4802, for which additional credit is precluded.

ENGL 5120 [0.5 credit]**Book Arts Workshop**

This course immerses graduate students in the practical arts and histories of book production. At least part of the course will take place in the Book Arts Lab in MacOdrum Library, where students will acquire skills in printing, bibliography, and/or bookmaking.
Includes: Experiential Learning Activity

ENGL 5207 [0.5 credit]**Studies in Old English**

Topics in the early medieval period. Topics vary from year to year and may include Old English, Old Norse, Latin texts in translation, or pre-Chaucerian texts.

ENGL 5208 [0.5 credit]**Studies in Middle English Literature**

Studies in the literature and culture of England between 1100 and 1550. Topics vary from year to year and may include texts in Middle English, French and/or Latin (French and Latin texts are usually studies in translations).

ENGL 5303 [0.5 credit]**Studies in Early Modern Literature I**

A study of early modern authors, texts, and problems. Topics may vary from year to year.

ENGL 5305 [0.5 credit]**Studies in Early Modern Literature II**

A study of early modern authors, texts, and problems. Topics will vary from year to year.

ENGL 5402 [0.5 credit]
Studies in Eighteenth-Century Literature
Selected texts of eighteenth-century literature and culture. Topics may vary from year to year.

ENGL 5408 [0.5 credit]
Studies in Romanticism
Selected texts of Romantic literature and culture. Topics vary from year to year and may be organized by theme, author or genre.

ENGL 5501 [0.5 credit]
Studies in Nineteenth-Century Literature I
Selected readings in nineteenth-century British literature and culture. Topics vary from year to year and may be organized by theme, author, and/or genre.

ENGL 5503 [0.5 credit]
Studies in Nineteenth-Century Literature II
Selected readings in nineteenth-century British literature and culture. Topics vary from year to year and may be organized by theme, author, and/or genre.

ENGL 5606 [0.5 credit]
Studies in Twentieth-Century Literature
Selected texts of twentieth-century literature and culture. Topics may vary from year to year.

ENGL 5608 [0.5 credit]
Studies in Modernism
Special topics in studies in modernism will vary from year to year.

ENGL 5609 [0.5 credit]
Studies in American Literature I
Selected texts of American literature and culture. Topics may vary from year to year.

ENGL 5610 [0.5 credit]
Studies in Contemporary Literature I
Selected texts of contemporary literature and culture. Topics may vary from year to year.

ENGL 5611 [0.5 credit]
Studies in Contemporary Literature II
Selected texts of contemporary literature and culture.

ENGL 5708 [0.5 credit]
Studies in American Literature II
Topic may vary from year to year.

ENGL 5804 [0.5 credit]
Studies in Canadian Literature I
Topics vary from year to year and may include issues of genre, selected themes, literary movements, or developments in theory.

ENGL 5806 [0.5 credit]
Studies in Canadian Literature II
Topics vary from year to year and may include issues of genre, selected themes, literary movements, or developments in theory.

ENGL 5900 [0.5 credit]
Selected Topic in English Studies I
Topic may vary from year to year.

ENGL 5901 [0.5 credit]
Selected Topic in English Studies II
Topic may vary from year to year.

ENGL 5908 [1.0 credit]
Research Essay
Includes: Experiential Learning Activity

ENGL 5909 [2.0 credits]
M.A. Thesis
Includes: Experiential Learning Activity

ENGL 6002 [0.5 credit]
Proseminar
Exploration of recent critical theory and discussion of issues related to the profession. Graded SAT/UNSAT.

ENGL 6003 [0.5 credit]
Theories and Foundations in the Production of Literature
Survey of foundational theoretical texts from the fields of book history, manuscript and print cultural studies, media studies, and cultural theory.

ENGL 6004 [0.5 credit]
Approaches to the Production of Literature
With a focus on one or more approaches, this course studies how literary and cultural production are shaped by economic, historical, institutional, sociological, legal, and technological forces.

ENGL 6101 [0.5 credit]
Directed Reading
This tutorial is designed to permit students to pursue individual research. Topics will be chosen in consultation with at least one faculty member and the graduate supervisor.

ENGL 6102 [0.5 credit]
Studies in the Production of Literature
Explores selected studies/themes related to the production of literature.

ENGL 6103 [0.5 credit]
Selected Topics in the Production of Literature
Selected topics/themes related to the production of literature.

ENGL 6900 [1.0 credit]
Comprehensive Examination
This examination will include a range of topics related to the production of literature as a material object, as an institutional site or practice, and as an enabling concept. One four-hour written exam, and one week later, a one-to-two hour oral exam.

ENGL 6902 [0.5 credit]**Dissertation Proposal**

The dissertation proposal is approved by the student's dissertation committee and defended at an oral examination. The dissertation proposal is completed after the comprehensive examination requirement has been satisfied. Graded SAT/UNS.

Includes: Experiential Learning Activity

ENGL 6909 [0.0 credit]**Thesis**

Includes: Experiential Learning Activity

Environmental Engineering (ENVE)

Environmental Engineering (ENVE) Courses**ENVE 5001 [0.5 credit] (CVG 7160)****Biofilm Processes**

Physical, chemical properties, microbial ecology of biofilms. Biofilm processes, attachment, growth, sloughing. Transport and interfacial transfer phenomena; mass transfer models, mass transport in biofilms, deposition of solids. Modeling biofilm systems; species models, mass balance equations, boundary conditions, moving boundary problem, analytical and numerical solutions.

ENVE 5003 [0.5 credit] (EVG 7143)**Advanced Ultraviolet Processes**

Fundamentals and applications of ultraviolet (UV) light-based processes for water and wastewater treatment; principles of photochemistry and photobiology, methods of UV dose determination, UV disinfection of microorganisms, advanced oxidation processes, and design of UV disinfection systems and reactors.

ENVE 5004 [0.5 credit] (EVG 7144)**Advanced Wastewater Treatment**

Fundamentals, applications, and design of biological, physical, and chemical treatment processes employed for advanced treatment of domestic and industrial wastewater. Reuse applications and guidelines.

ENVE 5007 [0.5 credit]**Filtration and Membranes in Water Treatment**

Filtration is a key process for removal of contaminants from water sources. This course discusses various filtration processes including slow sand filtration, conventional filtration, biological filtration, and low and high pressure membrane applications in a lecture and seminar format. Previous water related course knowledge expected.

ENVE 5101 [0.5 credit] (EVG 7101)**Air Pollution Control**

Air quality and pollution; definitions, measurement and monitoring methods. Criteria pollutants, air toxics, particulate matter, secondary pollutants. Pollutant formation mechanisms. Major sources and control methods. Meteorology and principles of dispersion modeling. Principles of receptor modeling. Indoor air quality.

Also offered at the undergraduate level, with different requirements, as ENVE 4003, for which additional credit is precluded.

ENVE 5102 [0.5 credit] (EVG 7161)**Traffic-Related Air Pollution**

Pollutant formation, emission characterization, emission control technology and emission modeling from motor vehicles. Dispersion and receptor modeling for conservative pollutants in urban microenvironments. Personal exposure and health risk assessment.

ENVE 5103 [0.5 credit] (EVG 7162)**Air Quality Modeling**

Dispersion modeling for simple and complex sources and complex terrain. Physical and chemical transformations for pollutants in the atmosphere. Urban and regional air pollution modeling for reactive pollutants. The urban air shed model. Regional air quality modeling case studies.

ENVE 5104 [0.5 credit] (EVG 7104)**Indoor Environmental Quality**

Indoor environmental quality (air quality, thermal, visual, and acoustic comfort); physical and chemical parameters for characterization. Types and sources of indoor air pollution and discomfort; measurement techniques. Heating, ventilation, air conditioning, lighting practices and issues. Modeling of and design for indoor environmental quality.

ENVE 5105 [0.5 credit] (EVG 7105)**Atmospheric Aerosols**

Atmospheric aerosol characterization and size distribution, theoretical fundamentals of physical and chemical processes that govern formation and transformation of aerosols in the atmosphere such as nucleation, coagulation, condensation/evaporation, and aerosol thermodynamics; interactions between aerosols and climate, aerosol sampling and measurement.

ENVE 5106 [0.5 credit] (EVG 7106)**Atmospheric Chemical Transport Modelling**

Fundamentals of Eulerian atmospheric modelling; overview of global and regional atmospheric models, basic principles of numerical methods used in air quality models; applications of air quality models; uncertainty and sensitivity analysis in air quality modelling.

ENVE 5200 [0.5 credit] (EVG 7200)**Climate Change and Engineering**

Survey of the physical science of climate change, impacts on the built environment, and climate adaptation in engineering. Greenhouse gases, global warming, paleoclimatology, and Earth system responses. Climate change impacts on structural, water, transportation, and energy systems. Climate vulnerability assessment, examples of design adaptation.

Also offered at the undergraduate level, with different requirements, as ENVE 4200, for which additional credit is precluded.

ENVE 5201 [0.5 credit] (EVG 7201)**Geo-Environmental Engineering**

Landfill design; hydrogeologic principles, water budget, landfill liners, geosynthetics, landfill covers, quality control and quality assurance, clay/leachate interaction, composite liner design and leachate collection systems. Landfill operation, maintenance and monitoring. Design of environmental control and containment systems; slurry walls, grout curtains, Case studies.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as ENVE 4002, for which additional credit is precluded.

ENVE 5203 [0.5 credit] (EVG 5203)**Hazardous and Radioactive Wastes**

Classification of hazardous, radioactive and mixed wastes, hazardous waste treatment processes, wastes generated in the nuclear fuel cycle, radioactive waste classification, radioactive waste treatment and management of residuals, engineered systems for long-term isolation and disposal, mixed waste management.

Also offered at the undergraduate level, with different requirements, as ENVE 4101, for which additional credit is precluded.

ENVE 5204 [0.5 credit] (EVG 7134)**Resource Industry Waste Management**

Application of geotechnique and hydraulics to management of resource extraction residuals such as tailings, waste rock, and sludge from hard rock mines and bitumen extraction operations. Geotechnique of conventional and high density tailings disposal. Pipeline transport of concentrated suspensions. Closure technologies for mine waste impoundments.

ENVE 5205 [0.5 credit] (EVG 7132)**Sludge Treatment and Disposal**

Aspects of sludge treatment, management, and disposal; sludge generation and characterization, thickening, preliminary treatment processes, aerobic and anaerobic digestion, lime stabilization, conditioning, dewatering, composting, land application and other disposal options, and thermal processes.

ENVE 5301 [0.5 credit] (EVG 7301)**Contaminant Hydrogeology**

Theory of flow through porous media; soil characterization, soil properties, anisotropy, heterogeneity. Contaminant transport. Well hydraulics and pump tests. Introduction to numerical modeling; finite difference, finite elements, conceptual model, boundary conditions. Site remediation and remediation technologies.

Also offered at the undergraduate level, with different requirements, as ENVE 4006, for which additional credit is precluded.

ENVE 5302 [0.5 credit] (EVG 7163)**Case Studies in Hydrogeology**

Development of a conceptual model; chemistry, geology and hydrology, site characterization, initial and boundary conditions. Application of industry-recognized computer codes to model flow and contaminant transport at a particular site. Evaluation of remedial alternatives at a site. Modeling of the more common remediation technologies. Includes: Experiential Learning Activity

ENVE 5303 [0.5 credit] (EVG 7303)**Multiphase Flow in Soils**

Theory of unsaturated flow and multiphase flow; capillary pressure-saturation relationships, relative permeability relationships, wettability, hysteresis, fluid entrapment, residual saturations, governing equations for flow and transport. Richard's Equation for unsaturated flow. Modeling of multiphase flow.

ENVE 5402 [0.5 credit] (EVG 7402)**Finite Elements in Field Problems**

Use of Galerkin and Ritz finite element formulations to solve one and two dimensional field problems. Steady state and time-dependent phenomena involving heat transfer, fluid flow, diffusion, and dispersion with emphasis on practical applications. Basic knowledge of third year-level undergraduate engineering mathematics and physics required.

Also listed as CIVE 5107.

ENVE 5701 [0.5 credit] (EVG 7001)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5702 [0.5 credit] (EVG 7002)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5703 [0.5 credit] (EVG 7003)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5704 [0.5 credit] (EVG 7004)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5705 [0.5 credit] (EVG 7005)**Topics in Environmental Engineering**

Courses in special topics in environmental engineering not covered by other graduate courses.

ENVE 5800 [0.0 credit] (EVG 7305)**Master's Seminar**

M.A.Sc. and M.Eng (project option) students in the Environmental Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

Registration in the course should be in the term that the presentation will take place.

ENVE 5900 [1.0 credit] (EVG 6001)**Environmental Engineering Project**

Students enrolled in the M.Eng. program by course work will conduct an engineering study, analysis, or design project under the general supervision of a member of the Department.

Includes: Experiential Learning Activity

ENVE 5906 [0.5 credit] (EVG 6108)**Directed Studies 1**

Precludes additional credit for CIVE 5906.

Prerequisite(s): open only to students in an Environmental Engineering Master's program.

ENVE 5909 [2.5 credits] (EVG 7999)**Master's Thesis**

Includes: Experiential Learning Activity

ENVE 6906 [0.5 credit] (EVG 6109)**Directed Studies 2**

Precludes additional credit for CIVE 6906.

Prerequisite(s): open only to students in the Environmental Engineering Ph.D. program.

ENVE 6909 [0.0 credit] (EVG 9999)**Ph.D. Thesis**

Includes: Experiential Learning Activity

ENVE 7800 [0.5 credit] (EVG 6109)**Ph.D. Seminar**

Ph.D. students in the Environmental Engineering program are required to participate in these seminar series by attending all seminars and making at least one presentation during their graduate studies.

Registration in the course should be in the term that the presentation will take place.

Environmental Engineering - Joint (ENVJ)

Environmental Engineering - Joint (ENVJ) Courses

ENVJ 5001 [0.5 credit] (EVG 5001)**Biofilm Processes in Wastewater Treatment**

Lecture

ENVJ 5105 [0.5 credit] (CHG 8132)**Adsorption Separation Process****ENVJ 5182 [0.5 credit] (EVG 5182)****Water Resources Management**

Also listed as CIVJ 5182.

ENVJ 5183 [0.5 credit] (EVG 5183)**Mixing and Transport in Water Bodies****ENVJ 5212 [0.5 credit]****Climate Change Impacts on Water Resources****ENVJ 5301 [0.5 credit] (EVG 5301)****Soil and Water Conservation Engineering****ENVJ 5302 [0.5 credit] (EVG 5302)****Decentralized Wastewater Management****ENVJ 5304 [0.5 credit] (CHG 8158)****Porous Media****ENVJ 5502 [0.5 credit] (CHG 8192)****Membranes in Clean Processes****ENVJ 5503 [0.5 credit]****Reverse Osmosis****ENVJ 5504 [0.5 credit] (CHG 8194)****Membrane Liquid Separation Processes and Materials****ENVJ 5505 [0.5 credit] (CHG 8195)****Advanced Numerical Methods in Chemical and Biological Engineering**

Includes: Experiential Learning Activity

ENVJ 5507 [0.5 credit] (CHG 8196)**Interfacial Phenomena in Engineering****ENVJ 5700 [0.5 credit] (EVG 5139)****Environmental Assessment of Civil Engineering Projects****ENVJ 5900 [0.5 credit] (EVG 5130)****Wastewater Treatment Process Design****ENVJ 5901 [0.5 credit] (EVG 5132)****Unit Operations of Water Treatment****ENVJ 5902 [0.5 credit] (EVG 5138)****Advanced Water Treatment****ENVJ 5903 [0.5 credit] (EVG 5331)****Sludge Utilization and Disposal****ENVJ 5905 [0.5 credit] (EVG 5137)****Water and Wastewater Treatment Process Analysis****ENVJ 5906 [0.5 credit] (EVG 5133)****Solid Waste Management****ENVJ 5907 [0.5 credit] (EVG 5134)****Chemistry for Environmental Engineering**

ENVJ 5908 [0.5 credit] (EVG 5179)
Anaerobic Digestion

ENVJ 5909 [0.5 credit]
Biological Nutrient Removal

ENVJ 6002 [0.5 credit]
Sludge Processing, Utilization

ENVJ 6300 [0.5 credit] (EVG 6300)
Special Topics in Environmental Engineering

ENVJ 6301 [0.5 credit] (EVG 6301)
Special Topics in Environmental Engineering

ENVJ 6302 [0.5 credit] (EVG 6302)
Special Topics in Environmental Engineering

ENVJ 6303 [0.5 credit] (EVG 6303)
Special Topics in Environmental Engineering

ENVJ 6304 [0.5 credit] (EVG 6304)
Special Topics in Environmental Engineering

ENVJ 8191 [0.5 credit] (CHG 8191)
Selected Topics in Chemical Engineering

Epidemiology (EPIJ) - Joint Courses

Epidemiology - Joint (EPIJ) Courses

EPIJ 5240 [0.5 credit] (EPI 5240)
Epidemiology

EPIJ 5241 [0.5 credit] (EPI 5241)
Epidemiology II

EPIJ 5330 [0.5 credit] (EPI 5330)
Vital and Health Statistics

EPIJ 5340 [0.25 credit] (5340)
Epidemiological Methods
Major principles of study design and analysis: validity in epidemiologic studies; precision and statistics in epidemiology studies; confounding; additive and multiplicative interaction; stratified analysis; regression models; regression modeling; bias analysis; analytical strategy.
Includes: Experiential Learning Activity
Prerequisite(s): EPI 5240, (EPI 5242 or MAT 5375).

EPIJ 5344 [0.25 credit] (EPI 5344)
Survival Analysis in the Health Sciences
Types of survival data. Hazard function and its links to incidence rate/density. Nonparametric analysis including actuarial life tables, Kaplan-Meier method and log-rank test. Proportional hazards (Cox regression) modeling. Methods for time varying covariates and non-proportional hazards. SAS software for hands-on modeling.
Includes: Experiential Learning Activity
Prerequisite(s): EPI 5340.

EPIJ 5345 [0.25 credit] (EPI 5340)
Applied Logistic Regression
Foundation of model estimation: maximum likelihood; modeling dichotomous outcome (dependent) variables: logistic regression; logistic models with several independent variables; interpretation of model parameters; model-building strategies; assessing the fit of the model; regression diagnostics. Classes will include hands-on modeling examples using SAS statistical software.
Includes: Experiential Learning Activity
Prerequisite(s): EPI 5340.

EPIJ 5346 [0.25 credit] (EPI 5346)
Applied Longitudinal and Clustered Data Analysis
Introduction to longitudinal (repeated measures) and clustered data and overview of regression models for correlated data; linear mixed effects models: modelling the mean; modelling the covariance structure; generalized estimating equations and generalized linear mixed effects models; regression diagnostics; missing data and drop-out; case studies.
Includes: Experiential Learning Activity
Prerequisite(s): EPI 5340.

EPIJ 6178 [0.5 credit] (EPI 6178)
Clinical Trials

EPIJ 6278 [0.5 credit] (EPI 6278)
Advanced Clinical Trials

Ethics and Public Affairs (EPAF)

Ethics and Public Affairs (EPAF) Courses

EPAF 5000 [0.5 credit]
Topics in Ethics and Public Affairs
Students prepare for and attend a series of guest lectures, submitting in writing a critical analysis of some aspect of the presentation or discussion for each lecture they attend.

EPAF 5100 [0.5 credit]
Supervised Research Tutorial
On a particular public issue, students identify ethical concerns and a range of evidence-based and values-based arguments for alternative policy options, assessing the comparative strength of those arguments.
Includes: Experiential Learning Activity
Prerequisite(s): EPAF 6100.

EPAF 5200 [0.5 credit]
Ethics in Organizations
A seminar on proactive approaches to ethical issues in organizations including design and implementation of ethics programs based on research in ethics and social science.

EPAF 5300 [0.5 credit]
Values-based Deliberation
A seminar exploring examples of civic and government dialogues on public issues, in light of theoretical foundations of deliberative dialogue.

EPAF 5500 [0.5 credit]**Practicum**

Students gain experience doing ethics-related work in government, business, civil society, or consulting. Students report on their work as required, and their performance is graded satisfactory or unsatisfactory. Includes: Experiential Learning Activity

EPAF 5800 [0.0 credit]**Workshop**

This workshop provides opportunities for gaining practical knowledge about academic and professional work in ethics and public affairs, through sharing experience among new students, advanced students, faculty, and guest speakers. Continued registration in each year of the EPAF programs is recommended but not required. Prerequisite(s): Enrollment in Ethics and Public Affairs programs.

EPAF 6000 [0.5 credit]**Ethical Concerns in Public Affairs**

A tutorial in which students identify the range of ethical concerns raised by a particular public issue chosen by the student.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in the Ph.D. Ethics and Public Affairs program.

EPAF 6100 [1.0 credit]**Public Reason I**

A seminar on the nature and limits of public reason, with application to a particular public issue chosen by the instructors. Normative concepts and theories of ethics and political philosophy will be studied as relevant to that issue.

EPAF 6200 [1.0 credit]**Public Reason II**

A seminar continuing from Public Reason I, with application to a different public issue, which makes relevant a different set of normative concepts and theories of ethics and political philosophy.

Prerequisite(s): EPAF 6100.

EPAF 6600 [0.5 credit]**Theory Examination**

Ph.D. comprehensive examination on main works and approaches in ethics and political philosophy.

EPAF 6700 [0.5 credit]**Area Examination**

Ph.D. comprehensive examination on main works and approaches concerning the public issue on which the student wishes to conduct dissertation research, including relevant social science, ethics, and political philosophy.

EPAF 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

European, Russian, Eurasian Studies (EURR)

European and Russian Studies (EURR) Courses**EURR 5001 [0.5 credit]****Interdisciplinary Seminar in European, Russian and Eurasian Studies**

Current debates and methodological approaches within various academic disciplines relating to Europe, Russia, and Eurasia.

Prerequisite(s): permission of the Institute or enrolment in the EURUS program.

EURR 5002 [0.5 credit]**Post-Soviet States and Societies**

The relationship between social forces and state structures at both the national and local levels in the USSR and the post-soviet states.

Also listed as PSCI 5110.

Also offered at the undergraduate level, with different requirements, as EURR 4002, PSCI 4502, for which additional credit is precluded.

EURR 5003 [0.5 credit]**Social and Political Perspectives in Europe**

Social issues and policies in the European Union including European identity, democratic legitimacy, nationalist and extremist political movements, Euroscepticism, migration and immigration, social inclusion/exclusion and social models, gender and family policy, regional differentiation.

Also offered at the undergraduate level, with different requirements, as EURR 4003, for which additional credit is precluded.

EURR 5008 [0.5 credit]**Nationalism and Ethnic Conflict in Eastern and Central Europe**

Ethnic basis of nationalism in the region. Ethnic politics and trends.

Precludes additional credit for EURR 4008.

EURR 5010 [0.5 credit]**Research Design and Methodology in European, Russian and Eurasian Studies**

Examination of various issues in research design and methodology, with examples from the academic literature. Discussion of student research proposals.

Includes: Experiential Learning Activity

Precludes additional credit for EURR 5200 (no longer offered) and EURR 5300 (no longer offered).

EURR 5100 [0.5 credit]**Nation-Building in Central and Eastern Europe**

Processes of nation-building in the region examined in terms of a particular country, or set of countries. Country focus may vary.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4100, for which additional credit is precluded.

EURR 5101 [0.5 credit]**Russian Domestic Politics**

Examination of the evolution of Russian domestic politics and society since the collapse of the Soviet Union.

Themes discussed include the transformation of Russia's political system, changes in the behavior of political elites, the evolution of Russia's social structure, and federal-regional relations.

Also listed as PSCI 5112.

EURR 5102 [0.5 credit]**The International Political Economy of Transition**

Problems of reintegration into the world economy and dilemmas of transition from command to market economies. Topics may include new trade and investment patterns, role in regional and international economic organizations, search for appropriate exchange rate policies, impact of Western assistance.

Also listed as INAF 5802.

EURR 5103 [0.5 credit]**Sustainability and Development in the Arctic: Transformations in the Circumpolar North**

The Circumpolar Arctic Region is undergoing rapid political, economic, social and technological development, which impacts sustainability. Climate, contaminants and biological diversity focus international attention.

Nunavut, the Russian North, major developments, and international circumpolar regime formation, with emphasis on environment and development.

EURR 5104 [0.5 credit]**European Integration and European Security**

A seminar focusing on security issues related to the formation of supra-national decision-making structures in Europe.

Includes: Experiential Learning Activity

Also listed as PSCI 5608.

Also offered at the undergraduate level, with different requirements, as EURR 4104, for which additional credit is precluded.

EURR 5105 [0.5 credit]**European Economic Integration**

Economic issues and policies related to the process of European integration and the development of the post-World War II European Union.

Also listed as INAF 5803.

Prerequisite(s): ECON 1000.

EURR 5106 [0.5 credit]**Selected Topics in European Integration Studies**

Selected topics related to post-World War II European integration.

Also listed as PSCI 5609.

EURR 5107 [0.5 credit]**Russia's Regional and Global Ambitions**

This course examines domestic conditions in Russia from 2000 to the present and the framing of Russia's foreign policy and strategic objectives towards the former Soviet republics and other key global actors, including the United States, the European Union, NATO and China.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4107, for which additional credit is precluded.

EURR 5108 [0.5 credit]**Canada-EU Relations: Summer Module**

Relations between Canada and Europe in the context of European integration, with attention to policy issues affecting the relationship and/or areas of common policy challenges.

Also listed as PSCI 5103.

Precludes additional credit for EURR 5106 and PSCI 5609 if taken in the summer of 2003-2004 or 2004-05.

Prerequisite(s): previous course in European integration or permission of the instructor.

EURR 5109 [0.5 credit]**The EU in International Affairs**

The impact of the EU on international affairs; the internal development of the EU, the evolution of integration theory, and the growth of the EU's external relations capabilities.

Includes: Experiential Learning Activity

Also listed as INAF 5805.

EURR 5113 [0.5 credit]**Democracy in the European Union**

Survey of empirical research and normative theorizing about democracy in the EU. Topics include: European Parliament and other channels for democratic input, patterns of citizen participation, impact of European integration on democracy in EU member states, Euroscepticism, theories of EU democracy.

Also listed as PSCI 5113.

EURR 5201 [0.5 credit]**Special Topics in European Studies**

Selected topics related to Europe and/or the European Union.

EURR 5202 [0.5 credit]**Special Topics in Russian and Eurasian Studies**

Selected topics related to the communist and post-communist states and processes of transition they are undergoing.

Also offered at the undergraduate level, with different requirements, as EURR 4202, for which additional credit is precluded.

EURR 5204 [0.5 credit]**Central Europe, Past and Present**

Evolution and current status of Central Europe from periods of foreign control in the late nineteenth and twentieth centuries to independent statehood. Emphasis on national accommodations and conflicts.

Also listed as HIST 5604.

Also offered at the undergraduate level, with different requirements, as EURR 4204, for which additional credit is precluded.

EURR 5205 [0.5 credit]**The European Union and its Eastern Neighbours**

The EU's European Neighbourhood Policy and Eastern partnership policy, the Russia-EU "strategic partnership". Policies and reactions of non-EU East European countries toward the EU. The interaction of Member state policies and EU policies. May include attention to historical legacies, cultural factors, public opinion, energy security.

Includes: Experiential Learning Activity

Also listed as INAF 5807, PSCI 5111.

EURR 5301 [0.5 credit]**Internship and Applied Policy Skills**

A seminar accompanying an unpaid internship placement to develop workplace and applied policy skills. Relating applied experience to academic literature. Writing skills for an applied policy setting. Internship placement: 12 days over 12 weeks.

Includes: Experiential Learning Activity

Prerequisite(s): Open only to EURUS MA students with a minimum B+ average and placement in an internship position in the same semester or in the previous semester (based on a competitive application process).

Also offered at the undergraduate level, with different requirements, as EURR 4206, for which additional credit is precluded.

EURR 5302 [0.5 credit]**EU Summer Study Abroad**

This course is open only to students in approved summer study options in Europe, particularly the EU Study Tour.

Includes: Experiential Learning Activity

Prerequisite(s): approval of the Institute.

Also offered at the undergraduate level, with different requirements, as EURR 4302, for which additional credit is precluded.

EURR 5303 [0.5 credit]**Contemporary Europe: From Postwar to the European Union**

History of contemporary Europe from 1945 to present covering both eastern and western halves of the continent and including social, cultural, political, and economic dimensions.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4303, HIST 4606, for which additional credit is precluded.

EURR 5304 [0.5 credit]**Europe and International Migration**

Europe's role in international migration. Topics to be discussed may include migration and mobility as both assets and challenges for sending, transit, and destination countries, changing geographies of migration, inclusion and exclusion, political mobilization, and responses of European states and other actors.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as EURR 4304, for which additional credit is precluded.

EURR 5305 [0.5 credit]**Imperial Russia and the Russian Revolution**

Examination of the expansion and downfall of tsarist Russia from the eighteenth century to the revolutionary era and the establishment of Bolshevik rule. Topics include the relationship between the monarchy and subject peoples, social and economic change, and daily life.

Includes: Experiential Learning Activity

Also listed as HIST 5607.

Precludes additional credit for EURR 4203 (no longer offered), EURR 5203 (no longer offered), HIST 4603 (no longer offered), HIST 5603 (no longer offered).

Also offered at the undergraduate level, with different requirements, as EURR 4305, for which additional credit is precluded.

EURR 5306 [0.5 credit]**The Soviet Union: Power and Culture**

Examination of the rise of the Soviet Union to a global power and subsequent tensions that promoted its collapse. The course will analyze Stalinism, the Second World War, the Thaw, and Brezhnev and Gorbachev eras through the lens of the USSR's citizens.

Includes: Experiential Learning Activity

Also listed as HIST 5608.

Precludes additional credit for EURR 4203 (no longer offered), EURR 5203 (no longer offered), HIST 4603 (no longer offered), HIST 5603 (no longer offered).

Also offered at the undergraduate level, with different requirements, as EURR 4306, for which additional credit is precluded.

EURR 5307 [0.5 credit]**Topics in Migration and Diaspora: Europe, Russia and Eurasia**

Topics in European, Russian and Eurasian Studies with a focus on migration and diaspora in Europe, Russia and Eurasia.

Also listed as MGDS 5202.

EURR 5900 [0.5 credit]**Tutorial in Russian and Eurasian Studies**

Directed readings on selected aspects of Russian and Eurasian issues.

Prerequisite(s): permission of the Institute.

EURR 5901 [0.5 credit]**Tutorial in Russian and Eurasian Studies**

Directed readings on selected aspects of Russian and Eurasian issues.

Prerequisite(s): permission of the Institute.

EURR 5902 [0.5 credit]**Tutorial in European and European Union Studies**

Directed readings on selected aspects of European and European Union issues.

Prerequisite(s): permission of the Institute.

EURR 5903 [0.5 credit]**Tutorial in European and European Union Studies**

Directed readings on selected aspects of European and European Union issues.

Prerequisite(s): permission of the Institute.

EURR 5908 [1.0 credit]**Research Essay**

A research essay on a topic relating to European, Russian or Eurasian Studies.

Includes: Experiential Learning Activity

EURR 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Institute.

EURR 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Co-operative Education Program option in the M.A. program in European, Russian, and Eurasian Studies.

Film Studies (FILM)

Film Studies (FILM) Courses**FILM 5001 [0.5 credit]****Directed Readings and Research**

Tutorials designed to permit students to pursue research on topics in film studies which have been chosen in consultation with members of faculty.

Includes: Experiential Learning Activity

FILM 5002 [0.5 credit]**Special Topics**

Selected topics in film studies not available in the regular course program.

FILM 5010 [0.5 credit]**Film Theory, History, and Critical Methodologies I**

Recent developments in film theory and history, with emphasis on the themes and concepts informing the development of the discipline of film studies, and training in methodologies for critical, theoretical and historical research in film studies.

Precludes additional credit for FILM 5000 (no longer offered).

FILM 5020 [0.5 credit]**Film Theory, History, and Critical Methodologies II**

Building on the skills and knowledge developed in FILM 5010, the course examines recent developments in film theory and history. Emphasis on themes and concepts informing the discipline of film studies, and methodologies for critical, theoretical and historical research in film studies.

Precludes additional credit for FILM 5000 (no longer offered).

Prerequisite(s): FILM 5010 or permission of the instructor.

FILM 5106 [0.5 credit]**Cinema and Technology**

Selected aspects of the technological development of cinema, with emphasis on the impact of technological advances on film historiography and critical analysis.

FILM 5107 [0.5 credit]**Topics in Film History**

Aspects of the history of cinema, with emphasis on periods, film movements, styles, genres and comparative approaches to national, regional and/or world-wide trends.

FILM 5109 [0.5 credit]**Topics in Film and Philosophy**

Selected topics in philosophical approaches to the study of film, and an examination of the relations between film theory and philosophical aesthetics.

Also offered at the undergraduate level, with different requirements, as FILM 4301, for which additional credit is precluded.

FILM 5203 [0.5 credit]**Issues in World Cinema**

Study of the theoretical and methodological issues raised by the concept of world cinema. Topics may include nationalism, transnationalism, translation, cosmopolitanism, local and regional vernaculars, co-productions, film festivals, multinational corporations and other phenomena associated to globalization.

FILM 5205 [0.5 credit]**Topics in Hollywood Cinema**

Examination of Hollywood cinema relative to recent research into Hollywood's impact on film aesthetics, technology, economics and culture.

FILM 5209 [0.5 credit]**Critical Perspectives on Canadian Cinema**

Current critical and historical approaches to Canadian film, with emphasis on institutions, aesthetic traditions and cultural practices.

FILM 5401 [0.5 credit]**Studies in Authorship**

Examination of the work of one or two filmmakers, with a concern for recent ideas about the concept of authorship and the formation of artistic and critical reputations.

FILM 5500 [0.5 credit]**Advanced Film Analysis**

Issues and approaches to the detailed analysis of particular film texts. Work in narratology, hermeneutics, discourse analysis, psychoanalysis, deconstruction and semiotics will provide the methodological background to the study of individual films.

FILM 5506 [0.5 credit]**Topics in Culture, Identity and Representation**

Current critical approaches to the study of identity in cinema. Topics will vary from year to year, and may include race, ethnicity and sexuality, and the geopolitical implications of colonialism and post-colonialism.

FILM 5601 [0.5 credit]**Studies in Genre**

The theory and practice of film genres will be the object of study in this course.

FILM 5701 [0.5 credit]**Topics in Animation**

Institutional histories, the work of individual animators, modes of production, and the social function of animation represent topics to be covered by this course.

FILM 5801 [0.5 credit]**Graduate Internship**

This course provides students with the opportunity to gain practical experience by working on film-related projects under the supervision of staff at a museum, gallery, archive, exhibition venue or government agency. Graded SAT/UNS.

Includes: Experiential Learning Activity

FILM 5908 [1.0 credit]**Research Essay**

Individual project on a topic of the student's choice involving research undertaken after admission into the program and supervised by a faculty member.

Includes: Experiential Learning Activity

FILM 5909 [1.5 credit]**M.A. Thesis**

Includes: Experiential Learning Activity

Financial Management (FINA)

Financial Management (FINA) Courses**FINA 5501 [0.25 credit]****Financial Management**

Overview of finance from the perspective of the financial manager. Corporate governance issues, financial markets, time value of money, valuation and yields of financial securities, capital budgeting, financial statement analysis, and the trade-off between risk and return.

Precludes additional credit for BUSI 5504.

Prerequisite(s): ACCT 5001 and BUSI 5801.

FINA 5502 [0.25 credit]**Corporate Finance**

Aspects of corporate finance of most concern to managers: investment, financing and payout decisions, corporate restructuring. Case studies will be used.

Includes: Experiential Learning Activity

Prerequisite(s): FINA 5501.

FINA 5511 [0.25 credit]**Investments**

The analytical foundations and tools necessary for successful decision making by investment managers and analysts and by individual investors. Includes a significant hands-on component.

Prerequisite(s): FINA 5502.

FINA 5512 [0.25 credit]**Valuation**

Valuation techniques needed for enterprise valuation. The identification of value drivers, insights into the valuation of companies in different settings. Step-by-step procedures for valuing businesses. Includes a team case analysis and presentation.

Includes: Experiential Learning Activity

Prerequisite(s): FINA 5502.

FINA 5513 [0.25 credit]**Mergers and Acquisitions**

Theory and practice of mergers and acquisitions. Skills needed to be effective in mergers and acquisitions. Best practices in deal origination, design, implementation and post merger integration.

Precludes additional credit for BUSI 5500.

Prerequisite(s): FINA 5512.

FINA 5514 [0.25 credit]**International Finance**

Issues encountered by the multinational financial manager in making financing and investment decisions within a global context. Foreign exchange markets, parity conditions, currency quotation methods, management of foreign exchange/political risk and international capital budgeting.

Prerequisite(s): FINA 5502.

FINA 5515 [0.5 credit]**Micro Finance**

Introduces students to the theory and practice of microfinance. Provides students with a comprehensive understanding of microfinance, its achievements, its current challenges, and the basic skills needed to manage microfinance institutions (MFIs). Serves as a forum to reflect on the future of microfinance and of.

Includes: Experiential Learning Activity

Prerequisite(s): FINA 5501, FINA 5502.

Also offered at the undergraduate level, with different requirements, as BUSI 4515, for which additional credit is precluded.

FINA 5521 [0.25 credit]**Financial Management Concentration Integration**

Integrates and applies all the accounting and finance concentration coursework. Critical thinking is stressed via the case study approach. Focuses on complex problems and allows students to gain a deeper understanding of the salient issues discussed within the financial management concentration.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5500.

Prerequisite(s): FINA 5501, FINA 5502, FINA 5512 and FINA 5513.

Food Science (FOOD)

Food Science (FOOD) Courses**FOOD 5100 [0.5 credit]****Advanced Food Processing and Technology**

Major techniques used in food processing and preservation of raw agricultural materials. Targeted food groups include dairy, cereal grains and oilseeds.

FOOD 5101 [0.5 credit]**Advanced Nutrition and Metabolism**

Metabolism of macronutrients in the human body. Detailed catabolic and anabolic reactions of carbohydrates, lipids and proteins. Regulatory control points in healthy and diseased states. Discussion of the literature pertaining to nutrition, metabolism and disease.

Also offered at the undergraduate level, with different requirements, as FOOD 4201, for which additional credit is precluded.

FOOD 5102 [0.5 credit]**Food Biotechnology**

Developments in biotechnology related to food production and quality. Traditional food biotechnology and novel biotechnological methods related to the production of food; the use of traditional food crops in other bio-industries. Aspects of microbiology and genetic engineering.

FOOD 5103 [0.5 credit]**Cellular Redox in Health and Disease**

Crucial interactions of free radicals with biomolecules in living organisms. Procedures for detecting cellular and DNA damage, lipid and protein oxidation products; the link between oxidative stress and chronic diseases.

FOOD 5104 [0.5 credit]**Theory and Principles of Food Quality and Control**

Sampling plans and statistical methods. Physical, chemical, biological and microbiological tests in quality control as it relates to food safety and regulation.

Also offered at the undergraduate level, with different requirements, as FOOD 4001, for which additional credit is precluded.

FOOD 5105 [0.5 credit]**Functional Foods and Natural Health Products**

Bioactive components of functional foods and natural health products, for improvement of health and nutrition. Sources and chemistry of bioactives, mechanisms of actions, process technology, efficacy and safety. Role of research and development in industry in commercialization of new products.

Also offered at the undergraduate level, with different requirements, as FOOD 4203, for which additional credit is precluded.

FOOD 5801 [1.0 credit]**Seminar I**

A seminar course in which students are required to present a seminar on a topic not related to their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.

Includes: Experiential Learning Activity

Also listed as CHEM 5801.

FOOD 5802 [1.0 credit]**Seminar II**

A seminar course in which students are required to present a seminar on their Ph.D. research topic in their research program. In addition, students are required to attend the seminars of their fellow classmates and actively participate in the discussion following the seminar.

Includes: Experiential Learning Activity

Also listed as CHEM 5802.

Prerequisite(s): enrolment in the Ph.D. program.

FOOD 5909 [3.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

FOOD 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

French (FREN)

French (FREN) Courses**FREN 5004 [0.5 credit]****Linguistique du français canadien**

Regard sur la diversité du français parlé au Canada d'un point de vue diachronique, synchronique ou les deux. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5100 [0.5 credit]**Le monde francophone: linguistique et littérature**

Étude trans- et inter-disciplinaire de la langue et de la littérature d'une région du monde francophone. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5212 [0.5 credit]**Littératures francophones**

Analyse de problématiques liées à la francophonie littéraire. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4212, for which additional credit is precluded.

FREN 5213 [0.5 credit]**Littérature québécoise et canadienne d'expression française**

Étude approfondie portant sur un ou plusieurs aspects des littératures d'expression française au Canada. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4213, for which additional credit is precluded.

FREN 5214 [0.5 credit]**Genre et mouvement**

Étude approfondie d'un thème, d'un mouvement, d'un genre dans le champ littéraire. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4214, for which additional credit is precluded.

FREN 5215 [0.5 credit]**Problématiques contemporaines**

Étude de questions contemporaines dans le domaine littéraire. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also offered at the undergraduate level, with different requirements, as FREN 4215, for which additional credit is precluded.

FREN 5300 [0.5 credit]**Méthodologie de la recherche**

Initiation au monde de la recherche, aux techniques de documentation, à l'exploitation des ressources bibliographiques, à l'élaboration d'un problème de recherche, à l'organisation d'un programme de recherche, aux enjeux épistémologiques de la recherche universitaire.

FREN 5350 [0.0 credit]**Proposition de recherche**

Élaboration de la proposition de thèse ou de mémoire (selon l'option choisie) sous la direction du membre du département qui supervisera la thèse ou le mémoire.

Prerequisite(s): FREN 5300.

FREN 5400 [0.5 credit]**Théories littéraires**

Étude de théories ciblées dans le champ des études littéraires. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5403 [0.5 credit]**Littérature et idéologie**

Études des rapports entre la production littéraire et les discours idéologiques. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5404 [0.5 credit]**Auteurs I**

Étude approfondie de l'œuvre d'un auteur francophone. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5408 [0.5 credit]**Littérature française I**

Étude approfondie d'un aspect particulier de la littérature française. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5409 [0.5 credit]**Littérature française II**

Étude approfondie d'un aspect particulier de la littérature française. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5412 [0.5 credit]**Diversité du français**

Études des variétés du français, dans ses dimensions spatiales. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5412.

Also offered at the undergraduate level, with different requirements, as FREN 4412 and LING 4412, for which additional credit is precluded.

FREN 5413 [0.5 credit]**Diachronie du français**

Étude du français, dans ses dimensions historiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5413.

Also offered at the undergraduate level, with different requirements, as FREN 4413 and LING 4413, for which additional credit is precluded.

FREN 5414 [0.5 credit]**Analyse du français**

Étude du français, dans ses dimensions morphologiques, syntaxiques ou phonologiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5414.

Also offered at the undergraduate level, with different requirements, as FREN 4414 and LING 4414, for which additional credit is precluded.

FREN 5415 [0.5 credit]**Variation du français**

Étude des variations internes de la langue, dans ses dimensions orales et écrites. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as LING 5415.

Also offered at the undergraduate level, with different requirements, as FREN 4415 and LING 4415, for which additional credit is precluded.

FREN 5501 [0.5 credit]**Experiential Learning in French and Francophone studies**

Topics in French language, literature or linguistics. Application of language skills in a francophone context. Topic and location may vary; consult Departmental website.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as FREN 4300, for which additional credit is precluded.

FREN 5603 [0.5 credit]**Littérature et les autres arts**

Étude des rapports entre l'art littéraire et d'autres formes d'expression artistique. Le contenu précis de ce cours varie selon les années. La description actuelle se trouve sur le site web départemental carleton.ca/french.

FREN 5800 [0.5 credit]**Cours de lectures dirigées**

Sujet établi sur proposition de l'étudiant en consultation avec son conseiller.

FREN 5908 [1.0 credit]**Mémoire de recherche**

Includes: Experiential Learning Activity

FREN 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Geography (GEOG)

Geography (GEOG) Courses**GEOG 5000 [0.5 credit]****Approaches to Geographical Inquiry**

A review of the major philosophical perspectives shaping research and explanation by geographers. Particular attention is paid to interpretations of social structure and human action, the nature of the biophysical universe, and the interaction between human beings and their environments.

Includes: Experiential Learning Activity

GEOG 5001 [0.5 credit]**Modeling Environmental Systems**

Methods and problems of research on the physical environment, with illustrative material taken from the atmospheric and surface earth sciences. Topics include: the identification and behaviour of environmental systems, temporal and spatial scale, experimental method under field conditions, and simulation and model development.

Includes: Experiential Learning Activity

GEOG 5002 [0.5 credit]**Quantitative Analysis for Geographical Research**

Quantitative techniques and methods for research on the natural and cultural environment. Topics include sampling, experimental design, replication, variance, correlation, time series analysis, statistical uncertainty, simulation, calibration, validation.

Includes: Experiential Learning Activity

GEOG 5003 [0.5 credit]**Critical Approaches to Qualitative Inquiry**

Development of critical skills in qualitative research by considering the relationship between theory and method. Engaged scholarship and participatory, community-based, action research. Practical experience with select methods including: interviews, personal narratives, focus groups, participant observation, archival research, discourse analysis, and visual methodologies.

Includes: Experiential Learning Activity

GEOG 5005 [0.5 credit]**Global Environmental Change: Human Implications**

Global environmental change: its significance for societies, economies and international relations. Value systems underlying environmental discourse; political economy of the environment; sustainability and security. Environmental diplomacy and grassroots environmentalism. Regionalized impacts of pressures on natural environments; challenges of adaptation.

Includes: Experiential Learning Activity

Also listed as INAF 5701.

GEOG 5006 [0.5 credit]**Special Topics in Geography of the Environment**

Research seminar on a selected theme within geographical approaches to environmental analysis. Topics will vary from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5103 [0.5 credit]**Hydrologic Principles and Methods**

Advanced physical hydrology with emphasis on atmospheric moisture, precipitation, evaporation, infiltration, soil water physics, snow hydrology and runoff generation. Analytical approaches and methods to solve practical hydrological problems.

Includes: Experiential Learning Activity

GEOG 5104 [0.5 credit]**Advanced Biogeography**

Current methods and theories in paleoecology are examined: dendrochronology, paleolimnology and other techniques for examining past climates and environmental condition. Numerical approaches to climate change studies.

Includes: Experiential Learning Activity

GEOG 5107 [0.5 credit]**Field Study and Methodological Research**

Field acquisition and analysis of geographic material; supervised field observations and methodology. (Individual or group basis, by special arrangement.).

Includes: Experiential Learning Activity

GEOG 5201 [0.5 credit]**Special Topics in the Geography of Development**

Research seminar within geographical approaches to development focusing on a selected theme or region. Topics vary from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5303 [0.5 credit]**Geocryology**

Development of ground ice in permafrost regions of Canada; ice segregation and pore-water expulsion during ground freezing; analytical and numerical approaches to modeling permafrost conditions.

Includes: Experiential Learning Activity

Prerequisite(s): GEOG 4108 or permission of the Department.

GEOG 5307 [0.5 credit]**Soil Resources**

Physical, mineralogical, chemical, and other properties of soils will be studied in agricultural, environmental, geomorphological and/or geotechnical contexts, as relevant to the students enrolled.

Includes: Experiential Learning Activity

GEOG 5400 [0.5 credit]**Territory and Territoriality**

Contemporary geographical and international relations theorizing is challenging notions of boundaries and territories in the political organization of modernity. Using contemporary writings on geopolitics, security, sovereignty, self-determination and identity politics this course investigates territoriality as a political and intellectual strategy.

Includes: Experiential Learning Activity

Also listed as INAF 5402.

GEOG 5406 [0.5 credit]**Special Topics in Cultural Geography**

Research seminar on a selected theme within cultural (including historical) geography. Topic varies from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5500 [0.5 credit]**Special Topics in the Study of Cities and Urbanization**

Research seminar on a selected theme within geographical approaches to the study of cities and urbanization. Topics will vary from year to year. Consult departmental website for current details.

Includes: Experiential Learning Activity

GEOG 5502 [0.5 credit]**Special Topics in Geography of Globalization**

Research seminar on a selected theme within geographical aspects of globalization. Topic varies from year to year. Consult departmental web site for current details.

Includes: Experiential Learning Activity

GEOG 5600 [0.5 credit]**Empire and Colonialism**

Theoretical approaches to empire and colonialism: postcolonial, feminist, Indigenous, anti-racist, queer, decolonizing, and political-economic approaches. Consideration of a range of sites of imperial and colonial formation, including land, territory, nature, the body, sexuality, gender, and race, as well as forms of resistance, resurgence, and decolonization.

Includes: Experiential Learning Activity

GEOG 5701 [0.5 credit]**Topics in Northern Human Geography**

Political, social, economic, cultural, and environmental geographies of the Canadian North and/or circumpolar North. Topics may include climate change, resource development, politics and governance, knowledge and expertise, geopolitics, sovereignty, colonialism, Indigenous knowledge, Indigenous self-determination, conservation and wildlife, environmental politics.

Includes: Experiential Learning Activity

GEOG 5803 [0.5 credit]**Seminar in Geomatics**

Current research issues in geomatics, including remote sensing, geographic information systems, geographic positioning, and cartography. Topics will focus on combined interests of enrolled students and departmental faculty.

Includes: Experiential Learning Activity

Prerequisite(s): prior experience with GIS, GPS, remote sensing or cartography and permission of the department.

GEOG 5804 [0.5 credit]**Geographic Information Systems**

GIS for students with no previous experience. Includes data formats and structures, input/output and analysis capabilities, and GIS applications.

Includes: Experiential Learning Activity

GEOG 5900 [0.5 credit]**Graduate Tutorial**

Tutorial, directed reading or research, offered on an individual basis, to meet specific program needs; may be taken in one of the areas of specialization of the Department.

Includes: Experiential Learning Activity

GEOG 5905 [0.5 credit]**Masters Research Workshop**

A workshop which focuses on the challenges of research design in the various sub-fields of geography. The workshop will culminate with the development and defence of a thesis research proposal.

Includes: Experiential Learning Activity

GEOG 5906 [3.0 credits]**M.Sc. Thesis**

Thesis supervision will be given in Physical Geography, as listed in the introductory section of this department's program description.

Includes: Experiential Learning Activity

GEOG 5909 [2.5 credits]**M.A. Thesis**

Thesis supervision will be given in all areas of specialization of the Department, as listed in the introductory section of this department's program description.

Includes: Experiential Learning Activity

GEOG 6000 [0.5 credit]**Doctoral Core Seminar: Geography, Society and the Environment**

Geographical perspectives on the development of society/environment interrelations in Western thought and critiques thereof. The course is designed to represent and address integrative issues in the two fields of the program, the geography of social change and the geography of environmental change.

Includes: Experiential Learning Activity

GEOG 6001 [0.5 credit]**Doctoral Core Seminar: Geography, Society and the Environment**

Geographical perspectives on the development of society/environment interrelations in Western thought and critiques thereof. The course is designed to represent and address integrative issues in the two fields of the program, the geography of social change and the geography of environmental change.

Includes: Experiential Learning Activity

GEOG 6003 [0.5 credit]**Field Seminar: Geography of Societal Change**

Analysis of current geographical and related research into the three themes of global political economy: restructuring and the environment; geographies of socio-cultural evaluation; and feminist geographies.

Includes: Experiential Learning Activity

GEOG 6004 [0.5 credit]**Field Seminar: Geography of Societal Change**

Analysis of current geographical and related research into the three themes of global political economy: restructuring and the environment; geographies of socio-cultural evaluation; and feminist geographies.

Includes: Experiential Learning Activity

GEOG 6006 [0.5 credit]**Field Seminar: Geography of Environmental Change**

Analysis of geographical and related research into the appraisal and societal management of environmental resources, and environmental processes and anthropogenic impacts.

Includes: Experiential Learning Activity

GEOG 6007 [0.5 credit]**Field Seminar: Geography of Environmental Change**

Analysis of geographical and related research into the appraisal and societal management of environmental resources, and environmental processes and anthropogenic impacts.

Includes: Experiential Learning Activity

GEOG 6906 [0.0 credit]**Comprehensive Examination: The Geography of Societal Change**

This examination focuses on research challenges in theory and methodology in the themes of global political economy: restructuring and the environment; geographies of socio-cultural evaluation; feminist geographies. A specific theme will be identified for each candidate.

Includes: Experiential Learning Activity

GEOG 6907 [0.0 credit]**Comprehensive Examination: The Geography of Environmental Change**

This examination focuses on research challenges in theory and methodology associated with the appraisal and societal management of environmental resources, and environmental processes and anthropogenic impacts. A specific theme will be identified for each candidate.

Includes: Experiential Learning Activity

GEOG 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Health Sciences (HLTH)

Health Sciences (HLTH) Courses**HLTH 5100 [0.5 credit]****Fundamentals of Research Methods**

Experimental design, statistical analysis and interpretation of results in health science research, principles and methods of epidemiology, fundamentals of research ethics.

Includes: Experiential Learning Activity

Prerequisite(s): university-level statistics.

HLTH 5101 [0.0 credit]**Statistical Software and its Application to Health Sciences Primer**

Introduction to statistical softwares used to analyze health research data. Data management topics include data entry, manipulation, and elementary statistical analyses using SAS, SPSS, Stata and R. Other topics include privacy/maintaining security of health datasets. For students without strong backgrounds in biostatistics/data handling.

Includes: Experiential Learning Activity

HLTH 5150 [0.5 credit]**Statistics for Health Sciences**

Statistical methods commonly used in analyses of health data. This applied course covers topics related to descriptive and graphical methods, tests of hypotheses in both paired and independent samples, linear regression, survival analysis, and logistic regression.

Includes: Experiential Learning Activity

Lecture three hours a week, lab/workshop three hours a week.

HLTH 5151 [0.5 credit]**Principles of Epidemiology**

Introduction to epidemiologic concepts and methods. Different types of epidemiological study designs. Fundamental concepts of: definitions and measures of disease frequency and effects, causality, bias, sample size, confounding and interaction.

Includes: Experiential Learning Activity

HLTH 5201 [0.5 credit]**Fundamentals of Policy I: Policy Analysis**

Policy analysis and policy processes with an emphasis on the stages of the policy process, as well as the influences of institutions, ideas and interests.

HLTH 5202 [0.5 credit]**Fundamentals of Policy II: The Health Sector**

Canadian health policies and programs with emphasis on the economics, politics and public administration of the healthcare sector.

HLTH 5300 [0.5 credit]**Knowledge Translation**

The application of knowledge translation in the formulation of policy and the development of skills required to maximize the impact of scientific findings through real world programs and policies and communication skills for diverse audiences.

Precludes additional credit for NEUR 5801.

Also offered at the undergraduate level, with different requirements, as HLTH 4701, for which additional credit is precluded.

HLTH 5350 [0.5 credit]**New Health Technologies**

Overview of new and emerging health technologies, including medical and assistive devices, diagnostics and screening, genetics, reproduction, tissue regeneration, imaging, and health informatics. Health technology assessment methods and issues. Regulatory, ethical and social implications; considerations in the developing world.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as HLTH 4102, for which additional credit is precluded.

HLTH 5401 [0.5 credit]**Interdisciplinary Problems in Health**

Development of an understanding of the scope and interdisciplinary nature of issues that impact the health of Canadians is the focus of this course.

HLTH 5402 [0.5 credit]**Biological and Social Fundamentals of Health**

What comprises a healthy body and mind? This course addresses the psycho-social and biological mechanisms that may interact to determine health outcomes. The course examines complex relationships between social, environmental, and biological factors underlying some of the most important and emerging health concerns today.

HLTH 5403 [0.5 credit]**Host-Pathogen Interactions**

Advanced cellular and molecular mechanisms governing host-pathogen interactions and their contribution to disease. Exploration of immune signaling and recognition, virulence factors, antimicrobial resistance and research techniques used in this field.

Prerequisite(s): Permission of the department.

Also offered at the undergraduate level, with different requirements, as HLTH 4304, for which additional credit is precluded.

HLTH 5501 [2.0 credits]**Collaborative Group Research Project**

Student teams, supervised by a cross-disciplinary team of faculty, will collaborate on a project that addresses a real-world health concern.

Includes: Experiential Learning Activity

Prerequisite(s): HLTH 5400.

HLTH 5504 [1.0 credit]**Interdisciplinary Health Research Project - Group**

Student teams will collaborate on a research project that addresses a real-world health concern, supervised by a cross-disciplinary team of faculty. Students must be continually registered in this course throughout their degree program (five terms.).

Includes: Experiential Learning Activity

Precludes additional credit for HLTH 5502 (no longer offered), HLTH 5503(no longer offered), HLTH 5505.

HLTH 5505 [1.0 credit]**Interdisciplinary Health Research Project – Individual**

An independent research project that addresses a real-world health concern, supervised by a faculty member and advised by a cross-disciplinary team of experts. Students must be continually registered in this course throughout their degree program (five terms).

Includes: Experiential Learning Activity

Precludes additional credit for HLTH 5502(no longer offered), HLTH 5503(longer offered), HLTH 5504.

Prerequisite(s): permission of the Faculty supervisor and the Department of Health Sciences.

HLTH 5600 [0.25 credit]**Special Topics in Biostatistics and Epidemiology**

Selected topics in biostatistics and epidemiology, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

Includes: Experiential Learning Activity

HLTH 5601 [0.25 credit]**Special Topics in Health Policy and Administration**

Selected topics in health policy and administration, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5602 [0.25 credit]**Special Topics: Social and Behavioural**

Selected topics in the social and behavioural sciences, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5603 [0.25 credit]**Special Topics in Environmental Health**

Selected topics in environmental health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5604 [0.25 credit]**Special Topics in the Science of Disease**

Selected topics in the science of disease, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5605 [0.25 credit]**Special Topics: Engineering, Design and Computer Science**

Selected topics in applications of engineering, design or computer science in health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5700 [0.5 credit]**Special Topics in Biostatistics and Epidemiology**

Selected topics in biostatistics and epidemiology, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

Includes: Experiential Learning Activity

HLTH 5701 [0.5 credit]**Special Topics in Health Policy and Administration**

Selected topics in health policy and administration, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5702 [0.5 credit]**Special Topics: Social and Behavioural**

Selected topics in the social and behavioural sciences, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5703 [0.5 credit]**Special Topics in Environmental Health**

Selected topics in environmental health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5704 [0.5 credit]**Special Topics in the Science of Disease**

Selected topics in the science of disease, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5705 [0.5 credit]**Special Topics: Engineering, Design and Computer Science**

Selected topics in applications of engineering, design or computer science in health, focusing on areas of specific relevance to the health sector, not available in regular program offerings. These courses are designed to provide depth of expertise and/or specific skills relevant to the workplace.

HLTH 5800 [0.5 credit]**Directed Studies in Health: Science, Technology and Policy**

One-to-one instruction in selected aspects of specialized Health: Science and Technology subjects not covered by other graduate courses. Students may not take this course from their project supervisor(s), and are limited to one directed studies course per program.

Prerequisite(s): permission of the director of Health: Science, Technology and Policy.

HLTH 5801 [0.5 credit]**Health: Science, Technology and Policy Practicum**

This practicum supports students in gaining relevant and practical experience through applying course learning at approved organizations. Students are responsible for arranging the placement with an external partner where the practicum will be held, preparing a learning contract, and completing a field-based project deliverable.

Includes: Experiential Learning Activity

Prerequisite(s): Completion of two semesters of the MSc in HSTP program, permission of the department and at the discretion of the practicum supervisor. Students may not be supervised by their MSc research supervisor(s) and are limited to one practicum per program.

HLTH 5901 [0.5 credit]**Advanced Topics in Interdisciplinary Health Sciences**

Discussion of current health problems and exploration of innovative interdisciplinary solutions. Development of skills required to perform critical analyses of health research to evaluate the quality, interpret the findings, and assess the impact of health sciences literature across disciplines.

HLTH 5902 [0.5 credit]**Seminars in Interdisciplinary Health Sciences for MSc**

Development of scientific communication skills through attendance at interdisciplinary seminars and by the student presenting a seminar on their own thesis research. Topics have specific or broad relevance to health sciences. Graded SAT/UNS.

HLTH 5905 [0.0 credit]**Final Research Seminar Presentation for MSc**

Final seminar of MSc thesis research. Seminar presentation should occur within one month of the final oral thesis defence.

Includes: Experiential Learning Activity

HLTH 5909 [4.0 credits]**MSc Thesis**

Includes: Experiential Learning Activity

HLTH 6902 [0.5 credit]**Seminars in Interdisciplinary Health Sciences**

Development of scientific communication skills through attendance at interdisciplinary seminars and by the student presenting a seminar on their own thesis research. Topics have specific or broad relevance to health sciences. Graded SAT/UNS.

HLTH 6903 [0.5 credit]**Grant Proposals and Ethics**

Advanced course in writing successful grant proposals in Tri-Council (CIHR, NSERC, SSHRC) formats. Ethics associated with conducting health sciences research, including the preparation of ethics proposals for human and animal studies in health sciences research.

Includes: Experiential Learning Activity

HLTH 6904 [0.0 credit]**Mid-Program Defence**

Departmental seminar and Graduate Advisory Committee meeting on PhD research including results to date and future research aims and directions, and on field-specific knowledge.

Includes: Experiential Learning Activity

HLTH 6905 [0.0 credit]**Final Research Seminar Presentation**

Final seminar of PhD thesis research. Seminar presentation should occur within one month of the final oral thesis defence.

Includes: Experiential Learning Activity

HLTH 6909 [0.0 credit]**PhD Thesis**

Includes: Experiential Learning Activity

History (HIST)

History (HIST) Courses

HIST 5003 [0.5 credit]**Historical Theory and Method**

An exploration of some of the theories, concepts and methodologies used in historical practice.

Includes: Experiential Learning Activity

HIST 5210 [0.5 credit]**Power**

A seminar on power and its deployment in Europe, whether by states and other political entities or in relation to gender, race, the body, private and public identities, and the family. Theories and philosophies of power and its exercise will be examined.

Includes: Experiential Learning Activity

HIST 5211 [0.5 credit]**Consumption**

A seminar exploring the development of European cultures of consumption and exchange of commodities and services. Examined in relation to gender, ideology, imperialism, social distinction, and everyday life, topics may include markets, food, clothing, material goods, leisure, and work.

Includes: Experiential Learning Activity

HIST 5212 [0.5 credit]**European History Special Topics**

A seminar on a thematic, transnational or regional topic related to European history. Topics will vary from year to year.

HIST 5314 [0.5 credit]**Colonialism and Postcolonialism in Canada**

A seminar on selected topics related to the histories and historiography of colonialism and postcolonialism in Canada.

Includes: Experiential Learning Activity

HIST 5315 [0.5 credit]**State and Society in Canadian History**

A seminar on selected topics related to the histories and historiography of political culture, state formation, and social relations in Canada.

Includes: Experiential Learning Activity

HIST 5316 [0.5 credit]**Canadian History Special Topics**

A seminar on a thematic or regional topic related to Canadian history. Topics will vary from year to year.

HIST 5410 [0.5 credit]**United States History Special Topics**

A seminar on a thematic topic related to the history of the United States of America. Topics will vary from year to year.

HIST 5510 [0.5 credit]**Gender History Special Topics**

A seminar on a topic related to gender and/or women's history. Topics will vary from year to year.

HIST 5511 [0.5 credit]**History of Sexuality Special Topics**

A seminar on a topic related to the history of sexuality. Topics will vary from year to year.

HIST 5604 [0.5 credit]**Central Europe, Past and Present**

Evolution and current status of Central Europe, from periods of foreign control in the late nineteenth and twentieth centuries to independent statehood. Emphasis on national accommodations and conflicts.

Also listed as EURR 5204.

Also offered at the undergraduate level, with different requirements, as HIST 4604, for which additional credit is precluded.

HIST 5607 [0.5 credit]**Imperial Russia and the Russian Revolution**

Examination of the expansion and downfall of tsarist Russia from the eighteenth century to the revolutionary era and the establishment of Bolshevik rule. Topics include the relationship between the monarchy and subject peoples, social and economic change, and daily life.

Includes: Experiential Learning Activity

Also listed as EURR 5305.

Also offered at the undergraduate level, with different requirements, as HIST 4607, for which additional credit is precluded.

HIST 5608 [0.5 credit]**The Soviet Union: Power and Culture**

Examination of the rise of the Soviet Union to a global power and subsequent tensions that promoted its collapse. The course will analyze Stalinism, the Second World War, the Thaw, and Brezhnev and Gorbachev eras through the lens of the USSR's citizens.

Includes: Experiential Learning Activity

Also listed as EURR 5306.

Also offered at the undergraduate level, with different requirements, as HIST 4608, for which additional credit is precluded.

HIST 5700 [0.5 credit]**Introduction to Public History**

Introduction to the professional and academic dimensions of public history with a focus on theory, method, ethics, modes of storytelling, and the politics of the past. The course also serves as a foundation for the M.A. in Public History programs.

Includes: Experiential Learning Activity

Prerequisite(s): Open only to students enrolled in the M.A. Public History programs, or with permission of the Department.

HIST 5701 [0.5 credit]**Archival Theory and Practice**

Theories, methodologies and problems relating to archives and records management including principles and concepts guiding the work of archivists; records appraisal, collection, arrangement, description; special attention to archival communities including Library and Archives Canada.

Includes: Experiential Learning Activity

HIST 5702 [0.5 credit]**Public History Special Topics**

Theoretical and practical instruction in topical areas such as digitizing history, oral history, local history, photography, material history, performance, etc.

Includes: Experiential Learning Activity

HIST 5703 [0.5 credit]**Public History Internship**

Placement for a term, normally over the summer following the first year of study, to put into practice the precepts learned in course work. Students will be jointly supervised by their employers and a faculty member. Graded Sat/Uns.

Includes: Experiential Learning Activity

HIST 5705 [0.5 credit]**Museums, National Identity and Public Memory**

Explores how national museums and similar institutions construct narratives and represent histories through processes of collection, preservation and exhibition. Topics include memory and identity; theory of museums; contestation; inclusivity and authority; cultural politics and heritage.

Includes: Experiential Learning Activity

HIST 5706 [0.5 credit]**Digital History**

Methods and theories of public history through the lens of computation, digital technologies and allied fields.

Includes: Experiential Learning Activity

HIST 5707 [0.5 credit]**Narrativity and Performance in Public History**

Theory and practice of storytelling and performance in public history through a variety of forms, media, and contexts.

Includes: Experiential Learning Activity

HIST 5709 [0.5 credit]**Photography and Public History**

The social history of photographic practices with an emphasis on the photograph as a material object. Traces the reproduction, circulation, and exhibition of photographs in a variety of contexts.

HIST 5710 [0.5 credit]**Race and Empire**

A seminar examining how discourses on race have been used to construct visions of empire. Students will be introduced to relevant historiographical, theoretical, discursive, and methodological approaches to race and empire.

HIST 5711 [0.5 credit]**Migration and Diaspora History Special Topics**

A seminar on the cultural, economic, political and social implications of the movement of people in historical and contemporary contexts. It takes a multidisciplinary and multiscale approach to topics such as citizenship, forced migration, diasporic communities, exile, immigration, global identities and transnationalism.

Also listed as MGDS 5201.

HIST 5712 [0.5 credit]**African History Special Topics**

A seminar on a thematic or regional topic related to African history. Topics will vary from year to year.

HIST 5713 [0.5 credit]**Latin America and Caribbean History Special Topics**

A seminar on a thematic or regional topic related to Latin America or Caribbean history. Topics will vary from year to year.

HIST 5803 [0.5 credit]**History of Women, Gender and Sexuality: Foundations**

Selected problems in the historiography of women, gender and sexuality.

Includes: Experiential Learning Activity

Precludes additional credit for HIST 5807 (no longer offered).

HIST 5900 [0.5 credit]**Directed Research**

A course designed for students and supervisors to confer regularly in preparation for the research essay. Graded satisfactory/unsatisfactory upon a written report from the supervisor.

Prerequisite(s): open only to students enrolled in the Resarch Essay option of the regular M.A.

HIST 5902 [1.0 credit]**Directed Studies**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

HIST 5904 [0.5 credit]**Directed Studies**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

HIST 5906 [0.5 credit]**Selected Topics**

A seminar in an area not covered by an existing graduate course.

HIST 5908 [1.0 credit]**M.A. Research Essay**

An examination of an approved topic in an area of departmental specialization or in an appropriate area of Public History.

Includes: Experiential Learning Activity

HIST 5909 [2.0 credits]**M.A. Thesis**

A substantial historical investigation. The subject will be determined in consultation with the Department, and a supervisor will be assigned. The candidate will be examined orally after presenting his/her thesis.

Includes: Experiential Learning Activity

HIST 6110 [0.5 credit]**History of Modern Europe**

Directed readings in modern European history.

HIST 6111 [0.5 credit]**History of France**

Directed readings in French history.

HIST 6112 [0.5 credit]**History of Russia**

Directed readings in Russian history.

HIST 6113 [0.5 credit]**History of Germany**

Directed readings in German history.

HIST 6210 [0.5 credit]**History of Early Modern Europe**

Directed readings in early modern European history.

HIST 6211 [0.5 credit]**History of Medieval Europe**

Directed readings in medieval European history.

HIST 6212 [0.5 credit]**History of Ancient Rome**

Directed readings in ancient Roman history.

HIST 6310 [0.5 credit]**History of Africa**

Directed readings in African history.

HIST 6311 [0.5 credit]**History of the African Diaspora**

Directed readings in the history of the African Diaspora.

HIST 6312 [0.5 credit]**History of Latin America**

Directed readings in Latin American history.

HIST 6313 [0.5 credit]**History of the Caribbean**

Directed readings in Caribbean history.

HIST 6410 [0.5 credit]**History of the United States**

Directed readings in U.S. history.

HIST 6510 [0.5 credit]**British History**

Directed readings in British history.

HIST 6601 [0.5 credit]**Transnational or Thematic History**

Directed readings in a transnational or thematic topic.

HIST 6604 [0.5 credit]**Directed Studies**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar.

HIST 6605 [0.5 credit]**Selected Topics**

A seminar in an area not covered by an existing graduate course.

HIST 6609 [1.0 credit]**Digital History and Digital Humanities**

A program of supervised reading in Digital History and Digital Humanities, leading to a digitally-mediated piece.

HIST 6612 [0.5 credit]**Public History**

Directed readings in Public History.

HIST 6613 [0.5 credit]**History of South Asia**

Directed readings in South Asian history.

HIST 6701 [0.5 credit]**History and Political Economy**

A program of supervised readings in political economy and history. When taken in conjunction with PECO 6000, will be considered a breadth-requirement course.

HIST 6805 [0.5 credit]**Professional Development Project I**

A project related to the student's doctoral program such as the preparation of an article-length essay, the design of an undergraduate course, internship, or curatorial initiative. Graded Sat./Uns.

Includes: Experiential Learning Activity

HIST 6806 [0.5 credit]**Professional Development Project II**

A 0.5 credit project related to the student's doctoral program such as the preparation of an article-length essay, the design of an undergraduate course, internship, or curatorial initiative. Graded Sat./Uns.

Includes: Experiential Learning Activity

HIST 6808 [1.0 credit]**Doctoral Seminar in Historical Theory and Method**

A critical examination of theories, concepts and methodological approaches in the discipline of history.

Includes: Experiential Learning Activity

HIST 6809 [0.5 credit]**Internship in Applied History Preparation Course**

A course of study to equip students with specialized skills and knowledge for the internship placement in applied history.

Includes: Experiential Learning Activity

HIST 6810 [0.5 credit]**Internship in Applied History**

An internship, normally of four months duration, in any field of applied history.

Includes: Experiential Learning Activity

HIST 6906 [0.5 credit]**Ph.D. Tutorials**

A program of directed readings in the student's major research field. Students normally complete three terms (fall, winter, summer) of tutorials before sitting the comprehensive examination.

HIST 6907 [0.5 credit]**Ph.D. Comprehensive Examination**

An examination of defined topics in the student's major research field. A written examination followed by an oral examination.

HIST 6908 [0.5 credit]**Ph.D. Comprehensive Examination in Public History**

An examination of defined topics in the field of Public History. A written examination followed by an oral examination.

HIST 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

HIST 6911 [0.5 credit]**Canadian History**

Directed readings in Canadian history.

HIST 6913 [0.5 credit]**History of Women, Gender, and Sexuality**

Directed readings in the history of women, gender and sexuality.

Human-Computer Interaction (HCIN)

Human-Computer Interaction (HCIN) Courses**HCIN 5100 [0.5 credit]****Fundamentals of HCI Design and Evaluation**

Strategies and practices in HCI design and evaluation. Students will learn to perform studies in user interface analysis and design, read research literature critically, distill important points from readings, summarize, write papers, design user interfaces and present their work. Precludes additional credit for PSYC 5105 (no longer offered).

HCIN 5200 [0.5 credit]**Software and User Interface Development**

Design and development of user interfaces for software systems based on principles for supporting user interaction, with emphasis on frameworks, tools, and processes for user interface development.

HCIN 5300 [0.5 credit]**Emerging Interaction Techniques**

Advanced interaction styles and their associated technologies. Topics may include hand held and gestural interactions, ubiquitous computing, deformable user interfaces, physiological computing and tangible user interfaces.

Also listed as ITEC 5204.

HCIN 5400 [0.5 credit]**Experimental Methods and Statistics**

An introduction to the design of experiments and the statistics needed to interpret data.

Also listed as CGSC 5101.

HCIN 5403 [0.5 credit]**Research methods in HCI**

An introduction to quantitative and qualitative research methods in HCI. Students will acquire skills in collecting and analyzing HCI data, presenting the findings and specifying practical implications.

Precludes additional credit for PSYC 5106 (no longer offered).

HCIN 5404 [0.5 credit]**Design Research Methods**

Critical review of qualitative and quantitative research methods to support interdisciplinary design. Methods used by collaborators from the sciences and humanities as well as methods designers bring to interdisciplinary collaborations are introduced. Research for design, research through design and theoretical frameworks are discussed.

Includes: Experiential Learning Activity

Also listed as IDES 5102.

HCIN 5405 [0.5 credit]**Methodologies for Discrete-Event Modelling and Simulation**

Methodological aspects of simulation. Modelling discrete events systems. Modeling formalisms: FSA, FSM, Petri Nets, DEVS, others. Verification and Verification. Cellular models: Cellular Automata, Cell-DEVS. Continuous and hybrid models. Parallel and Distributed simulation (PADS) techniques. PADS middleware: HLA, Parallel-DEVS, Time-Warp.

Also listed as SYSC 5104.

HCIN 5406 [0.5 credit]**Object-Oriented Software Development**

Issues in modeling and verifying quality and variability in object-oriented systems. Testable models in model-driven and test-driven approaches. System family engineering. Functional conformance: scenario modeling and verification, design by contract. Conformance to non functional requirements: goals, forces and tradeoffs, metrics.

Also listed as COMP 5104.

HCIN 5501 [0.5 credit]**Virtual and Augmented Reality Technology**

Research in and design of virtual/augmented reality systems. Applications, history, human factors, display and input hardware, and interaction techniques for navigation, selection and manipulation. Students develop and evaluate a VR/AR system using modern game engines and 3D hardware devices such as head-mounted displays.

Includes: Experiential Learning Activity

Also listed as ITEC 5208.

HCIN 5900 [0.5 credit]**Directed Studies**

Independent study under supervision of a member of the Human/Computer Interaction faculty. Students are required to obtain their supervisor's written approval prior to registration and are limited to one such course in their program.

Prerequisite(s): Enrolment in the HCI program and permission of the program Director.

HCIN 5901 [0.5 credit]**Advanced Topics**

Topics not ordinarily treated in the regular course program due to their contemporary subject matter. The choice of topics varies from year to year. Details will be available at the time of registration.

HCIN 5909 [2.5 credits]**Thesis in Human-Computer Interaction**

Industrial Design (IDES)

Industrial Design (IDES) Courses**IDES 5000 [0.5 credit]****Directed Studies in Industrial Design**

Reading and research tutorials.

Includes: Experiential Learning Activity

IDES 5101 [0.5 credit]**Interdisciplinary Design Development Seminar**

Investigation of interdisciplinary design discourse about disciplines, themes, and concepts involved in design development. Examines a range of different professional perspectives and methods for integrating collaborative practices affected by leadership, negotiation, conflict management, and team building. Introduction to graduate academic writing.

Includes: Experiential Learning Activity

IDES 5102 [0.5 credit]**Design Research Methods**

Critical review of qualitative and quantitative research methods to support interdisciplinary design. Methods used by collaborators from the sciences and humanities as well as methods designers bring to interdisciplinary collaborations are introduced. Research for design, research through design and theoretical frameworks are discussed.

Includes: Experiential Learning Activity

Also listed as HCIN 5404.

IDES 5103 [0.5 credit]**Interdisciplinary Design Development Studio**

Team-based studio projects draw on interdisciplinary design development methods in achieving a common design objective. Projects will be supervised by academic and industry advisors from a wide range of disciplines, and conducted in collaboration with professionals from external organizations. Open to students from other programs.

Includes: Experiential Learning Activity

Prerequisite(s): IDES 5101 and IDES 5102 or permission of the School of Industrial Design.

IDES 5104 [0.5 credit]**Accessibility and Inclusive Design Seminar**

Provides foundational knowledge, exploring interdisciplinary approaches for incorporating accessible, inclusive, and human-centered design principles into the research, design, and development of products, information, and environments that can be used by all people, regardless of ability.

Includes: Experiential Learning Activity

IDES 5500 [0.5 credit]**Special Topics in Industrial Design**

Seminar course in contemporary design issues of an interdisciplinary nature. Guided by a faculty member and supported by external professionals.

Includes: Experiential Learning Activity

IDES 5909 [2.0 credits]**Thesis**

A comprehensive project that demonstrates the student's ability to conduct critical research in a specific area in which design can contribute to competitive advantage through design planning and interdisciplinary design development processes.

Includes: Experiential Learning Activity

Prerequisite(s): IDES 5101, IDES 5102, and IDES 5103.

Information and Systems Science (ISYS)

Info and Systems Science (ISYS) Courses**ISYS 5802 [0.5 credit]****Introduction to Information and Systems Science**

An introduction to the process of applying computers in problem solving. Emphasis is placed on the design and analysis of efficient computer algorithms for large, complex problems. Applications in a number of areas are presented: data manipulation, databases, computer networks, queuing systems, optimization.

Also listed as MATH 5802, SYSC 5802, COMP 5802.

ISYS 5908 [1.5 credit]**M.Sc. Thesis in Information and Systems Science**

Includes: Experiential Learning Activity

Also listed as MATH 5908, SYSC 5908, COMP 5908.

Information Systems (ITIS)

Information Systems (ITIS) Courses**ITIS 5401 [0.25 credit]****Managing Information Systems in Organizations**

Key issues in managing of information systems in organizations. Business and information technology challenges faced by managers and how decisions are made about acquiring, deploying, and using information technologies to achieve business objectives.

Includes: Experiential Learning Activity

ITIS 5403 [0.25 credit]**ICT for Development**

Conceptual frameworks to understand the prospects and challenges and roles of information and of information and communications technologies (ICTs) in social and economic development; knowledge and skills to help in the effective planning, development, implementation and management of ICT for development initiatives; case studies.

Includes: Experiential Learning Activity

ITIS 5408 [0.5 credit]**Social Analytics**

The process, tools and techniques necessary to acquire, clean, and analyze text that has been generated on social platforms. Social network analysis, sentiment analysis, topic extraction, and co-occurrence analysis.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5401, MKTG 5200, BUSI 5801.

Also offered at the undergraduate level, with different requirements, as BUSI 4408, for which additional credit is precluded.

ITIS 5411 [0.25 credit]**IT Service Support**

Management of IT processes crucial to business operations. IT service management (ITSM) best practices including service desk management, incident management, problem management, change management, release management, and configuration management.

Prerequisite(s): ITIS 5401.

ITIS 5412 [0.25 credit]**IT Service Delivery**

Service level management, services reporting, service continuity and availability management, budgeting and accounting for IT services, capacity management and information security management. Service level agreements (SLAs) and information technology security techniques or subjects.

Prerequisite(s): ITIS 5401.

ITIS 5413 [0.25 credit]**Enterprise Architecture and Governance**

Exploration and analysis of enterprise architecture frameworks used to guide organizations in aligning business and IT strategies and goals while enhancing organizational efficiency in the adoption and use of IT. Models of IT Governance.

Prerequisite(s): ITIS 5401.

ITIS 5414 [0.25 credit]**Emerging Information Technologies and Business Innovation**

Examines the emerging information technology trends and how new technologies can be incorporated to drive process innovation and improve operational performance.

Prerequisite(s): ITIS 5401, or ITIS 5403 for students in the International Development Management Concentration.

ITIS 5421 [0.25 credit]**Strategic Management of Technology Concentration Integration**

Components and aspects of technology strategy formulation and its successful implementation in an organization. Technology strategy from a general management perspective, designing and developing technology strategy for sustaining competitiveness.

Project-based course.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5401, ITIS 5411, ITIS 5412, ITIS 5413.

ITIS 5431 [0.25 credit]**Business Analytics for Managers**

Decision support systems in organizations; moving from business intelligence to business analytics; big data trends in organizations; theories and trends in data analytics.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5401 or permission of the School of Business.

ITIS 5432 [0.25 credit]**Business Analytics Methods**

Tools for data analytics; analyzing data beyond statistics; data mining and predictive modeling; time series analysis and forecasting; neural networks algorithms in business analytics.

Includes: Experiential Learning Activity

Precludes additional credit for ITIS 5433.

Prerequisite(s): ITIS 5431 and BUSI 5801 (or equivalent).

ITIS 5433 [0.5 credit]**Business Analytics Methods**

Tools for data analytics; analyzing data beyond statistics; data mining and predictive modeling; decision trees; logistic regression; neural networks; time series analysis and forecasting; algorithms for business analytics.

Includes: Experiential Learning Activity

Precludes additional credit for ITIS 5432.

Prerequisite(s): ITIS 5431 and BUSI 5801 or equivalent.

ITIS 5434 [0.25 credit]**Data Visualization for Business Analytics**

Principles, techniques, technology and applications of data visualization for decision making; cognition and visual perception; types of visual analysis; interactive dashboards; story telling; infographics.

Includes: Experiential Learning Activity

Prerequisite(s): ITIS 5431 or permission of the School.

Information Technology (ITEC)

Information Technology (ITEC) Courses**ITEC 5001 [0.0 credit]****Information Technology Seminars**

A seminar based course where the students make the presentations and participate in discussions. Some seminars done by guest lecturers. Graded Sat/Uns.

Includes: Experiential Learning Activity

ITEC 5002 [0.5 credit]**Fundamentals of Information Technology Research**

Basic concepts and techniques in information technology, including information systems, algorithms and software development process, research methods, and research and technical writing.

Includes: Experiential Learning Activity

Precludes additional credit for ITEC 5000 (no longer offered).

ITEC 5010 [0.5 credit]**Applied Programming I**

Algorithm design and computer programming with practical industry problems in information technology.

Topics include algorithms and pseudocode, programming fundamentals, memory operations, data structures, object oriented programming, program design, testing and debugging.

Includes: Experiential Learning Activity

ITEC 5100 [0.5 credit]**Planning and Design of Computer Networks**

Planning process of computer networks; needs and technical requirements; modeling of different network planning problems; exact and approximate algorithms; topological planning and expansion problems; equipment (switch, router) location problem; approximate and optimal routing algorithms; presentation of various case studies.

Includes: Experiential Learning Activity

ITEC 5101 [0.5 credit]**Cross Layer Design for Wireless Multimedia Networks**

Quality of service measures at different layers. Parameter adaptation, trade-offs, and optimization at physical, data-link, network, transport, and application layers. Cross-layer design in cellular, ad hoc, sensor, local area, green, and cognitive radio networks.

ITEC 5102 [0.5 credit]**Designing Secure Networking and Computer Systems**

Network security with coverage of computer security in support of networking concepts. Security issues in data networks at different protocol layers. Routing security, worm attacks, and botnets. Security of new mobile networks and emerging networked paradigms such as social networks and cloud computing.

ITEC 5103 [0.5 credit]**Cloud and Datacentre Networking**

Special issues of the networking requirements in datacentres and cloud computing environments. Performance, power requirements, redundancy of datacentre networks.

ITEC 5110 [0.5 credit]**Emerging Network Technologies**

Overview of technologies, protocols and techniques related to Information Technology networking that are either in their early stage of adoption or are not yet mainstream (i.e. beta or prototype stage). Focus will vary from year to year to reflect the evolutionary nature of this domain.

Also offered at the undergraduate level, with different requirements, as NET 4000, for which additional credit is precluded.

ITEC 5111 [0.5 credit]**Multimedia Networking**

Audio and video compression. H.261, JPEG, MPEG and DVI. Accessing audio and video from a web server. Real Time Streaming Protocol (RTSP). Multimedia operating systems. Multimedia database. Network support for multimedia applications. Multimedia synchronization.

Also offered at the undergraduate level, with different requirements, as NET 4007, for which additional credit is precluded.

ITEC 5112 [0.5 credit]**Secure Mobile Networking**

The concept, principle and rationale of mobile networking. Mobile network architecture, protocols, mobility management, routing and mobile TCP/IP; Security challenges, vulnerabilities and threats in mobile networks; Security defense techniques and countermeasures in mobile networks.

Also offered at the undergraduate level, with different requirements, as NET 4010, for which additional credit is precluded.

ITEC 5113 [0.5 credit]**Network Simulation**

Introduction to discrete event simulation; fundamental stochastic models for networking; queueing theory; deterministic algorithms for networking; confidence intervals; introduction to network modeling. Simulation exercises including traffic monitoring, congestion, routing protocols, resource utilization and growth planning using OPNET simulation tool.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as NET 4001, for which additional credit is precluded.

ITEC 5114 [0.5 credit]**Networked Applications**

Architectures for computing in modern data networks that adopt the Internet architecture. Topics covered include socket programming, RPC and RMI. Client-server and peer-to-peer models. Emerging application architectures. Also offered at the undergraduate level, with different requirements, as NET 4005, for which additional credit is precluded.

ITEC 5200 [0.5 credit]**Entertainment Technologies**

Advanced topics in entertainment technologies including web-based, film and television, video games and interactive systems.

ITEC 5201 [0.5 credit]**Computer Animation Technologies**

Advanced topics in computer animation: full body motion capture, space-time systems, physics-based animation, realistic rendering techniques, industry methods for large scene animations and live action integration; behavioural animation.

ITEC 5202 [0.5 credit]**Visual Effects Technologies**

Advanced look at the processes and technologies in visual effects, specifically in advanced processing of virtual sets (e.g. using chroma-keying), lighting and colour integration, filming technologies, motion tracking, and the integration of 3D objects/elements into real scenes.

ITEC 5203 [0.5 credit]**Game Design and Development Technologies**

Advanced technologies in the development of computer game systems and gaming experiences; the production process from idea to design: story, level, and character development. Games, game engine, theory and methodology.

ITEC 5204 [0.5 credit]**Emerging Interaction Techniques**

Advanced interaction styles and their associated technologies. Topics may include hand held and gestural interactions, ubiquitous computing, deformable user interfaces, physiological computing and tangible user interfaces.

Also listed as HCIN 5300.

ITEC 5205 [0.5 credit]**Design and Development of Data-Intensive Applications**

Design and development of data-intensive applications dealing with large-scale data. Data may include spatial data, time series, text, social media and different forms of digital media. Data modeling and management techniques will be discussed that enhance data analysis techniques and improve data-intensive applications.

ITEC 5206 [0.5 credit]**Data Protection and Rights Management**

Understanding how to use technology to implement data privacy, security, protection and related legal issues. Insights on how to develop systems for managing digital rights, data privacy rules, laws or policies relevant to different jurisdictions, rights, and responsibilities for protecting data and personal information.

ITEC 5207 [0.5 credit]**Data Interaction Techniques**

Design and development of how humans (e.g., end-users, knowledge-users and expert-users) interact with data ecosystem like data collection, storage, analysis and visualization. Techniques, methods and tools will be discussed on how humans interact with data based on capabilities of machines and needs of humans.

ITEC 5208 [0.5 credit]**Virtual and Augmented Reality Technology**

Research in and design of virtual/augmented reality systems. Applications, history, human factors, display and input hardware, and interaction techniques for navigation, selection and manipulation. Students develop and evaluate a VR/AR system using modern game engines and 3D hardware devices such as head-mounted displays. Includes: Experiential Learning Activity
Also listed as HCIN 5501.

ITEC 5900 [0.5 credit]**Directed Studies**

A course of independent study that fits the student's area of interest under the supervision of a faculty member of the School.

ITEC 5905 [1.0 credit]**Network Technology Project**

Students pursuing this degree will conduct a networking study, analysis, and/or design project under the supervision of a faculty member in the area of networks. Includes: Experiential Learning Activity

ITEC 5909 [2.5 credits]**Master's Thesis**

Includes: Experiential Learning Activity

ITEC 5910 [0.5 credit]**Selected Topics in Network Technologies**

Recent and advanced topics in network technologies. Trends in wireless networking, software defined networks, power-line networking. Students may be expected to contribute to lectures or seminars on selected topics.

ITEC 5920 [0.5 credit]**Selected Topics in Digital Media**

Recent and advanced topics in Digital Media. Students may be expected to contribute to lectures or seminars on selected topics.

ITEC 6200 [0.5 credit]**Introduction to Interdisciplinary Research in Information Technology**

Introduction to concepts and practices for research in Information Technology. Understanding the defining properties of computer-based systems and related technologies. Emphasis on bringing together skills related to technology, people and content in order to solve problems and explore new possibilities.

ITEC 6900 [0.5 credit]**Directed Studies**

A course of independent study that fits the student's area of interest under the supervision of a faculty member of the School.

ITEC 6907 [0.0 credit]**Doctoral Comprehensive**

Ph.D. comprehensive examination in the student's field. The exam consists of a written submission and an oral examination.

ITEC 6908 [0.0 credit]**Doctoral Proposal**

Ph.D. thesis proposal. Defending a proposal consists of a written submission and an oral examination.

Prerequisite(s): ITEC 6907 and permission of the School.

ITEC 6909 [0.0 credit]**Doctoral Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): ITEC 6908 and permission of the School.

ITEC 6920 [0.5 credit]**Selected Topics in Digital Media**

Recent and advanced topics in Digital Media. Students are expected to contribute to lectures or seminars.

Infrastructure Protection and International Security (IPIS)

Infrastructure Protection and International Security (IPIS) Courses

IPIS 5002 [0.0 credit]**Policy Primer**

Designed to provide MIPIS, MENG IPIS and Graduate Diploma in IPIS students with analytical, writing, and argument formulating strategies to apply in other courses during their studies. Includes review of policy making, government departments, writing for government, and proper citation strategies.

IPIS 5003 [0.0 credit]**Mathematics and Engineering Primer for non-Engineers**

Review and application of basic mathematics, physics and engineering principles required to prepare non-engineers and other students without a previous background in mathematics for the required course in Infrastructure Engineering Principles and other engineering courses. Precludes additional credit for IPIS 5001.

IPIS 5101 [0.5 credit]**Critical Infrastructure Protection: Issues and Strategies**

Examines critical infrastructure, its interdependencies, vulnerabilities, and security requirements; intentional and natural risks; policy responses to threat and vulnerability assessments; risk management approaches, prevention and protective security, emergency management and damage mitigation measures; continuity of critical operations and resilience planning.

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5103 [0.5 credit]**Infrastructure Engineering Principles**

Introduction to infrastructure engineering: civil, municipal/environmental, energy, communications, and military infrastructure systems; engineering principles; design, analysis and construction techniques; lifecycle performance, maintenance and retrofit strategies; optimization, asset-management; decision-making and decision support tools.

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5104 [0.5 credit]**Terrorism and International Security**

Contemporary international terrorism in comparative perspective; religious and ideological parameters motivating terrorism; sociology of recruitment and participation; evolving structure and dynamics of terror networks; terrorism finance, operations and related activities; impact of counter-terrorism measures; examples are drawn from international and domestic terrorism. Also listed as INAF 5244.

IPIS 5105 [0.5 credit]**Critical Infrastructure Risk Assessment**

Risk-assessment techniques and methodologies relevant for the identification of threats. Assessment of vulnerabilities and evaluating the impact on infrastructures or systems considering the probability of such threats being realized.

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5106 [0.5 credit]**Management of Critical Infrastructure**

Management of critical infrastructure (CI) and its relationship to facility and asset management; asset maintenance, rehabilitation, and restoration; tools, systems and approaches to effective CI management, integration and linkages across CI and consequent challenges to managers of critical infrastructure systems. Precludes additional credit for CIVE 5809 (2005-2007), CIVE 5404 and IPIS 5102 (2010-2014).

Prerequisite(s): Registration in the G.Dip (IPIS), M.IPIS or M.Eng (IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5301 [0.5 credit]**Disarmament, Arms Control and Nonproliferation**

Origins, theory and practice, with a focus on so-called weapons of mass destruction and current controversies. Emphasis on treaty negotiation and implementation, including monitoring, verification, facilitation and enforcement of compliance.

Also listed as INAF 5201.

IPIS 5302 [0.5 credit]**Contemporary International Security**

The evolving strategic and security environment since the end of the Cold War, encompassing both traditional and non-traditional concepts. Topics include hegemonism; the rise of new powers; terrorism; multilateralism; human security; and new security threats, including climate change.

Also listed as INAF 5202.

IPIS 5303 [0.5 credit]**Intelligence Statecraft and International Affairs**

The role of intelligence in foreign and security policy after the Cold War. Evolution of intelligence as regards strategic and policy requirements, the capabilities of selected services, interactions within government and civil society. Emphasis on the structure and functions of Canada's intelligence community.

Also listed as INAF 5204.

IPIS 5304 [0.5 credit]**Intelligence and National Security: Policies and Operations**

The roles and activities of intelligence services of selected countries. Their performance will be assessed in the light of historical experience, and in the context of the policy, legal and ethical constraints.

Also listed as INAF 5224.

IPIS 5305 [0.5 credit]**National Security Policy and Law**

The international legal and policy implications of identifying and responding to national security threats. Topics include: intelligence gathering; verification regimes; military and counter-terrorism operations; criminal prosecution; and, balancing human rights and security concerns.

Also listed as INAF 5234.

IPIS 5306 [0.5 credit]**Emergency and Business Continuity Management**

The disciplines of emergency management and business continuity, their interaction, and how they provide complementary contributions to critical infrastructure protection and resilience. A focus on Canada and Canadian Standards is supplemented by consideration of broader international approaches and contexts.

Precludes additional credit for IPIS 5320 taken before Winter 2021.

Prerequisite(s): Registration in the M.IPIS or M.Eng(IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5320 [0.5 credit]**Topics in Infrastructure Security Policy**

Courses in special topics related to infrastructure security, not covered by other graduate courses; course topics will be available prior to registration.

IPIS 5501 [0.5 credit]**Transportation and Aviation Security**

Canadian Public Security Strategy and Transportation System security environment; Civil Aviation security and operations: trends, impacts, and implications of evolving policies, operations, and technologies; security vulnerabilities in the transportation system; transportation of hazardous materials; secure movements on roads, highways and railways.

IPIS 5504 [0.5 credit]**Fundamentals of Fire Safety**

The fire safety system; social, economic and environmental issues; description of the fire safety regulatory system and the governing building codes and standards. This includes the global fire safety system in a facility and active fire protection systems; detection, suppression, smoke management.

Precludes additional credit for CIVE 5707 (2001-2003), CIVE 5609.

IPIS 5505 [0.5 credit]**Natural Hazards in Canada: Risk and Impact**

Earthquakes and ground motion, tsunamis, landslides, liquefaction; soil properties for ground response analysis: laboratory tests, in-situ tests; dams and embankments, slope stability, seismic effects on slope stability, retaining structures.

Also listed as EARTH 5215.

IPIS 5507 [0.5 credit]**Blast-load Effects on Structures**

Threats, risk analysis, vulnerability assessment; explosives: types and mechanisms; load determination; response of structural elements under blast loads, analysis and design for blast loads; blast mitigation, retrofit of structures; post-event assessment.

Also listed as CIVE 5507.

Precludes additional credit for CIVE 5707 (2007-2008).

IPIS 5508 [0.5 credit]**Introduction to Explosives and Explosion Effects as they relate to Infrastructure and its Components**

Properties and effects of explosives, propellants and pyrotechnics, detonation, deflagration and consequence of confinement, commercial and military applications including areas of terrorism and entertainment, sensitivities and hazards in transport, storage and use, specialized charges, explosion effects and indicators, and bombings and accident investigations.
Precludes additional credit for IPIS 5520.

IPIS 5509 [0.5 credit]**Introduction to Cybersecurity**

Introductory cyber security principles with an emphasis on critical infrastructure protection. Basic concepts in computer networking, including: local and remote access, cloud computing, vulnerability identification and threat assessment, attack methodologies and exposed access points, access control and authentication.

Precludes additional credit for IPIS 5520 taken before January 2021.

Prerequisite(s): Registration in the M.IPIS or M.Eng(IPIS) degrees or permission of the Infrastructure Protection and International Security Program.

IPIS 5520 [0.5 credit]**Selected Topics in Engineering of Critical Infrastructure**

Courses in special topics related to infrastructure security, not covered by other graduate courses; course topics will be available prior to registration.

IPIS 5901 [0.5 credit]**Tutorials in Infra Protection and Intl Security**

To be selected in consultation with Director and/or Associate Director.

IPIS 5907 [1.0 credit]**Research Project**

Students may be given permission to undertake an approved research project that will conduct a study, analysis or design project that relates to the protection and security of infrastructure under the general supervision of an engineer approved by the MIPIS Director or Graduate Supervisor.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the MIPIS Program Director or Graduate Supervisor.

IPIS 5908 [1.0 credit]**Research Paper**

Students may be given permission to conduct independent research under the general guidance of a research supervisor, examining an approved policy-relevant topic that integrates the infrastructure, engineering and security elements of their program of study.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the MIPIS Program Director or Graduate Supervisor.

IPIS 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): Full-time M. IPIS or M. Eng IPIS students who have completed a minimum of three classes (1.5 credits) in each of their first two terms, including 1.5 credits in core compulsory courses, and IPIS 5002 or IPIS 5003 as required are eligible for registration in their third term. Eligibility for registration in subsequent co-op terms requires the successful completion of all core program requirements.

International Affairs (INAF)

International Affairs (INAF) Courses**INAF 5002 [0.5 credit]****International Development Policy**

Review of current political, social and economic issues in international development policy. Sample topics include international institutions and global governance, development assistance, economic liberalization, gender, the environment and natural resources, food security, crime and conflict.

INAF 5003 [0.5 credit]**Project Operations in a Developing Country Context**

Evolution, institutional framework and central policy issues of international development programming. Practical emphasis, with applications to project operations and planning, finance and funding, capital mobilization, administration, procurement, preventing fraud and corruption, monitoring, effectiveness measurement, and options for improving the planning and delivery of assistance.

INAF 5006 [0.5 credit]**Food Security and Rural Development**

How the agricultural sector affects rural development and food security. Topics include an examination of the global agricultural market, biofuels, structural change in agriculture and agrarian reform, agriculture and the environment, and public policies affecting agriculture and rural development.

INAF 5007 [0.5 credit]**Theories of Development and Underdevelopment**

A comparative analysis of approaches to the study of development processes and underdevelopment, including structural-functional, neo-classical, Marxist, and dependency theories.

Prerequisite(s): enrolment in the Development

Administration stream of the M.A. program in the School of Public Policy and Administration, or permission of the School of International Affairs.

INAF 5008 [0.5 credit]**Economic Development Policy and Planning**

Developing country policies and planning and their impacts, including macro and sectoral techniques employed in development planning, budgeting, and problems in development administration.

Prerequisite(s): enrolment in the Development Administration stream of the M.A. program in the School of Public Policy and Administration, or permission of the School of International Affairs.

INAF 5009 [0.5 credit]**International Aspects of Economic Development**

Economic theory and policy dimensions of key issues in international economic development. Topics include: trade theory and policy for developing countries; debt, adjustment and macroeconomic stabilization; the role of international financial institutions; financial flows and the role of multinational corporations.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5015 [0.5 credit]**Research Design and Methods for International Affairs**

Key principles of social sciences research, basics of research design, and techniques of analysis. Emphasis on applications to international affairs and policy evaluation.

Precludes additional credit for INAF 5001 (no longer offered) and INAF 5013 (no longer offered).

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School of International Affairs.

INAF 5016 [0.5 credit]**Statistical Analysis for International Affairs**

Applications of statistics to international policy issues, using statistical software to understand and present large sample empirical information. Topics include describing data, presenting data, comparing variables and hypothesis testing, and basic multiple linear regression.

Precludes additional credit for INAF 5001 (no longer offered) and INAF 5014 (no longer offered).

INAF 5017 [0.25 credit]**International Policymaking in Canada: Structure and Process**

Structure and policymaking processes of the Canadian government: the role of Parliament, the Prime Minister and Cabinet, central agencies, and departments involved in international and national security affairs; the application of theories of policymaking to international affairs.

Precludes additional credit for INAF 5011 (no longer offered).

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School of International Affairs.

INAF 5018 [0.25 credit]**Law and International Affairs**

Introduction to international law and its role in international affairs. International legal sources and subjects, state responsibility, succession, jurisdiction and immunities, dispute settlement, and domestic implementation.

Precludes additional credit for INAF 5012 (no longer offered).

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School of International Affairs.

INAF 5100 [0.5 credit]**Canada in International Affairs**

Canada's role in international affairs; issues of conflict and conflict resolution, international political economy, and international development. Analysis of the content and formulation of Canada's international policies.

INAF 5101 [0.5 credit]**The Politics and Institutions of International Trade**

Canadian trade practice; trade policy within the broader context of Canadian policy-making, comparison of Canadian policy and practice with that in the United States, Europe, Japan, and the major developing countries.

Precludes additional credit for INAF 5409 (taken prior to 1997-98).

INAF 5102 [0.5 credit]**Canada-U.S. Relations**

The relationship between Canada and the United States from political, economic, diplomatic, military, and cultural perspectives. The history of Canada's relations with the United States, as our neighbor, trading partner, ally, and sometime antagonist.

Precludes additional credit for INAF 5409, if taken 2003/04, 2004/05.

INAF 5108 [0.5 credit]**Conflict Analysis**

The causes of international and intrastate war and violent conflict, with a focus on preventable causes. Explores major theories, hypotheses, debates and historical controversies from a range of social science perspectives, with emphasis on the implications for diplomacy, foreign and military policy.

Precludes additional credit for INAF 5105 (taken prior to 2001).

INAF 5109 [0.5 credit]**Conflict Management: Theory and Evidence**

Evaluation of conflict management theory and practice in regional, interstate and intrastate conflict. Analyse the various dimensions of conflict management - including prevention, mitigation, and containment, as well as military engagement - and assess the efficacy of these approaches in contemporary case studies.

Includes: Experiential Learning Activity

INAF 5200 [0.5 credit]**Peacebuilding and Reconstruction: Theory and Practice**

Complexities and challenges of contemporary peacebuilding, reconstruction and reconciliation after violent conflict. Critical evaluation of post-war political, social, legal, and security arrangements and institutions for preventing violence and enhancing long-term peace and stability in war-torn societies.

Includes: Experiential Learning Activity

INAF 5201 [0.5 credit]**Disarmament, Arms Control and Nonproliferation**

Origins, theory and practice, with a focus on so-called weapons of mass destruction and current controversies. Emphasis on treaty negotiation and implementation, including monitoring, verification, facilitation and enforcement of compliance.

Also listed as IPIS 5301.

INAF 5202 [0.5 credit]**Contemporary International Security**

The evolving contemporary strategic and security environment, encompassing both traditional and non-traditional concepts. Topics include hegemony; the rise of new powers; terrorism; multilateralism; human security; and new security threats, including climate change.

Also listed as IPIS 5302.

INAF 5203 [0.5 credit]**International Mediation and Conflict Resolution**

Exploration of various approaches to the prevention, management and resolution of international conflict including peacekeeping, preventive diplomacy, mediation and peacebuilding, as well as less formal mechanisms for third party collaborative problem solving.

INAF 5204 [0.5 credit]**Intelligence and International Affairs**

Advanced introduction to the study of intelligence from an academic perspective, how it is conducted, its role and limits in democratic states. Topics include: the intelligence cycle; intelligence collection and analysis; intelligence and policy relationships; intelligence accountability and control; and international liaison and cooperation.

Also listed as IPIS 5303.

INAF 5205 [0.5 credit]**Economics of Conflict**

The economic dimensions of conflict and the application of economic methods to understanding conflict and conflict management.

Precludes additional credit for INAF 5409 [formerly 46.549R] (taken in 2002-03).

INAF 5206 [0.5 credit]**Civil-Military Relations**

Theoretical and practical issues of civil-military relations; analysis of the multidisciplinary and multidimensional nature of the relationship between society, political authority and the military, using comparative and global frames of reference.

Precludes additional credit for INAF 5409 sections R and S (taken 2002/03, 03/04).

INAF 5207 [0.5 credit]**Middle East Economic and Political Relations**

Economic and political relations among countries of the Middle East; emphasis on the peace process and arrangements for regional security and regional economic cooperation; prospects for regional collaboration.

INAF 5208 [0.5 credit]**U.S. Foreign and Security Policy**

Causes and consequences of U.S. foreign and security policy. Explanation and evaluation of past and present U.S. policies. Cases will be drawn from 20th century wars, interventions and crises; post-Cold War and post 9-11 U.S. policies.

Precludes additional credit for INAF 5409 section 'X' (taken 2001/02, 02/03).

INAF 5209 [0.5 credit]**Conflict and Development**

Examination of competing interpretations of conflict in developing countries; material conditions, institutional factors, and ideological, or identity-based framing processes. The impact of war on development, and implications for policy.

INAF 5210 [0.5 credit]**Technology and War**

The impact of technology on modern armed conflict, including the way states decide to use (or not use) force and debates over the ethics of war. Topics include: unmanned technologies, nuclear weapons, social media and technologies of peace.

INAF 5211 [0.5 credit]**Comparative Defence Policy**

Politics and processes shaping defence policies around the world. Topics include defence budgeting, recruitment and retention, gender and diversity in defence. Examines and assesses the roles played by armed forces, ministries/departments of defence, political leadership and legislatures.

INAF 5212 [0.5 credit]**Issues in War and Defence Studies**

Contemporary issues and topics related to the conduct of warfare and defence policymaking. Topics include military strategy and conduct of operations, and challenges in defence policy such as procurement.

INAF 5214 [0.5 credit]**Economics for Defence and Security**

Examines the economic analysis of defence and security, applying economic analysis to topics such as defence production, procurement, offence and defence balance, alliance theory, deterrence, arms races, terrorism and terrorist financing.

INAF 5218 [0.5 credit]**Post-Conflict Justice: Theory and Practice**

Domestic and international responses to war crimes, wartime atrocities, and human rights abuses. Emphasis on theoretical and policy debates, and relationship of post-war trials, truth commissions, and other accountability measures to democratic development, rule of law, reconciliation, and violent conflict resolution and prevention.

Includes: Experiential Learning Activity

INAF 5219 [0.5 credit]**Rights, Development, and Conflict**

Uses economic institutionalism to examine the intersection of development and conflict, focusing on how the connection between property rights and development affects conflict. Topics include gender, land conflict, urban peripheries, migration and refugees, domestic and transnational crime, and state violence.

INAF 5220 [0.5 credit]**Intelligence Analysis**

Theoretical and empirical literature related to intelligence analysis including the role and challenges of intelligence analysis, politicization of intelligence, analytical mindsets and limits of intelligence analysis, current versus long-term intelligence, estimative analysis, Structured Analytical Techniques, intelligence analytical products, the intelligence to policymaker dimension.

INAF 5223 [0.5 credit]**Counterterrorism**

Theory and practice of counterterrorism based on contemporary and historical experience of Western democracies including the role of law enforcement, intelligence, military force, diplomacy, and civil society in counterterrorism and assessment of the legal, ethical, human rights and civil liberties implications of contemporary counterterrorism.

Includes: Experiential Learning Activity

INAF 5224 [0.5 credit]**Intelligence and National Security**

The function and purpose of intelligence and activities of intelligence agencies in relation to contemporary national security challenges faced by Western democratic states; role of intelligence in strategic and operational warning, decision-making, and the policy, legal and ethical dimensions of intelligence and national security.

Also listed as IPIS 5304.

INAF 5225 [0.5 credit]**Cybersecurity in Canada**

Social and technical issues arising from cybersecurity threats, and the public and private policy responses to threats. Cybersecurity in Canada, including the implications for Canada arising from cyber policy of other key countries as well.

INAF 5226 [0.5 credit]**Cyber Warfare**

Defines and examines the emerging issue of cyber conflict. Surveys existing techniques, policies, and legal tools for using, or defending against, cyberattacks during both peacetime and war.

INAF 5234 [0.5 credit]**National Security Policy and Law**

The international legal and policy implications of identifying and responding to national security threats. Topics include: intelligence gathering; verification regimes; military and counter-terrorism operations; criminal prosecution; and, balancing human rights and security concerns.

Also listed as IPIS 5305.

INAF 5244 [0.5 credit]**Terrorism and International Security**

Contemporary international terrorism in comparative perspective, including religious and ideological motivations, recruitment and participation, evolving structures and dynamics of terror networks, financing and operations, and counter-terrorism measures. Examples are drawn from international and domestic terrorism.

Also listed as IPIS 5104.

Precludes additional credit for INAF 5409 Section W in Winter 2008.

INAF 5254 [0.5 credit]**Capstone in Canadian Security Policy**

Students practice researching and writing reports in the area of national and cyber security policy. Students work in groups to explore a novel security consideration or puzzle in collaboration with a pre-selected government partner.

Includes: Experiential Learning Activity

INAF 5300 [0.5 credit]**Foreign Direct Investment: Theory and Policy**

Concepts, theories, evaluation and analysis of foreign direct investment (FDI) and policies affecting international investment. Effects of FDI on source and recipient countries; including FDI to and from emerging markets; and national and international policies affecting FDI.

Includes: Experiential Learning Activity

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs, or permission of the School of International Affairs.

INAF 5301 [0.5 credit]**Strategic Foresight in International Security**

Introduces students to the methods and approaches used to identify, explore, and assess emerging and future trends in international security. Students apply a variety of tools and techniques for thinking creatively about the future of terrorism, crime, cybersecurity, weaponry, warfare, and intelligence.

Includes: Experiential Learning Activity

INAF 5305 [0.5 credit]**International Bargaining and Negotiation: Theory and Practice**

An examination of bargaining and negotiation in international economic, political, and security issue areas, using case studies and theoretical analysis.

Includes: Experiential Learning Activity

INAF 5306 [0.5 credit]**Trade Policy in North America**

Canadian, American and Mexican trade and trade policy from colonial times to present, emphasizing the development of trade relations and the negotiation and operation of bilateral, regional (NAFTA), and multilateral trade agreements.

Includes: Experiential Learning Activity

Precludes additional credit for INAF 5409, section 'F' (taken in 2005/06).

INAF 5308 [0.5 credit]**International Trade: Theory and Policy**

The pure theory of international trade and selected policy issues. Topics include theories of the pattern of trade, the gains from trade, the theory of distortions and welfare, and theories of endogenous trade policy formation.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5309 [0.5 credit]**International Finance: Theory and Policy**

Theory and policy in open economy macroeconomics and international finance. Topics include: exchange rate and output determination, balance of payments adjustment, monetary and fiscal policy under different exchange rate regimes, and the structure and performance of the international monetary system.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5400 [0.5 credit]**Trade Policy Analysis**

Selected trade policy instruments and trade-related policy issues. Analytical approaches to tariffs, quotas, dumping and countervailing duties, global value chains and trade disputes.

Includes: Experiential Learning Activity

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs, or permission of the School of International Affairs.

INAF 5401 [0.5 credit]**International Financial Institutions and Policy**

Institutional arrangements, international financial flows, and critical events in international finance; development and operation of international financial institutions, and how they have shaped modern financial markets, events, and policy.

Includes: Experiential Learning Activity

Precludes additional credit for INAF 5409 (taken prior to 1997-98).

INAF 5402 [0.5 credit]**Territory and Territoriality**

Contemporary geographical and international relations theorizing is challenging conventional notions of boundaries and territories in the political organization of modernity. Using contemporary writings on geopolitics, security, sovereignty, self-determination and identity politics, this course investigates territoriality as a political and intellectual strategy.

Includes: Experiential Learning Activity

Also listed as GEOG 5400.

INAF 5403 [0.5 credit]**Diplomacy and Foreign Policy: Theory and Practice**

Introduces actors, institutions, and formats of modern diplomacy and foreign policy, and examines the changing global policy context. Focuses on practical skills development such as diplomatic briefing and negotiation.

Includes: Experiential Learning Activity

INAF 5405 [0.5 credit]**International Organizations in International Affairs**

Theory of international organizations, the history of their accelerated emergence since World War II and a critical analysis of the roles they play in international affairs, with an emphasis on the United Nations and its subsidiary, specialized and associated agencies, and regional and sub-regional organizations.

INAF 5407 [0.5 credit]**International Relations Theory**

Overview of theories of international relations. Organized both historically and conceptually, the course will examine a variety of theoretical approaches to international relations, among them the realist, liberal, structural, neo-realist, and critical perspectives.

INAF 5408 [0.5 credit]**Gender in International Affairs**

The role of gender differences in international affairs gender in the social sciences and feminist theories regarding war, nationalism, human rights, development, and the global economy.

Includes: Experiential Learning Activity

INAF 5409 [0.5 credit]**Selected Topics in International Affairs**

INAF 5410 [0.5 credit]**Global Public Policy**

Public policy at the international level, including the roles of international institutions, states, non-governmental organizations and business in problem solving, policy making and governance. Examples of global policy problems include labour rights, public health, financial regulation, internet governance and environment.

INAF 5411 [0.5 credit]**Internet Governance**

Challenges of Internet governance at the national and global levels including trust, security and privacy; the expanding importance of the Internet to society and the economy; comparative and diffuse regulatory regimes, and challenges posed by the 'Dark Web' and the manipulation of content.

INAF 5419 [0.5 credit]**Selected Topics in International Affairs****INAF 5429 [0.5 credit]****Selected Topics in Diplomacy and Foreign Policy**

Selected Topics in Diplomacy and Foreign Policy. Topics may vary from year to year.

INAF 5439 [0.5 credit]**Selected Topics in Security and Defence Policy**

Selected Topics in Security and Defence Policy. Topic may vary from year to year.

INAF 5449 [0.5 credit]**Selected Topics in Conflict Analysis and Resolution****INAF 5459 [0.5 credit]****Selected Topics in International Economic Policy**

Includes: Experiential Learning Activity

INAF 5469 [0.5 credit]**Selected Topics in Intelligence and International Affairs**

Topic may vary from year to year.

INAF 5479 [0.5 credit]**Selected Topics in International Organizations and Global Public Policy****INAF 5489 [0.5 credit]****Selected Topics in International Development Policy****INAF 5499 [0.5 credit]****Selected Topics in Health, Displacement and Humanitarian Policy**

Selected Topics in Health, Displacement and Humanitarian Policy. Topics may vary from year to year.

INAF 5500 [0.5 credit]**Comparative Trade Policy**

Examination of trade policies of various states, and their associated institutional arrangement. Countries and country groupings to be examined include the United States, Japan, the European Union, and key developing countries.

INAF 5501 [0.5 credit]**Global Political Economy**

The interaction between states, interest groups, firms and markets, how the global nature of the world economy affects states, especially Canada, and the governance of economic issues at the international level including trade, investment, finance and development.

Precludes additional credit for INAF 5000 (taken prior to 2001).

INAF 5502 [0.5 credit]**State Sovereignty and Globalization**

How increased political, social and economic integration internationally affects a government's ability to formulate policy; examination of domestic and international policy issues and whether and how global forces and their domestic counterparts shape the policy-making environment.

Includes: Experiential Learning Activity

Precludes additional credit for INAF 5000 (taken prior to 2001).

INAF 5504 [0.5 credit]**Advanced International Law: Principles and Practice**

Critical assessment of international law in key areas of international affairs, including its development, content, application, and relationship to the behaviour and interests of various actors. Specific areas include human rights, self-determination, armed force, trade, criminal justice, and environmental law.

Prerequisite(s): INAF 5018 (may be taken concurrently) and M.A. standing in the Norman Paterson School of International Affairs, or permission of the School of International Affairs.

INAF 5505 [0.5 credit]**International Law: Theory and Practice**

Theoretical perspectives on international law and the role international law plays in the international system. Topics include basis, creation and sources of international law, international dispute resolution, and international law and world order transformation.

Also listed as LAWS 5603.

INAF 5506 [0.5 credit]**International Law: Use of Force**

Specialized international legal principles governing the use of armed force, and their theoretical and practical implications, with a view to understanding and critiquing their roles in limiting and justifying state recourse to armed force and regulating the conduct of resulting inter- and intra-state conflict.

Prerequisite(s): INAF 5018 (may be taken concurrently).

INAF 5507 [0.5 credit]**International Economic Law: Regulation of Trade and Investment**

Study of regulation of international economic relations. International institutions, legal aspects of integration, governmental regulation of trade and investment. Also listed as LAWS 5200.

Prerequisite(s): open only to graduate students in their master's year who have not previously studied international economic law.

INAF 5509 [0.5 credit]**Law, Politics, and Economics in International Affairs**

Linkages and differences between the disciplines of law, political science and economics as they relate to international affairs. How underlying assumptions of each discipline affect the way different issues in international affairs are considered.

Prerequisite(s): M.A./JD standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5510 [0.5 credit]**Law and Diplomacy**

International law as a tool of diplomacy and foreign policy, including international diplomatic law. Legal and practical considerations affecting treaty relationships, state recognition, dispute settlement, diplomatic relations (including inviolability, non-interference and asylum), consular activities and relations with international organizations.

Prerequisite(s): INAF 5018 (may be taken concurrently).

INAF 5600 [0.5 credit]**The Economics of Human Development**

The economic analysis and theory of the major areas of human development in developing countries. Topics include demography and population, education, health and nutrition, agriculture, women and development, the financial system and microfinance, the role of institutions.

Prerequisite(s): M.A. standing in the Norman Paterson School of International Affairs or permission of the School.

INAF 5601 [0.5 credit]**Social Theory and International Development**

This seminar examines the theoretical foundations for understanding international development policy and practice. It provides a space for thinking about development as a normative ideal and about the possibility of generating alternative horizons.

INAF 5602 [0.5 credit]**Development Assistance: Theory and Practice**

Economic, moral, and political arguments for development assistance, aid effectiveness; the role of bilateral and multilateral donors; aid accounting, human development and human rights; NGOs and international assistance.

INAF 5603 [0.5 credit]**Issues in Development in Africa**

Analysis of structures and processes of political, social, and economic change in intertropical Africa at scales ranging from the intrahousehold and local community to the state and international system. Integration of gender and the environment into analyses which draw on theories of political economy.

INAF 5604 [0.5 credit]**Issues in Development in Latin America**

Principal development challenges, trends, and policies in the region since 1960, e.g. climate change, poverty, inequality, de-industrialization, urbanization, crime and violence, with gender and racialized minorities as cross-cutting themes.

INAF 5605 [0.5 credit]**The Ethical Dimension of International Affairs**

Critical examination of the ethical dimensions of development, global conflict, and international political economy; beliefs and values, rights and obligations, individual and state morality.

INAF 5609 [0.5 credit]**Development Project Evaluation and Analysis**

Examination of social cost-benefit analysis and other micro-economic methods of project evaluation in the context of the project cycle in developing countries with emphasis on policy analysis and implementation practice, case studies of development projects, including those of non-governmental organizations.

INAF 5610 [0.5 credit]**Fragile States: Theory and Policy**

Introduction to the linkages between state fragility, development, conflict and instability with specific attention given to theory, evidence, analysis and policy. Diagnosis and analysis of fragile states for the purposes of program evaluation and strategic planning.

Includes: Experiential Learning Activity

INAF 5612 [0.5 credit]**International Development Institutions**

Structure, operations and effects of major international development institutions on international development policy and the development process. Key institutions include the World Bank, and the regional development banks, UNDP, and other public and private institutions.

INAF 5701 [0.5 credit]**Global Environmental Change: Human Implications**

Global environmental change; its significance for societies, economies and international relations. Value systems underlying environmental discourse; political economy of the environment; sustainability and security. Environmental diplomacy and grassroots environmentalism. Regionalized impacts of pressures on natural environments; challenges of adaptation.

Includes: Experiential Learning Activity

Also listed as GEOG 5005.

INAF 5702 [0.5 credit]**International Environmental Affairs**

International environmental issues, with a focus on policy options and institutions relevant to addressing these issues. Topics include the relationship between the environment and trade, investment, globalization, development and conflict.

Precludes additional credit for INAF 5409 (formerly 46.549U)(taken in 2002/03).

INAF 5703 [0.5 credit]**International Public Economics**

The economic analysis of institutions and of factors associated with global governance, including theories of cooperation, bureaucratic behaviour, externalities, common resource and environmental problems, public goods and other economic theories for state intervention applied to the international level.

INAF 5704 [0.5 credit]**Human Security: From Policy to Practice**

Human security issues including perspectives of key governmental, international and non-governmental actors. Micro-disarmament, the protection of civilians, war economies, and post-conflict security issues.

Precludes additional credit for INAF 5409, section 'W' if taken in 2004/05 or 2005/06.

INAF 5705 [0.5 credit]**Global Social Policy**

Concepts of and approaches to international social policy. Concepts of social justice, comparative welfare regimes and citizenship. Topics include social reform, changes in the public/private provision of social services, participation in social policy, poverty reduction, health and education.

INAF 5706 [0.5 credit]**Global Health Policy**

Global dimensions of health issues, including the relationship between health and governance, development, human rights, and security. Develop skills to examine global health challenges, such as HIV/AIDS and pandemic influenza, and to evaluate the international policy responses.

Includes: Experiential Learning Activity

INAF 5707 [0.5 credit]**Complex Humanitarian Emergencies**

The causes and consequences of complex humanitarian emergencies, their impact on civilians and the responses of international and national actors. Critical review of policy responses of the international community - including donor governments, multilateral organizations, the military and non-governmental organizations.

Includes: Experiential Learning Activity

INAF 5708 [0.5 credit]**Humanitarian Assistance: Policies and Issues**

Legal, policy and programming dimensions of humanitarian assistance. Policy responses and good practice; evaluations of donor performance.

INAF 5709 [0.5 credit]**Human Rights: International Politics and Policies**

Overview of key international human rights policies and debates. Themes include human rights and religion, development, trade, culture, and gender. Readings from applied and scholarly disciplines, focusing on the actions of governments, civil society, development agencies, international organizations and regional bodies.

Also listed as IDMG 5605.

INAF 5710 [0.5 credit]**Global Governance of Displacement**

This course examines how international and national governance mechanisms are addressing the unprecedented global movement of forcibly displaced people, how this movement of people is straining existing international and national institutions and cooperation mechanisms, and explores innovative mechanisms to improve this global response.

INAF 5711 [0.5 credit]**International Labour Migration**

This course will expose students to a range of issues pertaining to labour migration in the 21st Century. It will focus primarily on trends in temporary labour mobility but will address permanent migration, and consider factors that influence the international movement of such workers.

INAF 5800 [0.5 credit]**Asia Pacific Economic and Political Relations**

The evolving pattern of economic and political relations in the Asia-Pacific region. Topics will include security issues; trade and investment; and development cooperation; institutional arrangements, including ASEAN, APEC, AFTA, and Canada's role in the regional affairs.

INAF 5801 [0.5 credit]**Regional Cooperation Among Developing Countries**

The discourse between traditional and Southern theorists on regional integration among developing countries. The effects of regional trade, governance, investment, security and environmental agreements on development.

INAF 5802 [0.5 credit]**The International Political Economy of Transition**

Problems of reintegration into the world economy and dilemmas of transition from command to market economies. Topics may include new trade and investment patterns, role in regional and international economic organizations, search for appropriate exchange rate policies, impact of Western assistance.

Also listed as EURR 5102.

INAF 5803 [0.5 credit]**European Economic Integration**

Economic issues and policies related to the process of European integration and the development of the post-World War II European Union.

Also listed as EURR 5105.

Prerequisite(s): ECON 1000.

INAF 5804 [0.5 credit]**International Relations in Europe**

International relations and organizations in Europe from theoretical and historical perspectives. Origins and development of European organizations such as the European Union and the Organization for Security and Co-operation in Europe.

INAF 5805 [0.5 credit]**The EU in International Affairs**

The impact of the EU on international affairs; the internal development of the EU, the evolution of integration theory, and the growth of the EU's external relations capabilities. Includes: Experiential Learning Activity
Also listed as EURR 5109.

INAF 5807 [0.5 credit]**The European Union and its Eastern Neighbours**

The EU's European Neighbourhood Policy and Eastern partnership policy, the Russia-EU "strategic partnership". Policies and reactions of non-EU East European countries toward the EU. The interaction of Member state policies and EU policies. May include historical legacies, cultural factors, public opinion, energy security. Includes: Experiential Learning Activity
Also listed as EURR 5205, PSCI 5111.

INAF 5809 [0.5 credit]**Turkey in the International System**

Analysis of topics related to modern Turkey. The course may cover aspects of the Turkish economy, politics and government, foreign policy, and broader regional relations.

INAF 5901 [0.5 credit]**Tutorials in International Affairs**

To be chosen in consultation with the director.

INAF 5904 [0.5 credit]**Quantitative Research Methods**

A basic introduction into the theory and application of quantitative analysis, primarily applied basic econometrics for the constructions and analysis of data sets with standard software packages. Precludes additional credit for INAF 6002. Prerequisite(s): permission of the School.

INAF 5905 [0.5 credit]**Qualitative Research Methods and Design**

Problem statements, research questions and approaches to knowledge acquisition in international affairs, focusing on policy relevance. Topics include advantages and limitations of inductive and deductive research methods, variable selection and hypothesis development, case studies and field research, data gathering, and methodology choice. Precludes additional credit for INAF 6001. Prerequisite(s): permission of the School.

INAF 5906 [1.0 credit]**M.A./JD Research Essay**

A research essay that allows an M.A./JD. student to integrate legal and international affairs studies in an analysis of a topic of his or her choice. Includes: Experiential Learning Activity
Prerequisite(s): permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5908 [1.0 credit]**Research Essay**

A research essay option that allows an M.A. student to apply their international affairs studies to a topic of his or her choice. Includes: Experiential Learning Activity
Prerequisite(s): permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5909 [2.0 credits]**M.A. Thesis**

A research thesis option that allows a student in the M.A. program to combine original research with international affairs studies in an analysis of a topic of his or her choice. Prerequisite(s): A- average in all M.A. required courses and a minimum of 3.0 full course credits, permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity
Prerequisite(s): registration in the Co-operative Education Option of the Master of Arts program.

INAF 5914 [0.25 credit]**Internship Placement**

Internship students are required to register in this course during their internship work term. Priority for the internship placement will be given to full time, first year students in the MA and MA-JD program. Includes: Experiential Learning Activity
Prerequisite(s): full-time registration in the NPISA M.A. or M.A.-JD program.

INAF 5919 [2.0 credits]**M.A./JD Thesis**

A research thesis option that allows a student in the M.A./JD program to combine original research with legal and international affairs studies in an analysis of a topic of his or her choice. Prerequisite(s): A- average in all M.A. required courses and a minimum of 3.0 full course credits, permission of the School after the submission of a satisfactory proposal and identification of a suitable supervisory team.

INAF 5920 [0.5 credit]**Selected Topics in Security and Defence Policy**

Selected Topics in Security and Defence Policy. Topic may vary from year to year.

INAF 5921 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5922 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5923 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5924 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 5925 [0.5 credit]**Tutorial in International Affairs**

Prerequisite(s): permission of the School.

INAF 6001 [0.5 credit]**Qualitative Research Methods**

Problem statements, research questions and approaches to knowledge acquisition in international affairs, focusing on policy relevance. Topics include advantages and limitations of inductive and deductive research methods, variable selection and hypothesis development, case studies and field research, data gathering, and methodology choice.

Precludes additional credit for INAF 5406.

Prerequisite(s): standing in the NPSIA Ph.D. program or permission of the School.

INAF 6002 [0.5 credit]**Quantitative Research Methods**

Basic theory and application of quantitative analysis, primarily applied basic econometrics for the construction and analysis of data sets with standard software packages.

Precludes additional credit for INAF 5904.

Prerequisite(s): standing in the NPSIA Ph.D. program or permission of the School.

INAF 6003 [0.5 credit]**Advanced International Policy Analysis**

International public policies of a number of countries, including Canada; approaches to the policy process and case studies of the formulation and evaluation of economic, political, and security policies.

Precludes additional credit for INAF 5905.

Prerequisite(s): standing in the NPSIA Ph.D. program or permission of the School.

INAF 6004 [0.5 credit]**Doctoral Comprehensive Examination in Policy and Research Methods**

A comprehensive examination covering the policy and methods material in INAF 6001, INAF 6002, and INAF 6003.

Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6100 [0.5 credit]**Doctoral Field Examination in Conflict Management and Resolution**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in security, conflict analysis, management and prevention. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6200 [0.5 credit]**Doctoral Field Examination in International Development Policy**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in international development policy. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6300 [0.5 credit]**Doctoral Field Examination in International Economic Policy**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in international economic policy. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6400 [0.5 credit]**Doctoral Field Examination in Security, Intelligence and Defence (SID)**

A comprehensive examination covering interdisciplinary and policy-oriented research on key policy issues in security, intelligence and defence. Material is drawn from a core reading list, the required economics and three field courses declared by the student and approved by the Ph.D. Supervisor.

Prerequisite(s): Enrolment in the NPSIA Ph.D. program or permission of the School.

INAF 6800 [0.0 credit]**Doctoral Field Comprehensive Seminar**

The seminar helps to prepare students for writing their doctoral field comprehensive examinations while exposing them to the issues and approaches across the different doctoral field.

Prerequisite(s): standing in the NPSIA Ph.D. program.

INAF 6906 [0.5 credit]**Doctoral Research Prospectus Seminar**

A seminar to assist students in developing their research prospectus, and prepare for the prospectus defence. Other research issues, such as ethics clearance, scholarly articles submission and field work logistics are also addressed.

Prerequisite(s): Completion of field comprehensive examination and required courses in the NPSIA Ph.D.

INAF 6907 [0.5 credit]**Doctoral Research Prospectus Defence**

Public defence of a research prospectus that will be the basis for the dissertation.

Prerequisite(s): Successful completion of INAF 6906, the Doctoral Research Prospectus Seminar.

INAF 6909 [0.0 credit]**Doctoral Research Thesis**

The doctoral dissertation, normally supervised by faculty in the Norman Paterson School of international Affairs with the possibility of supervision from faculty in other social sciences departments, schools, and institutes.

Prerequisite(s): completion of all other Ph.D. program requirements in the NPSIA Ph.D. program.

INAF 6921 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6922 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6923 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6924 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

INAF 6925 [0.5 credit]**Ph.D. Tutorial in International Affairs**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

International Business (IBUS)

International Business (IBUS) Courses**IBUS 5701 [0.25 credit]****International Business**

Managerial and strategic implications of differing international environments for a variety of business functions including structure and control, managing human resources, marketing, finance and logistics. Complexities of working across political and cultural boundaries.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5300 (no longer offered).

IBUS 5711 [0.25 credit]**International Marketing and Trade**

Product adaptation, distribution networks, promotion practices, cross-border pricing strategy and regulatory and other limitations. Trade trends and the macro and micro effects of culture provide connecting themes.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5301 (no longer offered).

Prerequisite(s): IBUS 5701.

IBUS 5712 [0.25 credit]**Business and Government in Emerging Economies**

Projects in emerging economies often involve partnerships between businesses, local governments and foreign donors. Emerging forms of cooperation which address issues of poverty, infrastructure and education. The role of international firms in the process of economic transition.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5300 (no longer offered).

Prerequisite(s): IBUS 5701.

IBUS 5713 [0.25 credit]**Doing Business in the United States**

The role of the United States as Canada's most important foreign trade partner. The U.S. as a distinct business environment. Regulatory structures, competitive environment, and cross-regional buyer behaviour within the U.S. Comparative view of the business culture in the U.S. and Canada.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5300 (no longer offered).

Prerequisite(s): IBUS 5701.

IBUS 5714 [0.25 credit]**Buyer Behaviour in International Markets**

Globalization and the divergent, crossvergent and convergent paradigms are used to explain and analyze the behaviour of buyers across different markets and cultures. Socio-cultural, psychological, organizational and other factors that guide purchase decision-making behavior in consumer and B2B markets are examined.

Includes: Experiential Learning Activity

Prerequisite(s): IBUS 5701.

IBUS 5715 [0.25 credit]**Foreign Markets: Selection, Assessment and Entry Strategies**

Selection and assessment of foreign markets suitable to corporate capabilities. Factors affecting the internationalization of firms, from SMEs and born globals to large multinationals. Methods for foreign market entry and service, from exporting, licensing, and franchising to JVs, M&A and greenfield investment.

Includes: Experiential Learning Activity

Prerequisite(s): IBUS 5701.

IBUS 5716 [0.25 credit]**Management of International Business**

Operating organizations across national and cultural boundaries adds complexity to the tasks that confront managers and requires specific skills. Topics discussed include motivation, leadership, communication and negotiation in a cross-cultural context as well as the pervasive effects of culture on interactions within and across firms.

Includes: Experiential Learning Activity

Prerequisite(s): IBUS 5701.

IBUS 5721 [0.25 credit]**Regional and Global Business Strategies Concentration Integration**

Regional and global business expansion strategies and how global interdependence and regional trade groups affect international investment and marketing strategies. Environmental and political factors that influence policy within and between trade blocs and how businesses participate in these processes.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5301 (no longer offered).

Prerequisite(s): IBUS 5701 and successful completion of all courses in the International Business concentration.

International Development Management (IDMG)

International Development Mgmt (IDMG) Courses**IDMG 5610 [0.25 credit]****Introduction to International Development**

Overview of the theoretical and practical underpinnings of international development management. Covering macro and micro level perspectives, the course offers rich insights into current approaches and debates in international development management.

Includes: Experiential Learning Activity

Journalism (JOUR)

Journalism (JOUR) Courses**JOUR 5000 [0.5 credit]****Journalism and Society I**

An introduction to analysis of the news media in Western society, considering classical arguments and contemporary trends in the scholarly assessment of journalism practice.

JOUR 5003 [0.5 credit]**Advanced Journalism: Multimedia**

Designed to enhance storytelling, reporting and editing skills through the production of a digital publication.

Includes: Experiential Learning Activity

Precludes additional credit for JOUR 5704 (no longer offered), JOUR 5705 (no longer offered), JOUR 5701 (no longer offered).

Also offered at the undergraduate level, with different requirements, as JOUR 4003, for which additional credit is precluded.

JOUR 5004 [0.5 credit]**Advanced Journalism: Audio**

Designed to enhance audio storytelling and reporting/producing skills through the production of a weekly program.

Includes: Experiential Learning Activity

Precludes additional credit for JOUR 5707 (no longer offered), JOUR 5703 (no longer offered).

Also offered at the undergraduate level, with different requirements, as JOUR 4004, for which additional credit is precluded.

Workshops averaging eight hours a week.

JOUR 5005 [0.5 credit]**Advanced Journalism: Video**

Designed to enhance video storytelling skills through the production of a series of mini-documentaries for a digital program.

Includes: Experiential Learning Activity

Precludes additional credit for JOUR 5708 (no longer offered), JOUR 5703 (no longer offered).

Also offered at the undergraduate level, with different requirements, as JOUR 4005, for which additional credit is precluded.

Workshop averaging eight hours a week.

JOUR 5200 [1.0 credit]**Introduction to Reporting**

A laboratory course in basic reporting and editing techniques and introduction to multimedia reporting, followed by application in print and multimedia.

Includes: Experiential Learning Activity

JOUR 5202 [1.0 credit]**Broadcast Journalism Laboratory**

A laboratory course in reporting and editing in the broadcast media.

Includes: Experiential Learning Activity

JOUR 5206 [0.5 credit]**Reporting Methods**

Topics covered will range from interviewing and observation skills to conducting a title search, lodging an access to information request and interpreting data.

Includes: Experiential Learning Activity

JOUR 5208 [0.5 credit]**Public Affairs Reporting**

A course devoted to understanding selected political, economic and social issues, and to analytical reporting on timely issues under professional conditions.

Includes: Experiential Learning Activity

JOUR 5300 [0.5 credit]**Specialized Journalism: Special Topic**

Advanced reporting in a specialized subject area.

Topics may vary from year to year. Emphasis on subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Also offered at the undergraduate level, with different requirements, as JOUR 4300, for which additional credit is precluded.

JOUR 5301 [0.5 credit]**Specialized Journalism: Business and the Markets**

The fundamentals of business journalism, including corporate structures, the markets, trade policy, contemporary business news and local publicly-traded companies. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4301, for which additional credit is precluded.

JOUR 5302 [0.5 credit]**Specialized Journalism: Business and Canadian Society**

How business affects every aspect of public policy, from climate change to corporate social responsibility. What business does and how the media covers it.

Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4302, for which additional credit is precluded.

JOUR 5303 [0.5 credit]**Specialized Journalism: Health and Science**

How health science research permeates everyday life.

Global challenges confronting researchers and health science journalists. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4303, for which additional credit is precluded.

JOUR 5304 [0.5 credit]**Specialized Journalism: Environment and Science**

Analysis of global trends and research culture in climate and environmental sciences. Challenges confronting researchers and journalists. Emphasis on advanced subject exploration from a journalistic perspective.

Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4304, for which additional credit is precluded.

JOUR 5306 [0.5 credit]**Specialized Journalism: Canada and the World**

Canada's role in the world as shaped by diplomacy, war, terrorism, migration, the international economy and development. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4306, for which additional credit is precluded.

JOUR 5308 [0.5 credit]**Specialized Journalism: Sports and Sport Culture**

Beyond game scores—analysis of the culture of sports and evolution of sports reportage and writing. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4308, for which additional credit is precluded.

JOUR 5309 [0.5 credit]**Specialized Journalism: Arts and Culture**

An introduction to the crucial issues and trends necessary for reporters covering the arts and related cultural policy in Canada. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4309, for which additional credit is precluded.

JOUR 5310 [0.5 credit]**Specialized Journalism: Justice and the Law**

Building on basic media law through a practical exploration of how law works, and how to cover courts and write about legal issues. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4310, for which additional credit is precluded.

JOUR 5311 [0.5 credit]**Specialized Journalism: Justice and The Supreme Court**

Insight into the Supreme Court of Canada, and its role in the making and shaping of Canada. The relationship between the justices and journalists. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4311, for which additional credit is precluded.

JOUR 5315 [0.5 credit]**Specialized Journalism: Canada and the U.S.**

Fundamentals of the unique issues governing Canada-U.S. relations, from diplomacy to trade. Emphasis on advanced subject exploration from a journalistic perspective. Involves the production of in-depth journalism.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as JOUR 4305, for which additional credit is precluded.

JOUR 5401 [0.5 credit]**Journalism Law**

This course prepares journalists to function comfortably within the legal and ethical guidelines governing their occupation. Topics include: contempt of court; free press, fair trial; revealing of sources; civil defamation; obscenity; privacy; government secrecy.

JOUR 5500 [0.5 credit]**Journalism and Society II**

A critical examination of the conduct of the news media, exploring the social, political and economic contexts in which the media work and assessing the consequences of journalism practice for contemporary society.

Prerequisite(s): JOUR 5000 or permission of the School.

JOUR 5508 [0.5 credit]**Professional Practices: Specialized Media**

A workshop course designed to give students instruction in specialized areas. Not all specialties will be offered each year.

Includes: Experiential Learning Activity

JOUR 5700 [1.0 credit]**Advanced Writing**

Students will explore and apply advanced journalistic principles and practices through a combination of readings, discussion and reporting in specific areas.

Includes: Experiential Learning Activity

JOUR 5702 [1.0 credit]**Broadcast Journalism**

A seminar combining critical analysis of broadcast journalism and practical skill development in broadcast reporting, writing and production.

Includes: Experiential Learning Activity

JOUR 5706 [0.5 credit]**Professional Practices**

Students examine current journalism practices in a critical and analytical way, and explore ways of producing thorough and investigative journalism in print, broadcast and multimedia. Guest speakers share their expertise and skills.

Includes: Experiential Learning Activity

JOUR 5800 [0.5 credit]**Survey Methods for Journalists**

An examination of basic research design and data collection with emphasis on problems of interpretation.

JOUR 5808 [0.5 credit]**Directed Readings**

Students, working under faculty direction, will undertake an intensive reading schedule in order to pursue a subject area of particular interest.

JOUR 5809 [0.5 credit]**Directed Research**

Students, working under faculty direction, will develop and undertake a research project in order to pursue a subject area of particular interest.

Includes: Experiential Learning Activity

JOUR 5900 [1.0 credit]**Directed Studies**

Reading and research tutorials.

JOUR 5901 [0.5 credit]**Directed Studies**

Reading and research tutorials.

JOUR 5908 [1.0 credit]**M.Journalism Research Project**

The student will complete a substantial piece of public affairs journalism; or a research project on the media; or a document that makes a major contribution to journalism education. The format of the MRP will be determined by the stream of study.

Includes: Experiential Learning Activity

JOUR 5909 [2.0 credits]**M.Journalism Thesis**

To fulfil the requirements of this 2.0-credit thesis course, students must produce a major piece of journalistic research or complete an academic thesis in the area of journalism studies.

Includes: Experiential Learning Activity

Latin American and Caribbean Studies (LACS)

Latin American and Caribbean Studies (LACS) Courses

LACS 5000 [0.5 credit]

Interdisciplinary Approaches to Latin American and Caribbean Studies

An interdisciplinary overview of the historical, cultural, economic, and political dimensions of the Latin American and Caribbean region.

LACS 5800 [0.0 credit]

Scholarly Preparation in Latin American and Caribbean Studies

This course will provide scholarly preparation in Latin American and Caribbean Studies by requiring participation in public talks as both audience member and presenter.

Law (LAWS)

Law (LAWS) Courses

Note: some graduate courses may also be open to interested fourth-year students with permission of the Department.

LAWS 5000 [0.5 credit]

Theories of Law and Social Transformation

Examines three groups of theories of law (liberal, sociological and Marxist) focusing on different ways law is conceived as an object of inquiry and on different accounts of trajectories of legal development. Potential of law for realizing or inhibiting social change provides analytic framework.

LAWS 5001 [0.5 credit]

Legal Method and Social Inquiry

Introduces problems of research strategy and methods. Explores contrasting methodologies in legal research; evaluates methodologies employed in understanding legal reasoning, discourses, and practices. Includes seminars in which participants present outlines of their own research projects, focusing on methodologies and research questions.

LAWS 5002 [0.5 credit]

Law and Gender Relations

Examines theoretical approaches informed by significance of gender to structure and operation of law. Concepts such as essentialism, difference, cultural determination, and social construction of gender relations examined in context of contemporary feminist debates. Focus on understanding and facility with feminist analysis and methodology.

LAWS 5003 [0.5 credit]

Law, Economy and Society

Addresses the relationship between law, economy, and society. Competing theoretical accounts of the relationship between legal regulation and social and economic change explored through selected historical and contemporary case studies.

LAWS 5004 [0.5 credit]

Law, Crime and Social Order

Examines issues of crime control and state security through topical, in-depth investigations into contemporary problems. Focus is on critically analyzing the criminal justice system, and crime control strategies, as order maintenance /social control.

LAWS 5005 [0.5 credit]

Law, State and Politics

Examines theoretical explanations of relationships between law, state and politics. Selected areas such as rights theory, rule of law, separation of powers or judicial review may provide focus.

LAWS 5006 [0.5 credit]

Historical Perspectives on Law and Society

Examines historical relationship between social forces, law and legal institutions and utility of historical forms of knowledge and methods to legal studies. Surveys selected issues in private, public and criminal law.

LAWS 5007 [0.5 credit]

Race, Ethnicity and the Law

Examines ways race and racism interact with gender and class in shaping legal system. Explores ways legal system institutionalizes racism and potential for using the legal system to combat racism. Selected areas such as immigration law and native rights may be used to illustrate themes.

LAWS 5008 [0.5 credit]

Consuming Passions: The Regulation of Consumption, Appearance and Sexuality

Examines rise of consumption and private pleasures and their regulation and self-regulation. Social history of regulation of two fields of consumption: surfaces of the person: personal appearance, in particular of dress, the body, sexuality; and intakes of the body, focusing on food, alcohol, drugs.

Also listed as SOCI 5204.

LAWS 5100 [0.5 credit]

Advanced Problems in Legal Philosophy

Studies in legal theory and analyses of law advanced by Hart, Dworkin, and others, and legal concepts: for example, principles, rights, duties, liability, etc. Precise course content will vary from year to year and will be announced at the beginning of the term.

Also listed as PHIL 5100.

Prerequisite(s): either LAWS 3105 or LAWS 3101 (PHIL 3101) and LAWS 3102 (PHIL 3102), or permission of the Department.

LAWS 5200 [0.5 credit]**International Economic Law: Regulation of Trade and Investment**

Study of regulation of international economic activity. Discussion of relevant international institutions, legal aspects of integration, governmental regulation of trade and investment.

Also listed as INAF 5507.

Prerequisite(s): Open only to students in their master's year who have not studied international economic law.

LAWS 5302 [0.5 credit]**Feminism, Law and Social Transformation**

Drawing on contemporary cases and/or historical contexts to explore limits and impact of feminist legal engagement. Race, class, disability, sexuality and other social categories and changing feminist conceptions of law and sites of legal relations, politics and activism: the meaning of social transformation.

LAWS 5305 [0.5 credit]**Crime, Social Change and Criminal Law Reform**

Political, practical and ideological dimensions of criminal law reform and activism undertaken by individuals, groups and the state to achieve social transformation. Reform initiatives are considered in relation to their effects on race, class, gender, sexuality, disability and other sites of difference and discrimination.

LAWS 5306 [0.5 credit]**Police and Capital**

The idea of 'police' as a general historical project aimed at the fabrication of social order and the development of liberal philosophy, political economy and security. Contemporary public and private security provision considered in light of commodification, class conflict, and risk thinking.

Also listed as SOCI 5305.

LAWS 5500 [0.5 credit]**The Canadian Constitution**

Familiarizes students with terminology, principles, and doctrines of judicial interpretation of Constitution Acts 1867-1982 and other constitutional statutes. Emphasis on division of legislative powers in the Canadian federation.

Prerequisite(s): open only to graduate students in their master's year who have not previously studied Canadian constitutional law.

LAWS 5603 [0.5 credit]**International Law: Theory and Practice**

Legal principles governing international relations; emphasis on different theoretical, historical and political perspectives, such as Natural Law, Positivism, Critical Legal Studies, TWAIL, Feminism, Marxism. Specific case studies or topics are examined to critically interrogate the foundations and practices of international law.

Also listed as INAF 5505.

LAWS 5662 [0.5 credit]**Law, Regulation and Governance**

Historical and contemporary roles of law and regulation in processes, practices and discourses of governance. Law and state; domestic and global governance; diversity of law-governance relationships; law as a constituent force, enforcement mechanism and a distinctive product of governance.

Also offered, with different requirements as appropriate, as LAWS 6002, for which additional credit is precluded.

LAWS 5663 [0.5 credit]**Human Rights, Citizenship and Global Justice**

The implications of law in selected issues involving human rights, citizenship and global justice. Topics may include justification and legitimation of human rights, contemporary citizenship, struggles for global justice, recognition and democracy, and post-nationalism and global economic regulation.

Also offered with different requirements where appropriate, as LAWS 6003, for which additional credit is precluded.

LAWS 5664 [0.5 credit]**Crime, Law and Security**

Contemporary debates around crime, criminal justice and security as mediated through law. The interrelationship between the politics, process and reform of criminal justice in a socio-legal context.

Also offered as LAWS 6004, with different requirements where appropriate, for which additional credit is precluded.

LAWS 5700 [0.5 credit]**Theories of Conflict Resolution**

An introduction to the field of conflict studies, negotiation and mediation theory including: analyzing and resolving conflict, negotiation styles, orientations and models of mediation, alternative dispute resolution, building consensus, current issues and trends in the field of conflict studies.

LAWS 5701 [0.5 credit]**Introduction to Conflict Resolution and Mediation**

Introduction to the practice of negotiation and mediation including: contextualizing conflict resolution, understanding how to negotiate and mediate, determining the role of the negotiator/ mediator, reviewing the current state of mediation and conflict resolution, and understanding the importance of a theory-informed practice.

Includes: Experiential Learning Activity

LAWS 5702 [0.5 credit]**Advanced Conflict Resolution and Mediation**

Building upon the theory and skills of conflict resolution and mediation introduced in LAWS 5701. Students will learn to convene a mediation, analyze the level of conflict, design a conflict resolution process, co-mediate, and facilitate a multi-party problem solving session.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5701.

LAWS 5703 [0.5 credit]**Organizational Conflict and System Design**

Students will learn to apply conceptual frameworks to the diagnosis and assessment of organizational conflict, develop and implement appropriate intervention programs and strategies, and design conflict management systems for organizations.

Includes: Experiential Learning Activity

LAWS 5704 [0.5 credit]**Multi-Party, Multi-Issue Conflict Resolution and Consensus Building**

Using case studies where mediators have successfully assisted competing interest groups in finding mutual-gains resolutions to conflicts, students will expand upon their personal skills of crisis intervention, group facilitation, assisted negotiation, dispute resolution process design and coaching.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5701 and LAWS 5702 or equivalent.

LAWS 5705 [0.5 credit]**Mediation in Family Matters**

Students will examine family dynamics and family conflict and explore conflict within intact families as well as conflict that arises when parties separate. The practical aspects of mediation such as ethics, professional standards and screening, as well as intake and outcome documents will be discussed.

Includes: Experiential Learning Activity

LAWS 5706 [0.5 credit]**Special Topics in Conflict Resolution**

Topics of contemporary controversy relating to conflict and dispute resolution. Topics vary from year to year and may include bargaining, negotiation, legal issues, restorative justice, and international issues.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700 or LAWS 5701 or permission of the department.

LAWS 5708 [0.5 credit]**Applied Research Project**

Independent research in the theory and practice of conflict analysis, prevention or intervention, including system design, process intervention, and evaluation. The project must represent the candidate's independent study after being admitted to the program. Previous work may be used only as introductory or background material.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700, LAWS 5701, LAWS 5702, LAWS 5703, LAWS 5704.

LAWS 5709 [0.5 credit]**Skills Assessment**

An evaluation of a student's readiness to mediate disputes through a simulated mediation. Students are prepared by way of practice sessions and debriefings. Must be completed within one year after completion of course work.

Includes: Experiential Learning Activity

Prerequisite(s): Completion of three credits in Graduate Diploma in Conflict Resolution courses.

LAWS 5710 [0.5 credit]**Directed Readings in Conflict and Dispute Resolution**

A reading course on selected topics may be arranged with the permission of the GDCR Director.

Includes: Experiential Learning Activity

Prerequisite(s): LAWS 5700 and LAWS 5701, written acceptance by a faculty member, and permission of the Department.

LAWS 5900 [0.5 credit]**Tutorials/Directed Readings in Law**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

LAWS 5901 [0.5 credit]**Tutorial/Directed Readings in Law**

Tutorials or reading courses on selected topics may be arranged with the permission of the supervisor of graduate studies and the approval of the supervising faculty member.

LAWS 5903 [0.5 credit]**Contemporary Topics in Legal Studies**

A research seminar which explores a selected topic from current debates in legal studies. Students should check with the Department regarding the topic offered.

LAWS 5904 [0.5 credit]**Contemporary Topics in Legal Studies**

A research seminar which explores a selected topic from current debates in legal studies.

LAWS 5908 [1.0 credit]**M.A. Research Essay**

Includes: Experiential Learning Activity

LAWS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

LAWS 6000 [0.5 credit]**Doctoral Seminar in Legal Studies**

Analysis of the major themes, approaches and literature in contemporary legal and social theory.

LAWS 6001 [0.5 credit]**Proseminar in Legal Studies**

A seminar which meets every two weeks throughout the academic year. Based on presentations of papers and works in progress by faculty, students and invited guests, as well as assigned readings on issues that deal with current research in legal studies.

LAWS 6002 [0.5 credit]**Law, Regulation and Governance**

Historical and contemporary roles of law and regulation in processes, practices and discourses of governance. Law and state; domestic and global governance; diversity of law-governance relationships; law as a constituent force, enforcement mechanism and a distinctive product of governance. Also offered as LAWS 5662, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6003 [0.5 credit]**Human Rights, Citizenship and Global Justice**

The implications of law in selected issues involving human rights, citizenship and global justice. Topics may include justification and legitimation of human rights, contemporary citizenship, struggles for global justice, recognition and democracy, and post-nationalism and global economic regulation. Also offered as LAWS 5663, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6004 [0.5 credit]**Crime, Law, and Security**

Contemporary debates around crime, criminal justice and security as mediated through law. The interrelationship between the politics, process and reform of criminal justice in a socio-legal context. Also offered as LAWS 5664, with different requirements where appropriate, for which additional credit is precluded.

LAWS 6010 [0.5 credit]**Directed Readings in Legal Studies**

Advanced directed readings in selected areas of legal studies, involving presentation of papers as the basis for discussion with the course instructor.

LAWS 6095 [1.0 credit]**Field Comprehensive**

The field comprehensive examination will focus on the relevant theoretical and/or methodological issues related to the field of study. The examination can take a variety of forms and will be decided by the supervisory committee in consultation with the student.

The form of the exam will be in accordance with departmental policy.

LAWS 6096 [1.0 credit]**Thesis Proposal**

The thesis proposal is written after completion of the other course requirements, and is normally completed by the end of the second year of doctoral study. The proposal is defended at an oral examination conducted by the supervisory committee. Graded Sat/Uns.

LAWS 6909 [0.0 credit]**Ph. D. Thesis**

Includes: Experiential Learning Activity

Linguistics (LING)

Linguistics (LING) Courses**LING 5004 [0.5 credit]****Syntax**

A graduate seminar in contemporary syntactic theory. Includes: Experiential Learning Activity

LING 5005 [0.5 credit]**Morphology**

A graduate seminar in contemporary morphological theory. Includes: Experiential Learning Activity

LING 5007 [0.5 credit]**Phonology**

A graduate seminar in contemporary phonological theory. Includes: Experiential Learning Activity

LING 5009 [0.5 credit]**Special Topic in Linguistics**

Examination of a topic or more specialized area in linguistics or language study. Topic to be announced. Repeatable for credit when the topic changes. Includes: Experiential Learning Activity. Also offered at the undergraduate level, with different requirements, as LING 4009, for which additional credit is precluded.

LING 5077 [0.5 credit]**Phonetics**

A graduate seminar in contemporary phonetics. Includes: Experiential Learning Activity

LING 5412 [0.5 credit]**Diversité du français**

Études des variétés du français, dans ses dimensions spatiales. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5412.

Also offered at the undergraduate level, with different requirements, as LING 4412 and FREN 4412., for which additional credit is precluded.

LING 5413 [0.5 credit]**Diachronie du français**

Étude du français, dans ses dimensions historiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5413.

Also offered at the undergraduate level, with different requirements, as LING 4413 and FREN 4413., for which additional credit is precluded.

LING 5414 [0.5 credit]**Analyse du français**

Étude du français, dans ses dimensions morphologiques, syntaxiques ou phonologiques. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5414.

Also offered at the undergraduate level, with different requirements, as LING 4414 and FREN 4414, for which additional credit is precluded.

LING 5415 [0.5 credit]**Variation du français**

Étude des variations internes de la langue, dans ses dimensions orales et écrites. Le contenu précis de ce cours varie selon les années. Consulter le site Web du Département de français pour obtenir les détails.

Also listed as FREN 5415.

Also offered at the undergraduate level, with different requirements, as FREN 4415 and LING 4415., for which additional credit is precluded.

LING 5505 [0.5 credit]**Semantics**

A graduate seminar in contemporary semantics.

Includes: Experiential Learning Activity

Also listed as PHIL 5650.

LING 5510 [0.5 credit]**Lexical Semantics**

Study of the meaning of words. Topics may include lexical decomposition, meaning variation, lexical relations, and lexical aspect.

Includes: Experiential Learning Activity

Also listed as PHIL 5660.

Also offered at the undergraduate level, with different requirements, as LING 4510 and PHIL 4055, for which additional credit is precluded.

LING 5601 [0.5 credit]**Cognitive Neuroscience of Language**

Further study of psychological and neurolinguistic mechanisms of adult language processing. May include topics from first language acquisition.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4601, for which additional credit is precluded.

LING 5603 [0.5 credit]**First Language Acquisition**

Advanced topics in language acquisition and development, and the relative contributions of the environment, cognitive development, and inborn knowledge.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4603, for which additional credit is precluded.

LING 5605 [0.5 credit]**Psycholinguistic Research Methods**

Introduction to experimental methodologies used in current psycholinguistic studies. Topics include experimental design and techniques, descriptive statistics, and interpreting and reporting research findings.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as LING 4605, for which additional credit is precluded.

LING 5606 [0.5 credit]**Statistics for Language Research**

Application of statistical procedures to analysis of language data and to problems of measurement in experimental linguistics, applied linguistics, psycholinguistics, and related fields.

Includes: Experiential Learning Activity

Also listed as ALDS 5604.

Also offered at the undergraduate level, with different requirements, as ALDS 4606 and LING 4606, for which additional credit is precluded.

LING 5608 [0.5 credit]**Language and Cognition**

Structure and representation of linguistic knowledge in human cognition. Evidence from child language acquisition, language processing and language impairment.

Includes: Experiential Learning Activity

Also listed as ALDS 5301 and CGSC 5003.

LING 5704 [0.5 credit]**Linguistic Analysis, Culture and Cognition**

Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

Includes: Experiential Learning Activity

Also listed as ALDS 5303.

LING 5801 [0.5 credit]**Linguistic Field Methods**

With a language consultant, students discover the phonological, morphological, and syntactic structures of the target language using linguistic elicitation. Language will vary from year to year but will normally be a non-European language. Language documentation, data management, ethical issues surrounding research in Indigenous communities.

Includes: Experiential Learning Activity

Also listed as ALDS 5801.

Also offered at the undergraduate level, with different requirements, as LING 4801, for which additional credit is precluded.

LING 5802 [0.5 credit]**Historical Linguistics: English**

A theory-intensive course that will study the development of English starting with Proto-Indo-European progressing through Common Germanic to the stages of English itself. Topics include phonological sound changes, phonemic inventories, and morphological and syntactic theory. Also listed as ENGL 5101.

Also offered at the undergraduate level, with different requirements, as LING 4802, for which additional credit is precluded.

LING 5907 [0.0 credit]**Graduate Diploma Capstone Examination**

Students must pass an oral exam that will evaluate their knowledge of linguistic theory. Students will be provided with a reading list of literature in theoretical linguistics that they should be familiar with, based on their core linguistics courses and their research interests.

Includes: Experiential Learning Activity

LING 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

LING 5909 [2.5 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

LING 6801 [1.0 credit]**Language Documentation**

The core PhD seminar in Language Documentation. Topics include the detailed examination of foundational texts, current theories, research methodologies, and best practices in language documentation. Includes significant focus on interactions with language communities, field methods, and related ethics.

Includes: Experiential Learning Activity

LING 6907 [0.0 credit]**Doctoral Comprehensive Examination**

Students must pass an oral comprehensive exam that will evaluate their knowledge of linguistic theory. Students will be provided with a reading list of literature in theoretical linguistics that they should be familiar with, based on their core linguistics courses and their research interests.

Includes: Experiential Learning Activity

LING 6908 [0.0 credit]**Qualifying Paper**

Students are required to write a Qualifying Paper (QP) that assesses their potential for conducting original research. Their QP must include aspects of both linguistic theory and language documentation and/or revitalization, although the proportion devoted to each component will vary from student to student.

Includes: Experiential Learning Activity

LING 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Management (MGMT)

Management (MGMT) Courses**MGMT 5100 [0.5 credit]****Managing People and Organizations**

Organizations and the relationships that define them. Theories, concepts and experiential exercises help students understand their own values, attitudes and goals and those of others how to motivate, communicate, teach and lead others; and how to apply these concepts to improving personal and organizational performance.

Includes: Experiential Learning Activity

Precludes additional credit for MGMT 5101 (no longer offered) and MGMT 5102 (no longer offered).

Prerequisite(s): enrolment in the MBA program in the Sprott School of Business or permission of the School.

MGMT 5111 [0.25 credit]**Conflict and Negotiation**

Conflict, negotiation and bargaining. The bargaining process, conflict handling and how to analyze, plan and implement successful negotiations. Management and labour objectives and strategies that lead to conflict.

Prerequisite(s): MGMT 5100.

MGMT 5112 [0.25 credit]**Power and Influence**

The role of power and influence in organizations. Sources of power, the effectiveness of various influence tactics, the implications of powerlessness, types of empowerment, organizational politics and fostering constructive versus destructive political behaviour in organizations.

Precludes additional credit for BUSI 5101 (no longer offered).

Prerequisite(s): MGMT 5100.

MGMT 5113 [0.25 credit]**Managing Teams**

Factors affecting team performance. Team development, the impact of team size, team processes, organizational practices that support teams, potential team interventions and the unique challenges faced by virtual teams.

Prerequisite(s): MGMT 5100.

MGMT 5114 [0.25 credit]**Managing Diversity**

Exploration of issues arising from diversity within organizations including the implications of cultural differences for motivation, communication, conflict and leadership. Identification of practices that facilitate the effective management of diversity.

Prerequisite(s): MGMT 5100.

MGMT 5115 [0.25 credit]**Leadership**

Post-heroic leadership theories, with a practical emphasis on developing and honing leadership skills in practicing managers. A highly self-reflective course, requiring students to question and share their own leadership styles and situational antecedents.

Prerequisite(s): MGMT 5100.

MGMT 5116 [0.25 credit]**Managing Performance**

Principles and techniques relating to the development, support, and evaluation of employee performance in organizations. Models of individual and organizational performance; identifying high performing employees; methods of measuring performance; employee development and incentive systems.

Prerequisite(s): MGMT 5100.

MGMT 5117 [0.25 credit]**Knowledge Management**

Knowledge as a resource; methodologies for managing ongoing and future knowledge needs in businesses. As required knowledge is dispersed and developed throughout the globe, international dimensions of knowledge management.

Prerequisite(s): MGMT 5100.

MGMT 5120 [0.5 credit]**Fundamentals of Leading and Managing Organizational Change**

How individuals, groups and organizations respond to change; overview of key change models and change strategy. At the micro level how individuals respond to change, how change should be managed, change management competencies and changing organizational culture.

Includes: Experiential Learning Activity

Prerequisite(s): MGMT 5100 and 0.5 credit from MGMT 5111, MGMT 5113 or MGMT 5115; and registration in the Management and Change concentration or a grade of A- or better in MGMT 5100.

MGMT 5128 [0.25 credit]**Ethical Issues in Managing Arts and Culture Organizations**

Ethical issues in the management and governance of arts and culture organizations including cultural appropriation, rights of production and reproduction, artistic ownership, and censorship.

Prerequisite(s): BUSI 5802.

MGMT 5129 [0.5 credit]**Managing the Arts**

The challenges of managing arts organizations with emphasis on the changing environment of arts consumption and funding. The tensions arising from blending artistic and aesthetic dimensions with functional considerations when judging organizational and personal issues form a continuing theme.

Also offered at the undergraduate level, with different requirements, as BUSI 4129, for which additional credit is precluded.

Marketing (MKTG)

Marketing (MKTG) Courses**MKTG 5200 [0.5 credit]****Marketing Strategy**

Essential concepts for cultivating and maintaining successful buyer-seller relationships, customer and competitor analysis, segmentation, targeting, and positioning. Translation of target market and positioning decisions into actionable marketing plans, including product, pricing, channel/promotional decisions, and tools for forecasting/evaluating success. Organizational capstone project required.

MKTG 5211 [0.25 credit]**Technology Marketing**

Marketing in technology-intensive environments, with focus on business buying processes. Buyer behaviour, competitive and environmental analysis, planning and implementation of product and service innovations, targeting and positioning in the early stages of introduction, management through the growth stages, tracking success and contingency planning.

MKTG 5229 [0.5 credit]**Marketing in the Arts and Culture Sectors**

Advanced study of marketing within the arts and culture sectors. Facilitates sophisticated understanding of the knowledge and skills required for marketing managers to respond to changing market environments in order to bring arts and culture offerings to their target audiences.

Prerequisite(s): MKTG 5200.

Also offered at the undergraduate level, with different requirements, as BUSI 4229, for which additional credit is precluded.

Mathematics (MATH)

Mathematics (MATH) Courses**MATH 5001 [0.5 credit] (MAT 5144)****Commutative Algebra**

Prime spectrum of a commutative ring (as a topological space); localization of rings and modules; tensor product of modules and algebras; Hilbert's Nullstellensatz and consequences for finitely generated algebras; Krull dimension of a ring; integral dependence, going-up, going-down; Noether Normalization Lemma and dimension theory.

MATH 5002 [0.5 credit] (MAT 5149)**Algebraic Geometry**

Brief overview of commutative algebra, Hilbert's Nullstellensatz, algebraic sets, and Zariski topology. Affine and projective varieties over algebraically closed fields. Regular functions and rational maps. Additional topics.

MATH 5003 [0.5 credit] (MAT 5122)**Banach Algebras**

Commutative Banach algebras; the space of maximal ideals; representation of Banach algebras as function algebras and as operator algebras; the spectrum of an element. Special types of Banach algebras: for example, regular algebras with involution, applications.

MATH 5005 [0.5 credit] (MAT 5127)**Complex Analysis**

Complex differentiation and integration, harmonic functions, maximum modulus principle, Runge's theorem, conformal mapping, entire and meromorphic functions, analytic continuation.

MATH 5007 [0.5 credit] (MAT 5125)**Real Analysis I (Measure Theory and Integration)**

General measure and integral, Lebesgue measure and integration on \mathbb{R} , Fubini's theorem, Lebesgue-Radon-Nikodym theorem, absolute continuity and differentiation, LP-spaces. Selected topics such as Daniell-Stone theory. Also offered at the undergraduate level, with different requirements, as MATH 4007, for which additional credit is precluded.

MATH 5008 [0.5 credit] (MAT 5126)**Real Analysis II (Functional Analysis)**

Banach and Hilbert spaces, bounded linear operators, dual spaces. Topics selected from: weak-topologies, Alaoglu's theorem, compact operators, differential calculus in Banach spaces, Riesz representation theorems. Prerequisite(s): MATH 5007 (MAT 5125) or permission of the School.

Also offered at the undergraduate level, with different requirements, as MATH 4003, for which additional credit is precluded.

MATH 5009 [0.5 credit] (MAT 5121)**Introduction to Hilbert Space**

Geometry of Hilbert Space, spectral theory of linear operators in Hilbert Space.

MATH 5102 [0.5 credit] (MAT 5148)**Group Representations and Applications**

An introduction to group representations and character theory, with selected applications.

MATH 5103 [0.5 credit] (MAT 5146)**Rings and Modules**

Generalizations of the Wedderburn-Artin theorem and applications, homological algebra.

MATH 5104 [0.5 credit] (MAT 5143)**Lie Algebras**

Basic concepts: ideals, homomorphisms, nilpotent, solvable, semi-simple. Representations, universal enveloping algebra. Semi-simple Lie algebras: structure theory, classification, and representation theory. Prerequisite(s): MATH 5107 (MAT 5141) and MATH 5109 (MAT 5142) or permission of the School.

MATH 5106 [0.5 credit] (MAT 5145)**Group Theory**

Fundamental principles as applied to abelian, nilpotent, solvable, free, and finite groups; representations. Also offered at the undergraduate level, with different requirements, as MATH 4106, for which additional credit is precluded.

MATH 5107 [0.5 credit] (MAT 5141)**Algebra I: Rings and Modules**

Noetherian and artinian modules and rings. Varieties, Hilbert Basis Theorem, radical ideals, Hilbert Nullstellensatz. Localization and tensor products of modules and algebras. Semisimple rings and modules, Schur's Lemma, Jacobson Density Theorem, Artin-Wedderburn Theorem. Short exact sequences. Free, projective, injective and flat modules.

MATH 5108 [0.5 credit] (MAT 5147)**Homological Algebra and Category Theory**

Axioms of set theory, categories, functors, natural transformations; free, projective, injective and flat modules; tensor products and homology functors, derived functors; dimension theory.

Also offered at the undergraduate level, with different requirements, as MATH 4108, for which additional credit is precluded.

MATH 5109 [0.5 credit] (MAT 5142)**Algebra II: Groups and Galois Theory**

Group actions, class equation, Sylow theorems, central, composition and derived series, Jordan-Holder theorem, field extensions and minimal polynomials, algebraic closure, separable extensions, integrality, Galois groups, fundamental theorem of Galois theory, finite fields, cyclotomic field extensions, fundamental theorem of algebra, transcendental extensions.

MATH 5201 [0.5 credit] (MAT 5150)**Topics in Geometry**

Various axiom systems of geometry. Detailed examinations of at least one modern approach to foundations, with emphasis upon the connections with group theory.

MATH 5202 [0.5 credit] (MAT 5168)**Homology Theory**

The Eilenberg-Steenrod axioms and their consequences, singular homology theory, applications to topology and algebra.

Prerequisite(s): MATH 5205 (MAT 5151) or permission of the School.

MATH 5205 [0.5 credit] (MAT 5151)**Topology I**

Topological spaces, product and identification topologies, countability and separation axioms, compactness, connectedness, homotopy, fundamental group, net and filter convergence.

Also offered at the undergraduate level, with different requirements, as MATH 4205, for which additional credit is precluded.

MATH 5206 [0.5 credit] (MAT 5152)**Topology II**

Covering spaces, homology via the Eilenberg-Steenrod Axioms, applications, construction of a homology functor. Prerequisite(s): MATH 5205 (MAT 5151) or permission of the School.

Also offered at the undergraduate level, with different requirements, as MATH 4206, for which additional credit is precluded.

MATH 5207 [0.5 credit] (MAT 5169)**Foundations of Geometry**

A study of at least one modern axiom system of Euclidean and non-Euclidean geometry, embedding of hyperbolic and Euclidean geometries in the projective plane, groups of motions, models of non-Euclidean geometry.

MATH 5208 [0.5 credit] (MAT 5155)**Differentiable Manifolds**

A study of differentiable manifolds from the point of view of either differential topology or differential geometry. Topics such as smooth mappings, transversality, intersection theory, vector fields on manifolds, Gaussian curvature, Riemannian manifolds, differential forms, tensors, and connections are included.

MATH 5300 [0.5 credit] (MAT 5160)**Mathematical Cryptography**

Analysis of cryptographic methods used in authentication and data protection, with particular attention to the underlying mathematics, e.g. Algebraic Geometry, Number Theory, and Finite Fields. Advanced topics on Public-Key Cryptography: RSA and integer factorization, Diffie-Hellman, discrete logarithms, elliptic curves. Topics in current research.

MATH 5301 [0.5 credit] (MAT 5161)**Mathematical Logic**

A basic graduate course in mathematical logic. Propositional and predicate logic, proof theory, Gentzen's Cut-Elimination, completeness, compactness, Henkin models, model theory, arithmetic and undecidability. Special topics (time permitting) depending on interests of instructor and audience.

MATH 5305 [0.5 credit] (MAT 5163)**Analytic Number Theory**

Dirichlet series, characters, Zeta-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, binary quadratic forms.

MATH 5306 [0.5 credit] (MAT 5164)**Algebraic Number Theory**

Algebraic number fields, bases, algebraic integers, integral bases, arithmetic in algebraic number fields, ideal theory, class number.

Also offered at the undergraduate level, with different requirements, as MATH 4306, for which additional credit is precluded.

MATH 5403 [0.5 credit] (MAT 5187)**Topics in Applied Mathematics****MATH 5405 [0.5 credit] (MAT 5131)****Ordinary Differential Equations**

Linear systems, fundamental solution. Nonlinear systems, existence and uniqueness, flow. Equilibria, periodic solutions, stability. Invariant manifolds and hyperbolic theory. One or two specialized topics taken from, but not limited to: perturbation and asymptotic methods, normal forms and bifurcations, global dynamics.

MATH 5406 [0.5 credit] (MAT 5133)**Partial Differential Equations**

First-order equations, characteristics method, classification of second-order equations, separation of variables, Green's functions. L_p and Sobolev spaces, distributions, variational formulation and weak solutions, Lax-Milgram theorem, Galerkin approximation. Parabolic PDEs. Wave equations, hyperbolic systems, nonlinear PDEs, reaction-diffusion equations, infinite-dimensional dynamical systems, regularity.

MATH 5407 [0.5 credit] (MAT 5134)**Topics in Partial Differential Equations**

Theory of distributions, initial-value problems based on two-dimensional wave equations, Laplace transform, Fourier integral transform, diffusion problems, Helmholtz equation with application to boundary and initial-value problems in cylindrical and spherical coordinates. Prerequisite(s): MATH 5406 or permission of the School. Also offered at the undergraduate level, with different requirements, as MATH 4701, for which additional credit is precluded.

MATH 5408 [0.5 credit] (MAT 5185)**Asymptotic Methods of Applied Mathematics**

Asymptotic series: properties, matching, application to differential equations. Asymptotic expansion of integrals: elementary methods, methods of Laplace, Stationary Phase and Steepest Descent, Watson's Lemma, Riemann-Lebesgue Lemma. Perturbation methods: regular and singular perturbation for differential equations, multiple scale analysis, boundary layer theory, WKB theory.

MATH 5605 [0.5 credit] (MAT 5165)**Theory of Automata**

Algebraic structure of sequential machines, decomposition of machines; finite automata, formal languages; complexity.

Also offered at the undergraduate level, with different requirements, as MATH 4805/COMP 4805, for which additional credit is precluded.

MATH 5607 [0.5 credit] (MAT 5324)**Game Theory**

Two-person zero-sum games; infinite games; multi-stage games; differential games; utility theory; two-person general-sum games; bargaining problem; n-person games; games with a continuum of players.

Also offered at the undergraduate level, with different requirements, as MATH 4807, for which additional credit is precluded.

MATH 5609 [0.5 credit] (MAT 5301)**Topics in Combinatorial Mathematics**

Courses in special topics related to Combinatorial Mathematics, not covered by other graduate courses.

MATH 5801 [0.5 credit] (MAT 5303)**Linear Optimization**

Linear programming problems; simplex method, upper bounded variables, free variables; duality; postoptimality analysis; linear programs having special structures; integer programming problems; unimodularity; knapsack problem.

MATH 5803 [0.5 credit] (MAT 5304)**Nonlinear Optimization**

Methods for unconstrained and constrained optimization problems; Kuhn-Tucker conditions; penalty functions; duality; quadratic programming; geometric programming; separable programming; integer nonlinear programming; pseudo-Boolean programming; dynamic programming.

MATH 5804 [0.5 credit] (MAT 5307)**Topics in Operations Research****MATH 5805 [0.5 credit] (MAT 5308)****Topics in Algorithm Design****MATH 5806 [0.5 credit] (MAT 5180)****Numerical Analysis**

Error analysis for fixed and floating point arithmetic; systems of linear equations; eigen-value problems; sparse matrices; interpolation and approximation, including Fourier approximation; numerical solution of ordinary and partial differential equations.

MATH 5807 [0.5 credit] (MAT 5167)**Formal Language and Syntax Analysis**

Computability, unsolvable and NP-hard problems. Formal languages, classes of language automata. Principles of compiler design, syntax analysis, parsing (top-down, bottom-up), ambiguity, operator precedence, automatic construction of efficient parsers, LR, LR(O), LR(k), SLR, LL(k). Syntax directed translation.

Also listed as COMP 5807.

Prerequisite(s): MATH 5605.

MATH 5808 [0.5 credit] (MAT 5305)**Combinatorial Optimization I**

Network flow theory and related material. Topics will include shortest paths, minimum spanning trees, maximum flows, minimum cost flows. Optimal matching in bipartite graphs.

MATH 5809 [0.5 credit] (MAT 5306)**Combinatorial Optimization II**

Topics include optimal matching in non-bipartite graphs, Euler tours, and the Chinese Postman problem. Other extensions of network flows: dynamic flows, multicommodity flows, and flows with gains, bottleneck problems. Matroid optimization. Enumerative and heuristic algorithms for the Traveling Salesman and other problems. Prerequisite(s): MATH 5808 or permission of the school.

MATH 5818 [0.5 credit] (MAT 5105)**Discrete Applied Mathematics I: Graph Theory**

Paths and cycles, trees, connectivity, Euler tours and Hamilton cycles, edge colouring, independent sets and cliques, vertex colouring, planar graphs, directed graphs. Selected topics from one or more of the following areas: algebraic graph theory, topological graph theory, random graphs.

MATH 5819 [0.5 credit] (MAT 5107)**Discrete Applied Mathematics II: Combinatorial Enumeration**

Ordinary and exponential generating functions, product formulas, permutations, rooted trees, cycle index, WZ method. Lagrange inversions, singularity analysis of generating functions and asymptotics. Selected topics from one or more of the following areas: random graphs, random combinatorial structures, hypergeometric functions.

MATH 5821 [0.5 credit] (MAT 5341)**Quantum Computing**

Space of quantum bits; entanglement. Observables in quantum mechanics. Density matrix and Schmidt decomposition. Quantum cryptography. Classical and quantum logic gates. Quantum Fourier transform. Shor's quantum algorithm for factorization of integers.

MATH 5822 [0.5 credit] (MAT 5343)**Mathematical Aspects of Wavelets and Digital Signal Processing**

Lossless compression methods. Discrete Fourier transform and Fourier-based compression methods. JPEG and MPEG. Wavelet analysis. Digital filters and discrete wavelet transform. Daubechies wavelets. Wavelet compression.

Also offered at the undergraduate level, with different requirements, as MATH 4822, for which additional credit is precluded.

MATH 5900 [0.5 credit] (MAT 5990)**Seminar****MATH 5901 [0.5 credit] (MAT 5991)****Directed Studies****MATH 5906 [0.5 credit] (MAT 5996)****Research Internship**

This course affords students the opportunity to undertake research in mathematics as a cooperative project with governmental or industrial sponsors. The grade will be based upon the mathematical content and upon oral and written presentation of results.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the graduate director.

MATH 5909 [2.0 credits] (MAT 7999)**M.Sc. Thesis in Mathematics**

Includes: Experiential Learning Activity

MATH 5910 [1.0 credit] (MAT 6997)**M.Sc. Project in Mathematics**

Project in mathematics supervised by a professor approved by the graduate director resulting in a major report (approximately 30-40 pages), together with a short presentation on the report. Graded by the supervisor and another professor appointed by the graduate director.

Includes: Experiential Learning Activity

Precludes additional credit for MATH 5909.

MATH 5993 [0.0 credit] (MAT 5993)**Research Participation**

Includes: Experiential Learning Activity

MATH 6002 [0.5 credit] (MAT 5309)**Harmonic Analysis on Groups**

Transformation groups; Haar measure; unitary representations of locally compact groups; completeness and compact groups; character theory; decomposition.

MATH 6008 [0.5 credit] (MAT 5326)**Topics in Analysis****MATH 6101 [0.5 credit] (MAT 5327)****Topics in Algebra****MATH 6104 [0.5 credit] (MAT 5158)****Lie Groups**

Matrix groups: one-parameter groups, exponential map, Campbell-Hausdorff formula, Lie algebra of a matrix group, integration on matrix groups. Abstract Lie groups. Prerequisite(s): MATH 5007 and PADM 5107 or permission of the School.

MATH 6201 [0.5 credit] (MAT 5312)**Topics in Topology****MATH 6507 [0.5 credit] (MAT 5319)****Topics in Probability****MATH 6806 [0.5 credit] (MAT 5361)****Topics in Mathematical Logic****MATH 6807 [0.5 credit] (MAT 5162)****Mathematical Foundations of Computer Science**

Foundations of functional languages, lambda calculi (typed, polymorphically typed, untyped), Curry-Howard Isomorphism, proofs-as-programs, normalization and rewriting theory, operational semantics, type assignment, introduction to denotational semantics of programs, fixed-point programming.

MATH 6900 [0.5 credit] (MAT 6990)**Seminar****MATH 6901 [0.5 credit] (MAT 6991)****Directed Studies****MATH 6909 [0.0 credit] (MAT 9999)****Ph.D. Thesis**

Includes: Experiential Learning Activity

Mech and Aero - Joint (MAAJ)

Mechanical and Aerospace Engineering (Joint) (MAAJ) Courses**MAAJ 5001 [0.5 credit] (AMM 5101)****Theory of Elasticity****MAAJ 5002 [0.5 credit] (AMM 5102)****Advanced Stress Analysis****MAAJ 5003 [0.5 credit] (AMM 5103)****Theory Perfectly Plastic Solid****MAAJ 5004 [0.5 credit] (MCG 5104)****Theory of Plates and Shells****MAAJ 5005 [0.5 credit] (MCG 5105)****Continuum Mechanics****MAAJ 5006 [0.5 credit] (AMM 5106)****Advanced Topics in Elasticity****MAAJ 5007 [0.5 credit] (MCG 5107)****Adv. Dynamics w/Applications****MAAJ 5008 [0.5 credit] (MCG 5108)****Finite Element Analysis**

MAAJ 5009 [0.5 credit] (MCG 5109)
Topics:Finite Element Analysis

MAAJ 5050 [0.5 credit] (MCG 5300)
Fundamentals of Fluid Dynamics
Also listed as MECH 5000.

MAAJ 5051 [0.5 credit] (AMM 5130)
Deformation and Fracture of Engineering Materials

MAAJ 5052 [0.5 credit] (AMM 5152)
Failure Analysis of High-Temperature Protective Coatings for Aerospace Applications

MAAJ 5053 [0.5 credit] (AMM 5124)
Failure and Damage Tolerance in Aircraft

MAAJ 5054 [0.5 credit] (MCG 5147)
Finite-Volume Methods for Compressible Flows

MAAJ 5055 [0.5 credit] (MCG 5148)
High-Performance Parallel Scientific Computing

MAAJ 5056 [0.5 credit] (AMM 5125)
Materials Characterization Techniques

MAAJ 5057 [0.5 credit] (AMM 5121)
Materials Selection in Engineering Design

MAAJ 5058 [0.5 credit] (MCG 5149)
Non-Equilibrium Gas Dynamics

MAAJ 5059 [0.5 credit] (MCG 5309)
Environmental Fluid Mechanics
Includes: Experiential Learning Activity
Also listed as MECH 5009.

MAAJ 5100 [0.5 credit] (MCG 5110)
Micromechanics of Solids

MAAJ 5101 [0.5 credit] (MCG 5111)
Gas Dynamics

MAAJ 5104 [0.5 credit] (MCG 5114)
Analy and Des: Pressure Vessels

MAAJ 5105 [0.5 credit] (MCG 5115)
Non-Linear Optimization

MAAJ 5107 [0.5 credit] (AMM 5117)
Intro to Composite Materials
Includes: Experiential Learning Activity

MAAJ 5108 [0.5 credit] (AMM 5118)
Introduction to Plasticity

MAAJ 5109 [0.5 credit] (AMM 5119)
Fracture Mechanics

MAAJ 5151 [0.5 credit] (MCG 5311)
Dynamics and Aerodynamics of Flight
Includes: Experiential Learning Activity
Also listed as MECH 5101.

MAAJ 5155 [0.5 credit] (MCG 5315)
Orbital Mechanics and Space Control
Includes: Experiential Learning Activity
Also listed as MECH 5105.

MAAJ 5206 [0.5 credit] (AMM 5126)
Deformation of Materials

MAAJ 5209 [0.5 credit] (AMM 5129)
Hot Working of Metals

MAAJ 5254 [0.5 credit] (MCG 5483)
Fundamentals of Combustion
Also listed as MECH 5204.

MAAJ 5255 [0.5 credit] (MCG 5324)
Building Performance Simulation
Includes: Experiential Learning Activity
Also listed as MECH 5205.

MAAJ 5301 [0.5 credit] (MCG 5131)
Heat Transfer by Conduction

MAAJ 5302 [0.5 credit] (MCG 5132)
Heat Transfer by Convection

MAAJ 5303 [0.5 credit] (MCG 5133)
Heat Transfer by Radiation

MAAJ 5304 [0.5 credit] (MCG 5134)
Heat Transfer w/Phase Change

MAAJ 5306 [0.5 credit] (MCG 5136)
Fluid Mech and Heat Transfer

MAAJ 5307 [0.5 credit] (AMM 5137)
Special Studies in Solid Mechanics and Materials

MAAJ 5308 [0.5 credit] (MCG 5138)
Advanced Topics in Advanced Materials and Manufacturing Engineering

MAAJ 5352 [0.5 credit] (MCG 5332)
Instrumentation Techniques
Also listed as MECH 5302.

MAAJ 5354 [0.5 credit] (MCG 5334)
Computational Fluid Dynamics of Compressible Flow
Also listed as MECH 5304.

MAAJ 5356 [0.5 credit] (MCG 5306)
Theory of Subsonic Flows

MAAJ 5357 [0.5 credit] (MCG 5307)
Theory of Supersonic Flows

MAAJ 5401 [0.5 credit] (MCG 5141)
Statistical Thermodynamics

MAAJ 5408 [0.5 credit] (MCG 5551)
Theorie d'Ecoulement Visqueux

MAAJ 5409 [0.5 credit] (MCG 5552)
Theorie de Turbulence

MAAJ 5451 [0.5 credit] (MCG 5341)

Turbomachinery

Includes: Experiential Learning Activity
Also listed as MECH 5401.

MAAJ 5452 [0.5 credit] (AMM 5144)

Superalloys and Ceramix-Metal Matrix Composites

MAAJ 5457 [0.5 credit] (MCG 5347)

Conductive and Radiative Heat Transfer

Also listed as MECH 5407.

MAAJ 5459 [0.5 credit] (MCG 5349)

Two-Phase Flow and Heat Transfer

MAAJ 5500 [0.5 credit] (MCG 5557)

Mecanique de Fluides

MAAJ 5501 [0.5 credit] (MCG 5151)

Laminar Flow Theory

MAAJ 5502 [0.5 credit] (MCG 5152)

Theory of Turbulance

MAAJ 5505 [0.5 credit] (MCG 5155)

Inviscid Flow Theory

MAAJ 5506 [0.5 credit] (MCG 5156)

Measurement of Fluid Mech

MAAJ 5507 [0.5 credit] (MCG 5157)

Num Comp:Fluid Dyn and Heat Tran

MAAJ 5509 [0.5 credit] (AMM 5159)

Production Planning and Control

MAAJ 5550 [0.5 credit] (MCG 5350)

Advanced Vibration Analysis

Includes: Experiential Learning Activity
Also listed as MECH 5500.

MAAJ 5555 [0.5 credit] (MCG 5355)

Stability Theory & Application

Also listed as MECH 5505.

MAAJ 5557 [0.5 credit] (MCG 5124)

Advanced Kinematics

Includes: Experiential Learning Activity
Also listed as MECH 5507.

MAAJ 5608 [0.5 credit] (AMM 5168)

Industrial Organization

MAAJ 5609 [0.5 credit] (MCG 5169)

Topics in Reliability Engineer

MAAJ 5652 [0.5 credit] (MCG 5362)

Failure Prevention

MAAJ 5655 [0.5 credit] (MCG 5365)

Finite Element Analysis I

Also listed as MECH 5605.

MAAJ 5656 [0.5 credit] (MCG 5367)

The Boundary Element Method

Includes: Experiential Learning Activity
Also listed as MECH 5607.

MAAJ 5657 [0.5 credit] (MCG 5361)

Creative Problem Solving and Design

Also listed as MECH 5601.

MAAJ 5659 [0.5 credit] (AMM 5123)

Microstructure and Properties of Materials

Also listed as MECH 5609.

MAAJ 5700 [0.5 credit] (MCG 5170)

CAD/CAM

Includes: Experiential Learning Activity

MAAJ 5701 [0.5 credit] (MCG 5171)

Applied Reliability Theory

MAAJ 5703 [0.5 credit] (MCG 5173)

Systems Engineer and Integration

MAAJ 5707 [0.5 credit] (MCG 5177)

Robot Mechanics

MAAJ 5709 [0.5 credit] (AMM 5179)

Manufacturing System Analysis

MAAJ 5750 [0.5 credit] (AMM 5345)

Surfaces and Coatings

Also listed as MECH 5700.

MAAJ 5751 [0.5 credit] (MCG 5369)

Metallic Phases and Transformations

MAAJ 5802 [0.5 credit] (AMM 5182)

Theory of Elastic Instability

MAAJ 5804 [0.5 credit] (MCG 5184)

Mechatronics

MAAJ 5805 [0.5 credit] (MCG 5185)

Multivariate Digital Control

MAAJ 5806 [0.5 credit] (MCG 5186)

Non-Linear Disc Dyn and Control

MAAJ 5850 [0.5 credit] (MCG 5480)

Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5800.

MAAJ 5851 [0.5 credit] (MCG 5380)

Safety and Risk Assessment of Nuclear Power

MAAJ 5852 [0.5 credit] (MCG 5483)

Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5802.

MAAJ 5853 [0.5 credit] (MCG 5488)
Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5803.

MAAJ 5854 [0.5 credit] (MCG 5384)
Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5804.

MAAJ 5855 [0.5 credit] (MCG 5482)
Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5805.

MAAJ 5857 [0.5 credit] (MCG 5487)
Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5807.

MAAJ 5858 [0.5 credit] (MCG 5376)
Special Topics in Mechanical and Aerospace Engineering

Also listed as MECH 5808.

MAAJ 5901 [0.5 credit] (MCG 5191)
Combustion in Premixed Systems

MAAJ 5902 [0.5 credit] (MCG 5192)
Combustion in Diffusion System

Mechanical Engineering (MECH)

Mechanical Engineering (MECH) Courses

MECH 5000 [0.5 credit] (MCG 5300)
Fundamentals of Fluid Dynamics

Differential equations of motion. Viscous and inviscid regions. Potential flow: superposition; thin airfoils; finite wings; compressibility corrections. Viscous flow: thin shear layer approximation; laminar layers; transition; turbulence modeling. Convective heat transfer: free versus forced convection; energy and energy integral equations; turbulent diffusion.

Also listed as MAAJ 5050.

Also offered at the undergraduate level, with different requirements, as AERO 4302, for which additional credit is precluded.

MECH 5001 [0.5 credit] (MCG 5301)
Theory of Viscous Flows

Navier-Stokes and boundary layer equations; mean flow equations for turbulent kinetic energy; integral formulations. Stability, transition, turbulence, Reynolds stresses; separation. Calculation methods, closure schemes. Compressibility, heat transfer, and three-dimensional effects.

Includes: Experiential Learning Activity

MECH 5003 [0.5 credit] (MCG 5303)
Incompressible Non-Viscous Flow

The fundamental equations and theorems for non-viscous fluid flow; solution of two-dimensional and axisymmetric potential flows; low-speed airfoil and cascade theory; wing lifting-line theory; panel methods.

MECH 5004 [0.5 credit] (MCG 5304)
Compressible Non-Viscous Flow

Steady isentropic, frictional, and diabatic flow; shock waves; irrotational compressible flow, small perturbation theory and similarity rules; second-order theory and unsteady, one-dimensional flow.

MECH 5008 [0.5 credit] (MCG 5308)
Experimental Methods in Fluid Mechanics

Fundamentals of techniques of simulation of fluid dynamic phenomena. Theoretical basis, principles of design, performance and instrumentation of ground test facilities. Applications to aerodynamic testing. Includes: Experiential Learning Activity

MECH 5009 [0.5 credit] (MCG 5309)
Environmental Fluid Mechanics Relating to Energy Utilization

Characteristics of energy sources and emissions into the environment. The atmosphere; stratification and stability, equations of motion, simple winds, mean flow, turbulence structure and dispersion near the ground. Flow and dispersion in groundwater, rivers, lakes and oceans. Physical and analytical modeling of environmental flows. Includes: Experiential Learning Activity
Also listed as MAAJ 5059.

MECH 5100 [0.5 credit] (MCG 5310)
Performance and Economics of Aircraft

Aircraft performance analysis with emphasis on factors affecting take-off, landing and economic performance; high lift schemes; operating economics.

MECH 5101 [0.5 credit] (MCG 5311)
Dynamics and Aerodynamics of Flight

Static stability theory. Euler's equations for rigid body motion; the linearized equations of motion; stability derivatives and their estimation. Longitudinal and lateral dynamic response of an aircraft to control and disturbance. Includes: Experiential Learning Activity
Also listed as MAAJ 5151.

Also offered at the undergraduate level, with different requirements, as AERO 4308, for which additional credit is precluded.

MECH 5103 [0.5 credit] (MCG 5328)
3D Machine Vision: From Robots to the Space Station

Through lectures and project work, this course introduces fundamental 3D machine vision methods (triangulation and time-of-flight), presents cutting-edge neural network approaches, and explores major engineering applications (e.g. robotics, autonomous vehicles, space navigation) where perception of the 3D environment is essential.

MECH 5104 [0.5 credit] (MCG 5314)**Ground Transportation Systems and Vehicles**

Performance characteristics, handling and directional stability, ride comfort and safety of various types of ground vehicle systems including road vehicles, terrain-vehicle systems, guided transport systems, and advanced ground transport technology.

MECH 5105 [0.5 credit] (MCG 5315)**Orbital Mechanics and Space Control**

Orbital dynamics and perturbations due to the Earth's figure, the sun, and the moon with emphasis on mission planning and analysis. Rigid body dynamics applied to transfer orbit and on-orbit momentum management and control of spacecraft. Effects of flexible structures on a spacecraft control system.

Includes: Experiential Learning Activity

Also listed as MAAJ 5155.

MECH 5106 [0.5 credit] (MCG 5121)**Space Mission Analysis and Design**

Review of solar system and space exploration. Space mission design and geometry. Analysis of orbit design, transfers, interplanetary trajectories. Effect of environment on spacecraft design. Space propulsion and launch vehicle design. Launch sequence, windows, cost. Reusable launch systems.

Precludes additional credit for MAAE 4906 (Section B) if taken between 1994-1995 and 2003-2004 inclusive, MECH 5805 taken between 2002-2003 and 2003-2004 inclusive, MAAE 5700 (Section L) taken between 1994-1995 and 1996-1997 inclusive, and MAAE 5805 taken between 1999-2000 and 2001-2002 inclusive. Also offered at the undergraduate level, with different requirements, as AERO 4802., for which additional credit is precluded.

MECH 5107 [0.5 credit] (MCG 5317)**Experimental Stress Analysis**

Introduction to theory of elasticity. Photo-elasticity: types of polariscopes, two- and three-dimensional stress fields, frozen patterns. Photoelastic coatings. Strain gauges; gauge factors, sensitivity, calibration, and temperature compensation. Moire fringes, brittle lacquers, mechanical strain gauges.

MECH 5201 [0.5 credit] (MCG 5321)**Methods of Energy Conversion**

Technical, economic and environmental aspects of present and proposed large-scale systems of energy conversion.

MECH 5202 [0.5 credit] (MCG 5122)**Smart Structures**

Structural dynamics principles: modal analysis and wave propagation. Linear time invariant systems: feedback, feedforward, SISO, MIMO, digital and adaptive filters.

'Smart' Structures: multifunctional materials, collocation principles, geometric filtering, and control authority.

Applications in aero-acoustics and aeroelasticity.

Precludes additional credit for MECH 5807 (if taken 2001-2002 to 2003-2004).

MECH 5203 [0.5 credit] (MCG 5322)**Nuclear Engineering**

Reactor design and safety requirement overview; reactor physics, chemistry and engineering, CANDU reactor design and operation; CANDU reactor fuel channels, thermalhydraulics and fuel; reactor safety design and analysis; IAEA and Canadian safety analysis requirements; reactor accidents; nuclear energy policy.

MECH 5204 [0.5 credit] (MCG 5483)**Fundamentals of Combustion**

Emphasis on gas phase reacting flows. Background of combustion thermodynamics, diffusion mass transfer, and chemical kinetics. Detonations and deflagrations. Chemical and dynamic structure of flames. Gaseous flame propagation under laminar and turbulent conditions. Flame stabilization and extinction. Introduction to burning rate theory.

Also listed as MAAJ 5254.

MECH 5205 [0.5 credit] (MCG 5324)**Building Performance Simulation**

During this course students will develop an understanding of the methodologies and theory employed historically and contemporarily in the Building Performance Simulation (BPS) field, develop capabilities for extending the functionality of BPS tools, and establish skills in applying BPS tools in research, analysis, and design.

Includes: Experiential Learning Activity

Also listed as MAAJ 5255.

MECH 5206 [0.5 credit] (MCG 5325)**Wind Engineering**

Theoretical and practical areas pertinent to the operation of wind turbines. World energy needs, wind farms versus traditional power plants, global wind characteristics, efficient turbine design, electrical components, modes of turbine operation and control, mechanical design, economic and environmental concerns.

MECH 5300 [0.5 credit] (MCG 5330)**Engineering Acoustics**

Review of acoustic waves in compressible fluids; acoustic pressure, intensity and impedance; physical interpretation and measurement; transmission through media; layers, in-homogeneous media, solids; acoustic systems; rooms, ducts, resonators, mufflers, properties of transducers; microphones, loudspeakers, computational acoustics.

MECH 5301 [0.5 credit] (MCG 5331)**Aeroacoustics**

The convected wave equation; theory of subsonic and supersonic jet noise; propeller and helicopter noise; fan and compressor noise; boundary layer noise, interior noise; propagation in the atmosphere; sonic boom; impact on environment.

Includes: Experiential Learning Activity

MECH 5302 [0.5 credit] (MCG 5332)**Instrumentation Techniques**

An introduction for the non-specialists to the concepts of digital and analog electronics with emphasis on data acquisition, processing and analysis. Topics covered include operational amplifiers, signal processing, digital logic systems, computer interfacing, noise in electronic systems. Hands-on sessions illustrate theory and practice. Also listed as MAAJ 5352.

MECH 5304 [0.5 credit] (MCG 5334)**Computational Fluid Dynamics of Compressible Flows**

Solution techniques for parabolic, elliptic and hyperbolic equations developed for problems of interest to fluid dynamics with appropriate stability considerations. A staged approach to solution of full Euler and Navier-Stokes equations is used. Grid generation techniques appropriate for compressible flows are introduced. Also listed as MAAJ 5354.

MECH 5400 [0.5 credit] (MCG 5344)**Gas Turbine Combustion**

Combustion fundamentals and gas turbine combustor design. Combustion fundamentals include fuel evaporation, chemistry of combustion, chemical kinetics and emissions formation and introduction to computational combustion modelling. Combustor design addresses the interrelationship between operational requirements and combustion fundamentals.

Precludes additional credit for MECH 5800 (MCG 5480) when MECH 5800 was offered with this topic.

MECH 5401 [0.5 credit] (MCG 5341)**Turbomachinery**

Types of machines. Similarity: performance parameters; characteristics; cavitation. Velocity triangles. Euler equation: impulse and reaction. Radial pumps and compressors: analysis, design and operation. Axial pumps and compressors: cascade and blade-element methods; staging; off-design performance; stall and surge. Axial turbines. Current design practice.

Includes: Experiential Learning Activity

Also listed as MAAJ 5451.

MECH 5402 [0.5 credit] (MCG 5342)**Gas Turbines**

Interrelationship among thermodynamic, aerodynamic, and mechanical design. Ideal and real cycle calculations. Cycle optimization; turbo-shaft, turbojet, turbofan. Component performance. Off-design performance; matching of compressor, turbine, nozzle. Twin-spool matching.

MECH 5403 [0.5 credit] (MCG 5343)**Advanced Thermodynamics**

The course covers three major topics: review of fundamentals from a consistent viewpoint, properties and equations of state, and applications and special topics. The third topic includes an introduction to statistical thermodynamics.

MECH 5407 [0.5 credit] (MCG 5347)**Conductive and Radiative Heat Transfer**

Analytical, numerical and analog solutions to steady-state and transient conduction heat transfer in multi-dimensional systems. Radiative heat exchange between black, grey, non-grey diffusive and specular surfaces, including effects of athermanous media.

Also listed as MAAJ 5457.

MECH 5408 [0.5 credit] (MCG 5348)**Convective Heat and Mass Transfer**

Analogies between heat, mass and momentum transfer. Forced and free convection relations for laminar and turbulent flows analytically developed where possible and otherwise deduced from experimental results, for simple shapes and in heat exchangers. Mass transfer theory and applications.

MECH 5500 [0.5 credit] (MCG 5350)**Advanced Vibration Analysis**

General theory of continuous and discrete multi-degree-of-freedom vibrating systems. Emphasis on numerical techniques of solving complex vibrating systems, with selected applications from aerospace, civil, and mechanical engineering.

Includes: Experiential Learning Activity

Also listed as MAAJ 5550.

MECH 5501 [0.5 credit] (MCG 5125)**Advanced Dynamics**

Developing and applying the governing equations of motion for discrete and continuous mechanical systems. Includes Newton-Euler and Lagrangian formulations; classical and finite element approaches for continuous systems; and linear stability, frequency response, and propagation solution methods.

Includes: Experiential Learning Activity

Precludes additional credit for MECH 5500 (if taken 2001-2002, 2002-2003).

MECH 5502 [0.5 credit] (MCG 5352)**Optimal Control Systems**

Review of transfer function and state-space system descriptions. Elements of the optimal control problem. Variational calculus. Optimal state feedback control. Riccati equations. Optimal observers and Kalman-Bucy Filters. Extension to discrete time systems including an introduction to dynamic programming. Practical applications are emphasized throughout the course.

MECH 5503 [0.5 credit] (MCG 5353)**Robotics**

The history of and introduction to robotics methodology. Robots and manipulators; homogeneous transformation, kinematic equations, solving kinematic equations, differential relationships, motion trajectories, dynamics. Control; feedback control, compliance, servomotors, actuators, external and internal sensors, grippers and vision systems. Microprocessors and their application to robot control. Programming.

MECH 5504 [0.5 credit] (MCG 5354)**Guidance, Navigation and Control**

Guidance system classification, flight control systems, targeting, target tracking, sensing. Modern multivariable control analysis; design requirements, sensitivity, robustness, perturbations, performance analysis. Modern filtering and estimation techniques. Terrestrial navigation; tactical air navigation (TACAN), star trackers Guidance mission and performance. Aircraft, missile and spacecraft guidance and control.

MECH 5505 [0.5 credit] (MCG 5355)**Stability Theory and Applications**

Fundamental concepts and characteristics of modern stability definitions. Sensitivity and variational equations; linear variational equations; phase space analysis; Lyapunov's direct method. Autonomous and nonautonomous systems; stability in first approximation; the effect of force type on stability; frequency method. Also listed as MAAJ 5555.

MECH 5506 [0.5 credit] (MCG 5356)**Neuro and Fuzzy Control**

Knowledge-based controllers. Fuzzy control: mathematics, relations, operations, approximate reasoning. Fuzzy knowledge base control and structure. Fuzzification, inference engine, defuzzification. Nonlinear, adaptive fuzzy control systems. Stability, Neuro-control: processing, learning. Adaptation of artificial neural systems: associative memories, algorithms, applications, and network implementation. Neurofuzzy systems: industrial applications.

Precludes additional credit for EACJ 5709 (ELG 5196).

MECH 5507 [0.5 credit] (MCG 5124)**Advanced Kinematics**

Algebraic-geometry applications: kinematic calibration of serial and in-parallel robots; kinematic synthesis of planar, spherical, spatial mechanisms. Various DH-parametrisations, Jacobian formulations. Topics in: projective geometry; Cayley-Klein geometries; Plücker line coordinates; Gröbner bases; Grassmannians; kinematic mapping; Burmester theory. Emphasis on practical applications.

Includes: Experiential Learning Activity

Also listed as MAAJ 5557.

MECH 5508 [0.5 credit] (MCG 5326)**System Modelling, Dynamics and Control**

The course provides an understanding of system modelling and the connection between energy domains. Within the temporal and/or frequency domains, system identification techniques and control aspects are explored for discrete and continuous systems along with lumped and distributed parameter models.

MECH 5509 [0.5 credit] (MCG 5327)**Nonlinear Systems Analysis & Controls**

Introduction to nonlinear systems, stability of periodic solutions and limit cycles. Second-order nonlinear systems. Mathematical foundations for stability analysis, Lyapunov and LaSalle's methods. Autonomous and non-autonomous systems. Input-Output stability formalisms. Basics of nonlinear control techniques based on Lyapunov methods.

MECH 5601 [0.5 credit] (MCG 5361)**Creative Problem Solving and Design**

Problem-solving processes and how they can be applied in engineering design. Emphasis on learning methodologies rather than accumulating information. Techniques can be successfully applied in any engineering specialty.

Also listed as IDES 5301 (no longer offered), MAAJ 5657.

MECH 5602 [0.5 credit] (MCG 5362)**Failure Prevention (Fracture Mechanics and Fatigue)**

Design of engineering structures to ensure against failure due to fatigue or brittle fracture. Nature of fatigue and brittle fracture; selection of suitable material, geometry, and inspection procedures for the load and environmental conditions.

MECH 5603 [0.5 credit] (MCG 5381)**Lightweight Structures**

Structural behaviour. Fundamentals of basic elasticity. Energy methods of structural analysis. Bending, shear, and torsion of open and closed multicell structures. Bending of plates. Structural idealization and its effects on open and closed sections. Structural stability.

MECH 5604 [0.5 credit] (MCG 5364)**Computational Metallurgy**

Development of microstructure in alloys in solidification processes and post-solidification processing. Nucleation and growth of solid phase. Formation of a dendrite structure, macro and micro segregations. Pore formation in castings. Thermodynamic and kinetics of phase transformations and structure evolution in solid alloys.

MECH 5605 [0.5 credit] (MCG 5365)**Finite Element Analysis I**

An introduction to the finite element methodology, with emphasis on applications to heat transfer, fluid flow and stress analysis. The basic concepts of Galerkin's method, interpolation, numerical integration, and isoparametric elements are taught using simple examples.

Also listed as MAAJ 5655.

MECH 5606 [0.5 credit] (MCG 5366)**Finite Element Analysis II**

Time marching heat flow problems with linear and nonlinear analysis. Static plasticity. Time-dependent deformation problems; viscoplasticity, viscoelasticity, and dynamic analysis. Isoparametric elements and numerical integration are used throughout.

MECH 5607 [0.5 credit] (MCG 5367)**The Boundary Element Method (BEM)**

Integral equations. The BIE for potential theory and for elastostatics in two-dimensions. Boundary elements and numerical integration schemes. Practical applications.

Includes: Experiential Learning Activity

Also listed as MAAJ 5656.

MECH 5609 [0.5 credit] (AMM 5123)**Microstructure and Properties of Materials**

Essential microstructural features of metals and alloys: crystal structure, dislocations, grain boundaries. The importance of these features in controlling mechanical properties is emphasized. Analytical techniques observing microstructure in metals and other materials: TEM, SEM, electron diffraction, spectrometry.

Also listed as MAAJ 5659.

Precludes additional credit for MECH 5804 (if taken 2002-2003, 2003-2004).

MECH 5700 [0.5 credit] (MCG 5345)**Surfaces and Coatings**

Surface characteristics of solid materials and surface degradation/failure mechanisms including wear, fretting, oxidation, corrosion, and erosion are introduced. Coating methods including PVD, CVD, laser, thermal spray and electrochemical deposition are discussed in the context of failure prevention measures.

Also listed as MAAJ 5750.

MECH 5701 [0.5 credit] (MCG 5369)**Metallic Phases and Transformations**

Thermodynamics of crystals, phase diagrams, principles of alloy phases, thermal analysis. Transformation rate and mechanisms. Short and long range diffusional transformations, diffusionless transformations. Phase transformations in engineering systems.

Precludes additional credit for MECH 5608 if taken during 2001-2002 or during 2005-2006.

Prerequisite(s): MECH 2700 or the equivalent.

MECH 5704 [0.5 credit] (MCG 5374)**Integrated Manufacturing Systems (CIMS)**

Topics essential to CIMS including computer graphics, geometric modeling, numerically controlled machining, and flexible manufacturing. The fundamental data structures and procedures for computerization of engineering design, analysis and production.

Also offered at the undergraduate level, with different requirements, as MECH 4704, for which additional credit is precluded.

MECH 5705 [0.5 credit] (MCG 5375)**CAD/CAM**

Computer aided design and manufacturing methodology through hands-on experience and state-of-the-art software. Topics include mathematical representation, solid modeling, drafting, mechanical assembly, mechanism design and CNC machining. CAD data exchange standards, rapid prototyping, concurrent engineering and design for X are also discussed.

MECH 5800 [0.5 credit] (MCG 5480)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5850.

MECH 5801 [0.5 credit] (MCG 5489)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

MECH 5802 [0.5 credit] (MCG 5483)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5852.

MECH 5803 [0.5 credit] (MCG 5488)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5853.

MECH 5804 [0.5 credit] (MCG 5384)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5854.

MECH 5805 [0.5 credit] (MCG 5482)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5855.

MECH 5806 [0.5 credit] (MCG 5486)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

MECH 5807 [0.5 credit] (MCG 5387I)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5857.

MECH 5808 [0.5 credit] (MCG 5376)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

Also listed as MAAJ 5858.

MECH 5809 [0.5 credit] (MCG 5382)**Special Topics in Mechanical and Aerospace Engineering**

Topic will vary from year to year.

MECH 5906 [0.5 credit]**Directed Studies**

MECH 5908 [1.5 credit] (MCG 5398)**Independent Engineering Study**

Students pursuing a master's degree by course work carry out an independent study, analysis, and solution of an engineering problem or design project. The results are given in the form of a written report and presented at a departmental seminar. Carried out under the general. Includes: Experiential Learning Activity

MECH 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

MECH 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Migration and Diaspora Studies (MGDS)

Migration and Diaspora Studies (MGDS) Courses**MGDS 5001 [0.5 credit]****MA Core Seminar: Migration and Diaspora Studies**

Advanced overview of major themes in and approaches to both migration studies and diaspora studies, drawing on different disciplinary perspectives. Prerequisite(s): enrolment in the MGDS MA program or permission of the department.

MGDS 5002 [0.5 credit]**Key Issues in Migration and Diaspora Studies**

Social, cultural, economic and political implications of the movement and transnational settlement of people with a multidisciplinary and multiscalar approach to topics such as citizenship, forced migration, diasporic communities, exile, immigration, global identities and transnationalism.

MGDS 5003 [0.5 credit]**Research Seminar in Migration and Diaspora Studies**

Research design and methodology in migration and diaspora studies. Coursework students design a research project to be completed during the term. Research essay and thesis pathway students produce a proposal and work on the initial stages of their research project. Includes: Experiential Learning Activity Prerequisite(s): enrolment in the MGDS MA program or permission of the department.

MGDS 5101 [0.5 credit]**Practicum in Migration and Diaspora Studies**

Practicum placement in an organization that works in an area relevant to migration and diaspora studies. Requires written academic assignments. Graded SAT/UNS. Includes: Experiential Learning Activity Prerequisite(s): permission of the department.

MGDS 5201 [0.5 credit]**Migration and Diaspora History Special Topics**

Seminar on a topic in the history of Migration and Diaspora. Topic varies from year to year. Also listed as HIST 5711.

MGDS 5202 [0.5 credit]**Topics in Migration and Diaspora: Europe, Russia and Eurasia**

Topics in Migration and Diaspora Studies with a regional focus on Europe, Russia and Eurasia. Also listed as EURR 5307.

MGDS 5900 [0.5 credit]**Special Topics in Migration and Diaspora Studies**

Advanced topics in Migration and Diaspora Studies. Topics vary from term to term. Also offered at the undergraduate level, with different requirements, as MGDS 4900, for which additional credit is precluded.

MGDS 5901 [0.5 credit]**Directed Readings in Migration and Diaspora Studies**

Directed readings on a specific topic in Migration and Diaspora Studies. Prerequisite(s): permission of the department.

MGDS 5908 [1.0 credit]**Research Essay**

A research essay on a topic relating to Migration and Diaspora Studies. The topic must be approved by the program supervisor. Includes: Experiential Learning Activity Prerequisite(s): permission of the department.

MGDS 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity Prerequisite(s): permission of the department.

MGDS 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity Prerequisite(s): registration in the Co-operative Education Program option in the M.A.

Music (MUSI)

Music (MUSI) Courses

Note: the majority of courses are open to non-Majors; students are advised to consult the Discipline. Priority is given to Music students.

MUSI 5000 [0.5 credit]**Music and Cultural Theory I: Intellectual Histories**

Major intellectual trends relevant to cultural theory and their application to the study of music. Topics may include: Marxism and critical theory, anthropological and sociological theory, philosophical aesthetics, psychoanalysis, feminism and gender theory, post-colonial studies, and cultural studies. Includes: Experiential Learning Activity Precludes additional credit for MUSI 5001 (no longer offered).

MUSI 5002 [0.5 credit]**Research Methods in Music and Culture**

The research process, including the phases of conceptualization, gathering of sources, and writing up the completed research. Topics include: issues related to applying interdisciplinary methodologies to musical objects of study, conducting ethnographic research and writing for scholarly publications, conference presentations, and grant applications.

Includes: Experiential Learning Activity

MUSI 5004 [0.5 credit]**Music and Cultural Theory II: Current Debates**

Selected debates within contemporary theory and culture and their relevance to music. The focus will be on a limited range of debates and issues selected by the instructor for in-depth discussion and analysis. Topics will vary from year to year.

Includes: Experiential Learning Activity

Prerequisite(s): MUSI 5000 or permission of the School.

MUSI 5006 [0.5 credit]**Music and Identity**

Music as a medium for the construction and maintenance of cultural identities, including the relationship between music and traditional cultures, geography, the nation state, urban subcultures, gender and sexuality, race, class, and ethnicity.

Includes: Experiential Learning Activity

MUSI 5007 [0.5 credit]**Music and Visual Culture**

The relationships between musical and visual cultures, including traditional arts, fine art painting, film, television, and digital gaming and interactive media, and the ways in which meanings are dependent upon the various connections between them.

Includes: Experiential Learning Activity

MUSI 5008 [0.5 credit]**Technologies of Music**

The role that technologies, including musical instruments, notation, sound recording, and digital media, play in the concepts and practices associated with music. Topics include: technology as material culture, technology and musical practices, and the increasing importance of technology in contemporary music and culture.

MUSI 5009 [0.5 credit]**Music, Meaning and Representation**

Theories of meaning and representation as applied to music. Major source traditions and critiques to be considered include: semiotics and structuralism, analytic philosophy, formalism, cognitive theory, and post-structuralism.

Includes: Experiential Learning Activity

MUSI 5010 [0.5 credit]**History of Genres**

Theories of genre, including theories derived from literary theory and film studies, and their application to the history of music. Topics may include relationships between genre and musical style, production and reception, social contexts, markets, and the legitimization and organization of knowledge.

MUSI 5011 [0.5 credit]**Music and Social Institutions**

Historical relationships between music and society, including that of Western art music to sacred and secular institutions; the rise of the cultural industries (sound recording, radio and film); the relationship of science, the arts, and the academy; and state policies of arts funding and multiculturalism.

Includes: Experiential Learning Activity

MUSI 5012 [0.5 credit]**Music and Nation**

How nationhood narratives circulate within and around music and how they are articulated in institutional discourses, media, and state policy; how these narratives have been supported or challenged by musical practices, regionalism, immigration, social and cultural identities.

Includes: Experiential Learning Activity

MUSI 5013 [0.5 credit]**Music and Performance**

Music as a form of social practice rooted in traditions of performance. The variable, multimodal character of music as understood through theories of performance and gesture drawn from the histories and literatures of music, theatre, and dance (in art, popular, and non-Western forms).

Includes: Experiential Learning Activity

MUSI 5015 [0.5 credit]**Ethnomusicology of Canadian Traditions**

Issues of anthropological, sociological, and analytical significance are examined in the context of selected developments in folklore and ethnomusicological research on Canadian traditions.

Includes: Experiential Learning Activity

Precludes additional credit for MUSI 5101 (no longer offered).

Also offered at the undergraduate level, with different requirements, as MUSI 4103, for which additional credit is precluded.

MUSI 5016 [0.5 credit]**First Peoples Music in Canada**

The context and significance of musical expressions of selected Canadian Indigenous groups and the contributions of individuals in the creation of music and meaning in First Peoples' communities.

Includes: Experiential Learning Activity

Precludes additional credit for MUSI 5102 (no longer offered).

Also offered at the undergraduate level, with different requirements, as MUSI 4104, for which additional credit is precluded.

MUSI 5017 [0.5 credit]**Music and Globalization**

Music's role in the multifaceted and complex processes of globalization. Drawing on case studies of "world musics" this course explores how sound and music negotiate histories of post/colonialism, cultural and economic imperialism, and constructions of sameness and difference in "world music" contexts.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as MUSI 4304, for which additional credit is precluded.

MUSI 5018 [0.5 credit]**Music and Social Justice**

This course explores the varied roles that music has played—and continues to play—as an agent of positive social change, offering students innovative opportunities to reflect/act on the relationships between music and human rights and to forge connections between academic work and struggles for social justice.

Includes: Experiential Learning Activity

MUSI 5200 [0.5 credit]**Special Topics in Music and Cultural Theory**

Selected topics focusing on aspects of music and cultural theory not available in regular program offerings. Topic will vary from year to year.

MUSI 5201 [0.5 credit]**Special Topics in Music Genres**

Selected topics focusing on specific genres of music not available in regular program offerings. Topic will vary from year to year.

MUSI 5300 [0.5 credit]**Practicum in Music**

Academically informed practical experience in music-specific projects such as music recording, librarianship, concert management, research, multimedia creation at local institutions. A maximum of 1.0 credit of practicum may be used in fulfilment of M.A. requirements.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

MUSI 5400 [0.5 credit]**Advanced Studies in Performance**

Advanced study for voice or instrument in classical, traditional or popular idioms. The course requires a lecture-recital arranged in consultation with the Graduate Supervisor and the Supervisor of Performance Studies. This course is non-repeatable.

Includes: Experiential Learning Activity

Prerequisite(s): Proposal, audition, enrolment in the MA program and permission of the Graduate Supervisor and Supervisor of Performance Studies.

Individual instruction on a bi-weekly basis. 0.5 credit for full year course.

MUSI 5401 [0.5 credit]**Advanced Studies in Composition**

Advanced study in composition in classical, jazz or popular idioms. The student will be required to assemble a portfolio of work as a final project for the course. This course is non-repeatable.

Includes: Experiential Learning Activity

Prerequisite(s): Proposal, portfolio of compositions, enrolment in the MA program, and permission of the Graduate Supervisor.

Individual instruction on a bi-weekly basis. 0.5 credit for a full year course.

MUSI 5900 [0.5 credit]**Directed Readings and Research**

Course designed to permit students to pursue research on topics in music and culture chosen in consultation with a member of the faculty. A maximum of 1.0 credit of directed studies may be used in fulfilment of M.A. requirements.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the School.

MUSI 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

MUSI 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Neuroscience (NEUR)

Neuroscience (NEUR) Courses**NEUR 5000 [0.5 credit]****Foundations in Neuroscience**

A comprehensive, lecture-based course which will cover the foundational principles of neuroscience for students with a limited background in neuroscience. Topics include neural signalling, sensation, movement, neurodevelopment, neuroplasticity, neuroendocrinology, learning and memory, and other complex brain functions. Prerequisite(s): permission of the Department.

NEUR 5100 [1.0 credit]**Fundamentals in Neuroscience**

A general course covering core neuroscience topics including organization of the nervous system, sensory and motor systems, neuroendocrinology, motivation learning and memory, emotion, attention, and pathology. Course includes attendance of the neuroscience colloquium series.

Also listed as BIOL 5304.

Precludes additional credit for PSYC 5200.

NEUR 5201 [0.5 credit]**Statistics for Neuroscience I**

Concepts and applications of basic statistical methods. Power determinations, t-tests, analysis of variance designs, including factorial, within groups, and hierarchical designs, analysis of covariance, and follow-up tests. Extensive use of statistical software.

Precludes additional credit for PSYC 5410.

NEUR 5202 [0.5 credit]**Statistics for Neuroscience II**

Concepts and applications of advanced regression analyses, including multiple regression, hierarchical and polynomial techniques, factor analysis and cluster analysis. Extensive use of statistical software.

Precludes additional credit for PSYC 5411.

NEUR 5203 [0.5 credit]**Systematic Reviews and Meta-Analysis**

Introduces the methodology for conducting systematic reviews and meta-analysis. Topics include: conducting literature searches, extracting relevant literature, assessing quality of studies, and synthesizing findings across studies. Students will be expected to identify a research question, identify relevant literature, and carry out the statistical software.

Prerequisite(s): NEUR 5201.

NEUR 5800 [0.5 credit]**Special Topics in Neuroscience**

An in depth study of current topics in neuroscience and health. Course content varies yearly and has recently included cognitive neuroscience, neuropharmacology, neurodegeneration, neuroimmunology, behavioural medicine, neurobiology of learning and memory, brain mechanisms of ingestive behaviour and energy balance, and molecular neuroscience.

Also listed as BIOL 6203.

NEUR 5801 [0.5 credit]**Knowledge Mobilization**

Knowledge mobilization concepts, tools, and frameworks, the challenges and value of translational research, and processes involved in integrated knowledge mobilization. Skills to maximize research impacts will be developed.

Includes: Experiential Learning Activity

Precludes additional credit for HLTH 5300.

NEUR 5909 [3.0 credits]**M.Sc. Thesis**

Includes: Experiential Learning Activity

NEUR 6100 [1.0 credit]**Advanced Seminar in Neuroscience**

A comprehensive pro-seminar series, covering issues ranging from cellular and molecular processes through to neural systems and behaviours as well as psychopathology. Students will also be required to attend the Neuroscience colloquia series as part of this course. Also listed as BIOL 6305.

Precludes additional credit for PSYC 6200, PSYC 6202, PSYC 6203, BIOL 6303, BIOL 6306.

Prerequisite(s): NEUR5100 or equivalent.

NEUR 6200 [1.0 credit]**Comprehensive Examination**

The comprehensive examination will consist of either a grant proposal or a review paper, to be decided by the student in consultation with their supervisor.

The topic of the comprehensive examination must be outside of the candidate's primary area of specialization and must be completed within the first two years of PhD study.

NEUR 6301 [0.5 credit]**Techniques in Neuroscience I**

Completion of a research project carried out under the supervision of a neuroscience faculty member, normally not the current supervisor. The student will learn a new neuroscience technique and apply it to a research objective. Students must obtain prior approval from the graduate committee.

Precludes additional credit for PSYC 6204.

NEUR 6302 [0.5 credit]**Techniques in Neuroscience II**

Completion of a research project carried out under the supervision of a neuroscience faculty member, normally not the current supervisor. The student will learn a new neuroscience technique and apply it to a research objective. Students must obtain prior approval from the graduate committee.

Precludes additional credit for PSYC 6204.

NEUR 6401 [0.5 credit]**Independent Research in Neuroscience I**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade.

Includes: Experiential Learning Activity

Precludes additional credit for PSYC 5901 and PSYC 6901.

NEUR 6402 [0.5 credit]**Independent Research in Neuroscience II**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade.

Includes: Experiential Learning Activity

Precludes additional credit for PSYC 5901 and PSYC 6901.

NEUR 6501 [0.5 credit]**Directed Studies in Neuroscience I**

In-depth investigation of selected topics in neuroscience by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade. Precludes additional credit for PSYC 5900 and PSYC 6900.

NEUR 6502 [0.5 credit]**Directed Studies in Neuroscience II**

In-depth investigation of selected topics in neuroscience by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade. Precludes additional credit for PSYC 5900 or PSYC 6900.

NEUR 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Northern Studies (NRTH)

Northern Studies (NRTH) Courses**NRTH 5000 [1.0 credit]****Core Seminar: Northern Environments, Northern Societies, Northern Policy**

Disciplinary perspectives on the biophysical, social, and policy environments of northern Canada. Resource development, devolution, local governance and sovereignty in a time of rapid environmental change. Prerequisite(s): NRTH 5008 or permission of the Northern Studies program supervisor.

NRTH 5001 [1.0 credit]**Core Seminar: Northern and Arctic Issues**

Research and evaluation using interdisciplinary perspectives on biophysical and social issues faced by northern Canadians. Topics will vary from year to year. Research activities may be in collaboration with northern agencies.

Includes: Experiential Learning Activity

Prerequisite(s): NRTH 5000 (may be taken concurrently).

NRTH 5008 [0.0 credit]**Introductory Northern Field Course**

Overland field excursion to a northern community in the first week of the fall term or the week before the fall term. The course may last six days. Graded SAT/UNS.

Includes: Experiential Learning Activity

Prerequisite(s): Enrolment in the first year of a Northern Studies program.

NRTH 5009 [0.5 credit]**Field Course in Can. North**

Field observation and methods in a selected region of northern Canada on a group basis. A supplementary fee will apply.

Includes: Experiential Learning Activity

Prerequisite(s): NRTH 5000, NRTH 5001, NRTH 5008, NRTH 5905 (NRTH 5905 may be taken concurrently), and permission of the Northern Studies Supervisor.

Field course to take place for two or three weeks in the summer.

NRTH 5901 [0.5 credit]**Practicum in Northern Studies**

Research activity under the supervision of professionals in museums, government departments, nongovernmental organizations, embassies, or another professional research setting. The research must be in Northern Studies. Graded SAT/UNS.

Includes: Experiential Learning Activity

Prerequisite(s): NRTH 5000 (may be taken concurrently) and permission of the Northern Studies supervisor.

NRTH 5905 [0.5 credit]**Comprehensive Examination**

This examination focuses on interdisciplinary approaches to resolution of biophysical, social, or policy problems with respect to northern Canada. A specific theme will be identified for each candidate. The exam will comprise a research paper, common language summary, interview, and oral presentation.

Prerequisite(s): NRTH 5000, NRTH 5001, or permission of the Northern Studies supervisor.

Philanthropy and Nonprofit Leadership (PANL)

Philanthropy and Nonprofit Leadership (PANL) Courses**PANL 5001 [0.5 credit]****Foundations of Philanthropy**

The motivations, values and ethics, and history of philanthropy, and a critical examination of its role in relation to government, business and society. Trends and emerging challenges in philanthropy and voluntary action over time and in different cultures and regions.

PANL 5002 [0.5 credit]**Policy and Legal Environment**

The legal, tax and regulatory context in which philanthropy, charities and nonprofits operate; the processes of policy formation and means of participating in them.

PANL 5003 [0.5 credit]**Finances for Philanthropy and the Nonprofit Sector**

Revenue source development, business planning, financial management and accountability covering a range of financing options.

PANL 5004 [0.5 credit]**Governance and Leadership**

Theories of leadership, ethical decision making, and the function of governance, boards and strategic planning in directing effective sustainable organizations, building external relationships and managing multiple accountabilities.

PANL 5005 [0.5 credit]**Organizational Development**

Theories and application of organizational development for nonprofit and philanthropic organizations; human resource management for staff and volunteers, control systems, and project and risk management.

PANL 5006 [0.5 credit]**Research Methods**

Understanding of qualitative and quantitative methods with application to philanthropy and nonprofit research. Topics may include research design, techniques for collecting and managing evidence, an introduction to qualitative and statistical analysis and communication of results.

Precludes additional credit for PADM 5113 or 5114.

PANL 5007 [0.5 credit]**Policy and Program Evaluation**

Selected concepts, issues and processes in applied planning and evaluation, utilizing both Canadian and comparative experiences.

PANL 5008 [0.5 credit]**Capstone Project**

An integrative research project on a topic related to the philanthropic or nonprofit sector.

Includes: Experiential Learning Activity

Prerequisite(s): completion of core courses.

PANL 5009 [0.5 credit]**Internship**

This course requires supervised work experience over 10 weeks in an appropriate placement approved by the graduate supervisor. It culminates in a 25-30 page (or equivalent) analytical work graded by the academic supervisor.

Includes: Experiential Learning Activity

PANL 5010 [1.0 credit]**Capstone Project**

An integrative research project on a topic related to the philanthropic or nonprofit sector.

Includes: Experiential Learning Activity

Prerequisite(s): completion of core courses.

PANL 5301 [0.5 credit]**Planning and Management of Integrated Fundraising**

Strategic and tactical management, oversight and ethical considerations of a diversity of fundraising methods; donor relationships; planning and managing integrated campaigns.

PANL 5302 [0.5 credit]**Responsible and Impact Investing**

The financial instruments, organizational implications and measurement of program-related and other investments that lever economic, social and environmental value by organizations in or straddling the nonprofit and for-profit sectors.

PANL 5303 [0.5 credit]**Social Media, Communications and Marketing**

The use of social media and other information technologies for brand building, marketing, fundraising, and social/political activism. An overview of marketing and communications theory, principles and techniques, and their application in philanthropic, nonprofit, and social entrepreneurial environments.

PANL 5304 [0.5 credit]**Strategic Philanthropy and Grantmaking for Social Change**

Alternative approaches to effective grantmaking and funding practices, including managing the associated accountabilities for both grantmaking bodies and recipient organizations.

PANL 5305 [0.5 credit]**Globalization of Philanthropy**

Understanding global civil society and the effects that globalization has on giving and organizing. The legal, regulatory and cultural considerations for philanthropy, volunteerism, and civil society organizations that work transnationally.

PANL 5306 [0.5 credit]**Advanced Topics in Fundraising**

Specialized aspects and advanced methods of fundraising including planned giving, major campaigns, new technologies, ethical issues and leadership skills.

Prerequisite(s): PANL 5301 or permission of the Philanthropy and Nonprofit Leadership graduate supervisor.

Online course.

PANL 5307 [0.5 credit]**Community Philanthropy**

Formal and informal mechanisms communities use to mobilize their assets for public benefit and social change; analysis of major innovations and trends in community philanthropy from a global perspective.

Online

PANL 5701 [0.5 credit]**Social Innovation**

The processes, business models and leadership of 'social innovation' – system changing approaches to dealing with social, cultural, economic and environmental challenges. Use of case studies and prototypes to test assumptions and alternatives.

Includes: Experiential Learning Activity

PANL 5702 [0.5 credit]**Social Entrepreneurship**

The theory, leadership and management of social entrepreneurship, from evaluating the opportunity through implementation. Includes assessment of startup strategies, raising funds, assessing risks, legal aspects, marketing ideas, managing resources and growth, and creation of socially responsible models.

PANL 5703 [0.5 credit]**Public Policy Advocacy**

Examination of how nonprofit organizations and voluntary action can affect social change and influence public policy processes in both national and international contexts. Practical development of advocacy and public education strategies.

PANL 5704 [0.5 credit]**International Civil Society Organizations**

Understanding the role of international non-governmental organizations in a global civil society, and how they strategically plan and manage key functions including regime creation, humanitarian and development assistance and internal governance and operations.

PANL 5772 [0.5 credit]**Special Topics in Philanthropy and Nonprofit Leadership**

One or more specialized or advanced aspects of philanthropy and nonprofit leadership such as the ethics, history, cross-cultural dimensions and management of particular types of organizations. The topics will change each year.

PANL 5791 [0.5 credit]**Directed Studies in Philanthropy and Nonprofit Leadership**

A directed reading course on selected subjects related to philanthropy and nonprofit leadership, as arranged with a faculty supervisor.

Prerequisite(s): PANL 5001 and PANL 5002, at least an A- average in PANL courses, and permission of the Philanthropy and Nonprofit Leadership supervisor.

Philosophy (PHIL)

Philosophy (PHIL) Courses

PHIL 5000 [0.5 credit]**Special Topic in Philosophy**

A detailed study of a special topic in philosophy. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4100, for which additional credit is precluded.

PHIL 5004 [0.5 credit]**Tutorial in the History of Philosophy I**

Detailed study of a period or issue in the history of philosophy.

PHIL 5005 [0.5 credit]**Tutorial in the History of Philosophy II**

Detailed study of a period or issue in the history of philosophy.

PHIL 5104 [0.5 credit]**Tutorial in the Work of an Individual Philosopher I**

A critical and systematic study of the work of an individual philosopher.

PHIL 5105 [0.5 credit]**Tutorial in the Work of an Individual Philosopher II**

A critical and systematic study of the work of an individual philosopher.

PHIL 5200 [0.5 credit]**Topics in Philosophy of Mind or Philosophy of Language**

A detailed study of an issue or the work of selected philosophers in the general area of philosophy of mind and/or philosophy of language. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4210 or PHIL 4220, for which additional credit is precluded.

PHIL 5204 [0.5 credit]**Tutorial in Logic, Epistemology, or Metaphysics I**

An attempt to find a solution to a specific problem in logic, epistemology, or metaphysics.

PHIL 5205 [0.5 credit]**Tutorial in Logic, Epistemology, or Metaphysics II**

An attempt to find a solution to a specific problem in logic, epistemology, or metaphysics.

PHIL 5250 [0.5 credit]**Topics in Logic, Epistemology, Metaphysics or Philosophy of Science**

A detailed study of an issue or the work of selected philosophers in the general areas of logic, epistemology, metaphysics or philosophy of science. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4230, for which additional credit is precluded.

PHIL 5300 [0.5 credit]**Topics in Value Theory**

A detailed study of an issue or the work of selected philosophers in the general area of value theory. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4300, for which additional credit is precluded.

PHIL 5304 [0.5 credit]**Tutorial in Selected Problems of Philosophy I**

An attempt to find a solution to a specific problem in some area other than logic, epistemology, or metaphysics.

PHIL 5305 [0.5 credit]**Tutorial in Selected Problems of Philosophy II**

An attempt to find a solution to a specific problem in some area other than logic, epistemology, or metaphysics.

PHIL 5350 [0.5 credit]**Topics in Ethics or Political Philosophy**

A detailed study of an issue or the work of selected philosophers in the general areas of ethics or political philosophy. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4320 or PHIL 4330, for which additional credit is precluded.

PHIL 5500 [0.5 credit]**Topics in Contemporary Philosophy**

A detailed study of an issue or the work of selected philosophers in contemporary philosophy. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4007 or PHIL 4008, for which additional credit is precluded.

PHIL 5600 [0.5 credit]**Topics in the History of Philosophy**

A detailed study within the history of philosophy: a period, an issue or the work of selected philosophers. Topics may vary from year to year.

Also offered at the undergraduate level, with different requirements, as PHIL 4003, PHIL 4004, PHIL 4005, or PHIL 4006, for which additional credit is precluded.

PHIL 5650 [0.5 credit]**Semantics**

A graduate seminar in contemporary semantics. Also listed as LING 5505.

PHIL 5660 [0.5 credit]**Lexical Semantics**

Study of the meaning of words. Topics may include lexical decomposition, meaning variation, lexical relations, and lexical aspect.

Also listed as LING 5510.

Also offered at the undergraduate level, with different requirements, as LING 4510 and PHIL 4055, for which additional credit is precluded.

PHIL 5701 [0.5 credit]**Fall Colloquium**

Students attend each talk in the departmental colloquium series, preparing by doing mandatory background readings, and submit in writing a critical analysis of some aspect of the presentation.

Precludes additional credit for PHIL 5700 (no longer offered).

PHIL 5751 [0.5 credit]**Winter Colloquium**

Students attend each talk in the departmental colloquium series, preparing by doing mandatory background readings, and submit in writing a critical analysis of some aspect of the presentation.

Precludes additional credit for PHIL 5750 (no longer offered).

PHIL 5850 [0.5 credit]**Proseminar**

Students in this seminar will engage with contemporary philosophical research by exploring relations and interactions between two broad fields: philosophy of mind, language, and knowledge; and moral, social, and political philosophy. Specific topics will vary from year to year.

PHIL 5900 [0.5 credit]**Research Seminar**

Students select a contemporary philosophical position or historical interpretation and the surrounding debate in the philosophical or scholarly literature upon which to base a thesis proposal using literature review and an essay.

Includes: Experiential Learning Activity

PHIL 5908 [1.0 credit]**Research Essay**

Includes: Experiential Learning Activity

PHIL 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

Physics (PHYS)

Physics (PHYS) Courses

With the exception of PHYS 5701 Intermediate Quantum Mechanics with Applications and PHYS 5302 Classical Electrodynamics, which may be offered at either Carleton or the University of Ottawa, all PHYS courses are offered only at Carleton, and all PHYJ courses are offered only at the University of Ottawa.

PHYS 5002 [0.5 credit] (PHY 5344)**Statistical Data Analysis Techniques for Physics**

Computational methods used in analysis of experimental data. Introduction to probability and random variables. Monte Carlo methods for simulation of random processes. Statistical methods for parameter estimation and hypothesis tests. Confidence intervals. Multivariate data classification. Unfolding methods. Examples taken primarily from particle and medical physics.

Includes: Experiential Learning Activity

Prerequisite(s): an ability to program in Python, Java, C, or C++, and permission of the Department.

Also offered at the undergraduate level, with different requirements, as PHYS 4807, for which additional credit is precluded.

PHYS 5101 [0.5 credit] (PHY 8111)**Classical Mechanics and Theory of Fields**

Hamilton's principle; conservation laws; canonical transformations; Hamilton-Jacobi theory; Lagrangian formulation of classical field theory.

Prerequisite(s): permission of the Department.

PHYS 5201 [0.5 credit]**Introduction to Medical Imaging Principles and Technology**

Basic principles and technological implementation of x-ray, nuclear medicine, magnetic resonance imaging (MRI), and other imaging modalities used in medicine. Contrast, resolution, storage requirements for digital images. Applications outside of medicine, future trends. Precludes additional credit for BIOM 5201.

Prerequisite(s): permission of the Physics Department.

PHYS 5202 [0.5 credit] (PHY 8122)**Special Topics in Molecular Spectroscopy**

Topics may include: electronic spectra of diatomic and triatomic molecules and their interpretation using molecular orbital diagrams; Raman and resonance Raman spectroscopy; symmetry aspects of vibrational and electronic levels of ions and molecules in solids; the presence of weak and strong resonant laser radiation. Also listed as CHEM 5009/CHM 8150.

Prerequisite(s): permission of the Department.

PHYS 5203 [0.5 credit] (PHY 5161)**Medical Radiation Physics**

Interaction of electromagnetic radiation with matter. Sources: X-ray, accelerators, radionuclide. Charged particle interaction mechanisms, stopping powers, kerma, dose. Introduction to dosimetry. Units, measurements, dosimetry devices.

Prerequisite(s): permission of the Department.

PHYS 5204 [0.5 credit] (PHY 5112)**Physics of Medical Imaging**

Physical foundation of and recent developments in transmission X-ray imaging, computerized tomography, nuclear medicine, magnetic resonance imaging, and ultrasound, for the specialist imaging physicist. Image quality, contrast, resolution, SNR, MTF, DQE. Introduction to image processing, system performance assessment.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5203 and one of PHYS 4203 or PHYS 5313, or permission of the Department.

PHYS 5206 [0.5 credit] (PHY 5164)**Medical Radiotherapy Physics**

Radiation therapy process and physics. Ion chamber dosimetry, Monte Carlo techniques of radiation transport, cavity theories, external beam therapy, brachytherapy, dosimetry protocols, detectors used in radiation therapy. Treatment planning, monitor unit calculations, intensity-modulated radiation therapy. Novel and alternate techniques.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5203 or permission of the Department.

PHYS 5207 [0.5 credit] (PHY 5165)**Radiobiology**

Physics and chemistry of radiation interactions. Cell biology, DNA damage and repair, survival curves and models, radiosensitivity, oxygen effect. Linear energy transfer, relative biological effectiveness. Whole body radiation effects, radioprotectors, radiosensitizers.

Hyperthermia. Molecular techniques in radiobiology. Model tumour systems.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5203 must have been taken, or be taken concurrently, or permission of the Department.

PHYS 5208 [0.5 credit] (PHY 5163)**Radiation Protection**

Dose quantities, effects of radiation exposure, fetal risks, scientific basis for protection, dose limits. Background radiation, dose from internal radionuclides. Doses in radiology, incidents in radiation therapy. Shielding design, working with radioactive materials. Instruments and measurement. Radiation protection organizations.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5203 or permission of the Department.

PHYS 5209 [0.5 credit] (PHY 5166)**Medical Physics Practical Measurements**

Experience with current clinical medical imaging and cancer therapy equipment, and dosimetry and biophysics instrumentation. The course requires completion of experimental projects on medical imaging, radiotherapy, dosimetry, and biophysics, conducted at local clinics and NRC laboratories.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5203, and two of PHYS 5204, PHYS 5206, PHYS 5207, and enrollment in the medical physics graduate program, or permission of the Department.

PHYS 5210 [0.0 credit] (PHY 5168)**Anatomy and Physiology for Medical Physicists**

An overview of human anatomy and physiology as background for the application of physics to cancer therapy and medical imaging. Anatomy as depicted by imaging technologies such as CT, MRI, and radiography will be emphasized. Graded Sat/Uns.

Prerequisite(s): enrollment in the graduate program in medical physics or permission of the Department.

PHYS 5291 [0.5 credit] (PHY 5167)**Advanced Topics in Medical Physics**

Topics may include medical imaging physics, cancer therapy physics, medical biophysics, or radiation protection and health physics.

Prerequisite(s): PHYS 5203 plus, as appropriate to the particular advanced topic offered, at least one of PHYS 5204, PHYS 5206, PHYS 5207; or permission of the Department.

PHYS 5302 [0.5 credit] (PHY 8132)**Classical Electrodynamics**

Covariant formulation of electrodynamics; Liénard-Wiechert potentials; radiation reaction; plasma physics; dispersion relations.

Prerequisite(s): PHYS 3308, PHYS 3802, and PHYS 3807, or equivalent courses, or permission of the Department.

PHYS 5313 [0.5 credit]**Physical Applications of Fourier Analysis**

Fourier transform, convolution. Sampling theorem. Applications to imaging: descriptors of spatial resolution, filtering. Correlation, noise power. Discrete Fourier transform, FFT. Filtering of noisy signals. Image reconstruction in computed tomography and magnetic resonance. Laplace transform. Integral transforms, application to boundary value problems.

Also offered at the undergraduate level, with different requirements, as PHYS 4203, for which additional credit is precluded.

Lectures three hours a week.

PHYS 5318 [0.5 credit] (PHY 5318)**Modern Optics**

Electromagnetic wave propagation; reflection, refraction; Gaussian beams; guided waves. Laser theory: stimulated emission, cavity optics, gain and bandwidth, atomic and molecular lasers. Mode locking, Q switching. Diffraction theory, coherence, Fourier optics, holography, laser applications. Optical communication systems, nonlinear effects: devices, fibre sensors, integrated optics.

Prerequisite(s): permission of the Department.

Also offered at the undergraduate level, with different requirements, as PHYS 4208, for which additional credit is precluded.

PHYS 5401 [0.5 credit]**Astrophysics**

Stellar evolution, including stellar modeling, main sequence stars, red giants and the end states of stars such as neutron stars and black holes. Galactic structure and dynamics. Neutrino astrophysics.

Also offered at the undergraduate level, with different requirements, as PHYS 4201, for which additional credit is precluded.

PHYS 5402 [0.5 credit]**Cosmology**

Observational evidence for the Big Bang. Cosmological space-time, expansion dynamics and contents of the universe. Physical processes in the expanding universe, inflation, nucleosynthesis, the cosmic microwave background, dark matter, and dark energy.

Also offered at the undergraduate level, with different requirements, as PHYS 4202, for which additional credit is precluded.

PHYS 5601 [0.5 credit] (PHY 5966)**Experimental Techniques of Nuclear and Elementary Particle Physics**

The interaction of radiation and high energy particles with matter; experimental methods of detection and acceleration of particles; use of relativistic kinematics; counting statistics.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 4307 or equivalent, and PHYS 4707; or permission of the Department.

PHYS 5602 [0.5 credit] (PHY 5967)**Physics of Elementary Particles**

Standard Model. Properties of leptons, quarks, hadrons. Fundamental interactions: photon, gluons, W/Z bosons. Higgs bosons. Conservation laws, invariance principles, quantum numbers. Decay rates and scattering cross-sections. Quantum electrodynamics and chromodynamics. Resonances. Weak interactions, CKM matrix, parity and CP violation. Neutrino masses and oscillations. Future directions.

Prerequisite(s): PHYS 4707 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PHYS 4602, for which additional credit is precluded.

PHYS 5604 [0.5 credit] (PHY 8164)**Intermediate Nuclear Physics**

Properties of the deuteron and the neutron-proton force. Nucleon-nucleon forces, isospin and charge independence. Nuclear models. Scattering theory. Interpretation of n-p and p-p scattering experiments. Interaction of nucleons with electrons. Interaction of nuclei with radiation.

Prerequisite(s): PHYS 4608 or permission of the Department.

PHYS 5701 [0.5 credit] (PHY 5170)**Intermediate Quantum Mechanics with Applications**

Angular momentum and rotation operations; Wigner and Racah coefficients; several and many electron problem in atoms; variational and Hartree-Fock formalism; introduction to second quantized field theory; scattering theory.

Prerequisite(s): PHYS 4707 and PHYS 4708 or permission of the Department.

PHYS 5702 [0.5 credit] (PHY 8172)**Relativistic Quantum Mechanics**

Relativistic wave equations. Expansion of S matrix in Feynman perturbation series. Feynman rules. An introduction to quantum electro-dynamics with some second quantization. Gauge theories. May include introduction to Standard Model.

Prerequisite(s): PHYS 5701 and permission of the Department.

PHYS 5801 [0.5 credit] (PHY 5140)
Methods of Theoretical Physics I

This course and PHYS 5802 are designed for students who wish to acquire a wide background of mathematical techniques. Topics can include complex variables, evaluation of integrals, approximation techniques, dispersion relations, Pade approximants, boundary value problems, Green's functions, integral equations.

PHYS 5802 [0.5 credit] (PHY 5141)
Methods of Theoretical Physics II

This course complements PHYS 5801. Topics include group theory, discussion of SU2, SU3, and other symmetry groups. Lorentz group.

PHYS 5804 [0.5 credit]
Introduction to General Relativity

Special relativity using tensor analysis. Curved spacetime with physics applications which may include the solar system, stars, black holes, and gravitational waves. Introduction to differential geometry and Einstein's field equations.

Also offered at the undergraduate level, with different requirements, as PHYS 4804., for which additional credit is precluded.

PHYS 5900 [1.0 credit] (PHY 8290)
Selected Topics in Physics (M.Sc.)

A student may, with the permission of the Department, take more than one selected topic, in which case each full course is counted for credit.

Prerequisite(s): permission of the Department.

PHYS 5901 [0.5 credit] (PHY 8191)
Selected Topics in Physics (M.Sc.)

Prerequisite(s): permission of the Department.

PHYS 5905 [1.0 credit] (PHY 5495)
Physics in Modern Technology Work Term

Experience for students enrolled in the physics in modern technology stream. To receive course credit, students must receive satisfactory evaluations for their work term employment. Written and oral reports describing the work term project are required.

Includes: Experiential Learning Activity

Prerequisite(s): Registration in the physics in modern technology stream of the M.Sc. program and permission of the Department.

PHYS 5909 [2.5 credits] (PHY 7999)
M.Sc. Thesis

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PHYS 6601 [0.5 credit] (PHY 8165)
Particle Physics Phenomenology

This course covers much of the required knowledge for research in particle physics from both the experimental and theoretical points of view. Topics may include: standard model, parton model, quark model, hadron spectroscopy, and tests of QCD.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 5602 and PHYS 5702 or permission of the Department.

PHYS 6602 [0.5 credit] (PHY 8166)
Advanced Topics in Particle Physics

Phenomenology. This course will consist of a variety of seminars and short lecture courses, and will cover topics of immediate interest to the research program of the department.

Includes: Experiential Learning Activity

Prerequisite(s): PHYS 6601 or permission of the Department.

PHYS 6701 [0.5 credit] (PHY 8173)
Quantum Field Theory

Relativistic quantum field theory; second quantization of Bose and Fermi fields; reduction and LSZ formalism; perturbation expansion and proof of renormalizability of quantum field theories; calculations of radiative corrections and applications.

Prerequisite(s): PHYS 5701 and PHYS 5702, or permission of the Department.

PHYS 6900 [0.5 credit] (PHY 8490)
Selected Topics in Physics (Ph.D.)

Prerequisite(s): permission of the Department.

PHYS 6901 [0.5 credit] (PHY 8391)
Selected Topics in Physics (Ph.D.)

Prerequisite(s): permission of the Department.

PHYS 6909 [0.0 credit] (PHY 9999)
Ph.D. Thesis

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

Physics (PHYJ) - Joint Courses

Physics - Joint (PHYJ) Courses

With the exception of PHYS 5701 (PHY 5170) and PHYS 5302 (PHY 8132), which may be offered at either Carleton or the University of Ottawa, all PHYS courses are offered only at Carleton, and all PHYJ courses are offered only at the University of Ottawa.

PHYJ 5001 [0.5 credit] (PHY 5130)
Experimental Characterization Techniques in Materials Science, Physics, Chemistry, and Mineralogy

Survey of experimental techniques used in materials science, condensed matter physics, solid state chemistry, and mineralogy to characterize materials and solid substances. Diffraction. Spectroscopy. Microscopy and imaging. Other analytic techniques.

Prerequisite(s): permission of the Department.

PHYJ 5003 [0.5 credit] (PHY 5342)**Computer Simulations in Physics**

Advanced numerical methods to study large scale problems in the natural sciences; molecular dynamics, Langevin dynamics, Brownian dynamics methods. The use of different thermodynamic ensembles to compute experimentally relevant physical properties, and work with non-equilibrium situations. Methods to handle very large problems on parallel computers.

Prerequisite(s): PHY 3355 (PHY 3755), PHY 3370 (PHY 3770) and familiarity with FORTRAN, Pascal or C.

PHYJ 5004 [0.5 credit] (PHY 5340)**Computational Physics I**

Deterministic numerical methods in physics. Interpolation methods. Numerical solutions of Newton's, Maxwell's and Schrödinger's equations. Molecular dynamics. Non-linear dynamics. Numerical solutions of partial differential equations in physics. Finite elements. This course cannot be combined for credit with PHY 4340 (PHY 4740).

PHYJ 5005 [0.5 credit] (PHY 5341)**Computational Physics II**

Interpolation, regression and modeling. Random number generation. Monte Carlo methods. Simulations in thermodynamics. Fractals, percolation, cellular automation. Stochastic methods. This course cannot be combined for credit with PHY 4341 (PHY 4741).

PHYJ 5006 [0.5 credit] (PHY 5362)**Computational Methods in Material Sciences**

Introduction to modern computational techniques used in material science research. Classical molecular dynamics, classical and quantum Monte Carlo methods, plane-wave based electronic band structure calculations, Carr-Parrinello quantum molecular dynamics. Applications to condensed matter systems: basic simulation techniques, force-field based methods, first-principles quantum mechanical methods.

Prerequisite(s): permission of the Department.

PHYJ 5102 [0.5 credit] (PHY 5361)**Nonlinear Dynamics in the Natural Sciences**

Differential and difference equations, Fourier series and data analysis, stability analysis, Poincaré maps, local bifurcations, routes to chaos and statistical properties of strange attractors. Applications of these concepts to specific problems in condensed matter physics, molecular physics, fluid mechanics, dissipative structures, and evolutionary systems.

Prerequisite(s): permission of the Department.

PHYJ 5310 [0.5 credit] (PHY 5310)**Advanced Optics and Photonics**

Introduction to laser physics: optical resonators, light-matter interaction, basic operation of lasers, coherence, light control and manipulation, beam optics, Fourier optics. Guided wave optics: light propagation, allowed modes, dispersion.

Prerequisite(s): permission of the Department.

PHYJ 5311 [0.5 credit] (PHY 5311)**Quantum Optics I**

Classical and semi-classical light-matter interaction; gauges and energy conservation; two level systems in the resonant, under-resonant and over-resonant limit; time-dependent perturbation theory and Fermi's golden rule; semi-classical laser theory; Landau Zener tunnelling and multi-photon transitions; tunnel ionization and multi-photon ionization.

Prerequisite(s): permission of the Department.

PHYJ 5312 [0.5 credit] (PHY 5312)**Quantum Optics II**

Quantum light-matter interaction; quantization of the light field and of Schrodinger equation; number states and coherent states; photon emission and absorption; two-photon decay; photoelectric effect; Lamb shift, line-width and renormalization; Casimir effect; multi-photon processes; density operator; quantum theory of decay; quantum laser theory.

Prerequisite(s): permission of the Department.

PHYJ 5322 [0.5 credit] (PHY 5322)**Biological Physics**

Biological phenomena studied using techniques of physics. Key components of cells. Physical concepts relevant to cellular phenomena: Brownian dynamics, fluids, suspensions, entropy driven phenomena, chemical forces and self-assembly. Biological molecules. Enzymes. Molecular motors. Nerve impulses.

Precludes additional credit for PHY 4322.

Also offered at the undergraduate level, with different requirements, as PHYS 4322, for which additional credit is precluded.

PHYJ 5330 [0.5 credit] (PHY 5330)**Fibre Optics Communications**

Optical fibres: description, modes, losses. optical transmitters: light-emitting diodes, semiconducting lasers. Optical receivers: design, noise, sensitivity, degradation, performance. System design and performance. Optical amplifiers: dispersion management, pre-compensation schemes, post-compensation techniques, dispersion compensating fibres, optical filters, fibre Bragg gratings, soliton generation, long-haul lightwave systems, high-capacity systems.

Precludes additional credit for ELG 5103.

PHYJ 5331 [0.5 credit] (PHY 5331)**Fiber Optics Fundamentals and Applications**

Fiber optics fundamentals, Mach-Zehnder, Michelson, Fabry-Perot, Sagnac-based interferometers and phase detections, intensity of wavelength modulated sensors. Principles of Rayleigh, Raman and Brillouin scattering and scattering in fibers. Principles of self-phase and cross phase modulation and four-wave mixing. Birefringence and polarization-based instrumentation.

PHYJ 5332 [0.5 credit]**Nonlinear Optics**

Nonlinear optical susceptibility; wave equation description of nonlinear optics processes: second harmonic generation, intensity dependent refractive index, sum- and frequency-generation, parametric amplification; quantum mechanical theory of nonlinear optics; Brillouin and Raman scattering; the electro-optic effect; nonlinear fibre optics and solitons.

PHYJ 5364 [0.5 credit] (PHY 5364)**Nanotechnology and Modern Methods in Biophysics**

Modern experimental techniques and nanotechnology used in biophysics. Topics include biosensors, microfluidics, single molecule techniques, DNA sequencing technologies, microfabrication, nanoscale electrokinetics, atomic force microscopy, fluorescence and confocal microscopy, cell chips, etc. Course includes several hands-on experiments.

Includes: Experiential Learning Activity

PHYJ 5388 [0.5 credit] (PHY 5388)**Photons and Atoms**

Atomic, molecular structure and transitions, semi-classical light-matter interaction; two level systems; time-dependent perturbation theory, Fermi's golden rule; optical Bloch equations; coherent control; optical interactions with three-level systems, electromagnetically induced transparency; optical forces; laser cooling; Bose-Einstein condensation; atom optics and interferometers; quantization of light.

PHYJ 5389 [0.5 credit] (PHY 5389)**Quantum Theory of Light**

Quantum cryptography; entanglement; density operators; Bell's inequalities; quantization of light field; Lam shift; Casimir effect; vacuum; quantum optical states; Photon, homodyne detectors; quasi-probability functions; beam splitters; classical, quantum coherence; Hanbury Brown and Twiss effect, Hong-Ou-Mandel interference; quantum nonlinear optics, light-matter interaction, open systems.

PHYJ 5390 [0.5 credit] (PHY 5390)**Seminar in Quantum Science and Technology**

This course will reflect the interdisciplinary nature of the rapidly advancing field of quantum science and technology. The wide-range of topics include: foundations of quantum mechanics and quantum information, quantum materials, quantum communication, quantum sensing and metrology, quantum computing and simulations.

PHYJ 5391 [0.5 credit] (PHY 5391)**Quantum Materials, Nanostructures and Devices**

The course covers the electronic and optical properties of semiconductor nanostructures (quantum wells, wires and dots), topological insulators, 2D crystals, discussing single particle properties, many-electron description, response functions and computational tools. Application in single electron transistors, lasers, solar cells, Majorana quantum circuits will be covered.

PHYJ 5392 [0.5 credit] (PHY 5392)**Introduction to Nanoscience**

Nanoscience with photons (ray and wave optics), nanoscience with charged particles (light matter interaction, SEM, TEM), nanoscience with physical probes.

PHYJ 5401 [0.5 credit] (PHY 5100)**Solid State Physics I**

Periodic structures, Lattice waves. Electron states. Static properties of solids. Electron-electron interaction. Dynamics of electrons. Transport properties. Optical properties.

Prerequisite(s): permission of the Department.

PHYJ 5402 [0.5 credit] (PHY 5110)**Solid State Physics II**

Elements of group theory. Band structure, tight binding and other approximations, Hartree-Fock theory. Measuring the Fermi surface. Boltzmann equation and semiconductors. Diamagnetism, paramagnetism and magnetic ordering. Superconductivity.

Prerequisite(s): permission of the Department.

PHYJ 5403 [0.5 credit] (PHY 5151)**Type I and II Superconductors**

Flux flow and flux cutting phenomena. Clem general critical state model. Flux quantization, Abrikosov vortex model and Ginzburg-Landau theory. Superconducting tunnelling junctions (Giaever and Josephson types).

Prerequisite(s): PHY 4370 or permission of the Department.

PHYJ 5404 [0.5 credit] (PHY 6371)**Topics in Mössbauer Spectroscopy**

Recoilless emission/absorption, anisotropic Debye-Waller factors, second order Doppler shifts. Mössbauer lineshape theory with static and dynamic hyperfine interactions. Distributions of static hyperfine parameters. Physics of the hyperfine parameters: origin of the hyperfine field, calculations of electric field gradients. Applications of Mössbauer spectroscopy.

Prerequisite(s): permission of the Department.

PHYJ 5407 [0.5 credit] (PHY 5380)**Semiconductor Physics I**

Brillouin zones and band theory. E-k diagram, effective mass tensors, etc. Electrical properties of semiconductors. Conduction, hall effect, magneto-resistance. Scattering processes. Multivalley models and non-parabolic bands.

Prerequisite(s): PHY 4380 or permission of the Department.

PHYJ 5408 [0.5 credit] (PHY 5381, PHY 5781)**Semiconductor Physics II: Optical Properties**

Optical constants and dispersion theory. Optical absorption, reflection and band structure. Absorption at band edge and excitons. Lattice, defect and free carrier absorption, Magneto-optics. Photo-electronic properties, luminescence, detector theory. Experimental methods.

Prerequisite(s): PHY 4380 or permission of the Department.

PHYJ 5409 [0.5 credit] (PHY 5951)**Low Temperature Physics II**

Helium 3 and Helium 4 cryostats. Dilution refrigerators. Theory and techniques of adiabatic demagnetization. Thermometry at low temperatures. Problems of thermal equilibrium and of thermal isolation. Properties of matter at very low temperature.

Prerequisite(s): PHY 4355 or permission of the Department.

PHYJ 5501 [0.5 credit]**Charged Particle Dynamics****PHYJ 5502 [0.5 credit] (PHY 5740)****Physique Numérique I**

Méthodes numériques déterministes en physique. Techniques d'interpolation. Solutions numérique des équations de Newton, de Maxwell et de Schrödinger. Dynamique moléculaire. Dynamique non-linéaire. Solutions numériques des équations aux dérivées partielles en physique. Éléments finis.

Prerequisite(s): permission of the Department.

PHYJ 5503 [0.5 credit] (PHY 5741)**Physique Numérique II**

Interpolation, régression et modeler. Nombres aléatoires. Techniques de Monte-Carlo. Simulations thermostatiques. Percolation, fractales, et automatisation cellulaire. Méthodes numériques stochastiques.

Prerequisite(s): permission of the Department.

PHYJ 5504 [0.5 credit] (PHY 5387)**Physics of Materials**

Microscopic characteristics related to physical properties of materials. Materials families: metals and alloys, ceramics, polymers and plastics, composites, layered materials, ionic solids, molecular solids, etc. Specific materials groups. Equilibrium phase diagrams and their relation to microstructure and kinetics. Experimental methods of characterization. Interactions and reactions.

Prerequisite(s): PHY 4382 or equivalent. Cannot be combined with PHY 4387.

PHYJ 5505 [0.5 credit] (PHY 5355)**Statistical Mechanics**

Ensemble theory. Interacting classical and quantum systems. Phase transitions and critical phenomena. Fluctuations and linear response theory. Kinetic equations.

Prerequisite(s): PHY 4370 and PHY 3355 or permission of the Department.

PHYJ 5506 [0.5 credit] (PHY 5742)**Simulations numériques en physique**

Un cours ayant but d'étudier des méthodes numériques avancées employées dans les problèmes à grande échelle dans les sciences naturelles. Emploi d'ensembles thermo-dynamiques différents, calculs de propriétés physiques expérimentalement pertinentes, et extension aux situations hors d'équilibre. Techniques pour ordinateurs parallèles.

Prerequisite(s): permission of the Department.

PHYJ 5507 [0.5 credit] (PHY 5922)**Advanced Magnetism**

Study of some experimental and theoretical aspects of magnetic phenomena found in ferro-, ferri-, antiferromagnetic and spin glass materials. Topics of current interest in magnetism.

Prerequisite(s): PHY 4385 and permission of the Department.

PHYJ 5508 [0.5 credit] (PHY 5320)**Introduction to the Physics of Macromolecules**

Chemistry of macromolecules and polymers; random walks and the static properties of polymers; experimental methods; the Rouse model and single chain dynamics; polymer melts and viscoelasticity; the Flory-Huggins theory; the reptation theory; computer simulation algorithms; biopolymers and copolymers.

Prerequisite(s): permission of the Department.

PHYJ 5509 [0.5 credit] (PHY 5347)**Physics, Chemistry and Characterization of Mineral Systems**

The materials science of mineral systems such as the network and layered silicates. In-depth study of the relations between mineralogically relevant variables such as: atomic structure, crystal chemistry, site populations, valence state populations, crystallization conditions. Interpretation and basic understanding of characterization tools.

Prerequisite(s): permission of the Department.

PHYJ 5603 [0.5 credit]**Ion Collisions in Solids****PHYJ 5703 [0.5 credit] (PHY 6170)****Advanced Quantum Mechanics II**

Systems of identical particles and many-body theory. Lattice and impurity scattering. Quantum processes in a magnetic field. Radiative and non-radiative transitions. Introduction to relativistic quantum mechanics.

Prerequisite(s): PHY 5170 and permission of the Department.

PHYJ 5722 [0.5 credit] (PHY 5722)**Physique Biologique**

Application des méthodes de la physique à l'étude des phénomènes biologiques. Composantes principales d'une cellule. Concepts physiques pertinents aux phénomènes cellulaires : dynamique brownienne, liquides, suspensions, phénomènes d'origine entropique, forces chimiques et auto-assemblage. Molécules biologiques. Enzymes. Moteurs moléculaires. Impulsions nerveuses.

Precludes additional credit for PHY 4722.

Offert également, avec des exigences différentes, sous la cote PHY 4722.

PHYJ 6406 [0.5 credit] (PHY 6382)**Physics of Semiconductor Superlattices**

Fundamental physics of two-dimensional quantized semiconductor structures. Electronic and optical properties of superlattices and quantum wells. Optical and electronic applications. This course is intended for students registered for the Ph.D. in semiconductor physics research.

Prerequisite(s): advanced undergraduate or graduate course in solid state physics and permission of the Department.

PHYJ 6407 [0.5 credit] (PHY 6782)**Physique des super-réseaux à semi-conducteurs**

Physique fondamentale des structures quantiques bi-dimensionnelles à semi-conducteurs. Propriétés électroniques et optiques des super-réseaux et puits quantiques. Applications à l'électronique et à l'optique. Ce cours est destiné aux étudiants et aux étudiantes inscrits au doctorat en physique des semi-conducteurs.

Prerequisite(s): permission of the Department.

Political Economy (PECO)

Political Economy (PECO) Courses**PECO 5000 [0.5 credit]****Theories of Political Economy**

A survey of the core concepts and ideas proposed by both the founders and modern practitioners of political economy. Particular attention will be paid to contemporary theorists and classical theorists such as Smith, Ricardo, Marx, Mill, Schumpeter, Keynes, Veblen, and Innis.

PECO 5001 [0.5 credit]**The Methodology of Political Economy**

An examination of the methods, procedures, and rules for developing theory and guiding inquiry in political economy research, including topics such as logic of inquiry, conceptualization, research design, dialectics, level of analysis, comparison, evidence and statistics.

PECO 5002 [0.5 credit]**Political Economy of Work and Labour**

Interdisciplinary survey of core concepts, contexts, and debates in the study of work and labour; critical and historical approach addressing inequalities of class, race, and disabilities; relational perspective on labour including technological change, care, political action, and the environment.

PECO 5501 [0.5 credit]**Selected Problems in Political Economy I**

Also listed as SOCI 5504, PSCI 5501.

PECO 5502 [0.5 credit]**Selected Problems in Political Economy II**

Also listed as SOCI 5505, PSCI 5502.

PECO 5503 [0.5 credit]**Selected Issues in Work and Labour I**

Topics and emphasis vary from term to term according to current policies and events influencing the distribution and benefits of work and labour including migration, technological and environmental change, privatization, austerity, and transnational legislation.

PECO 5504 [0.5 credit]**Selected Issues in Work and Labour II**

Topics and emphasis vary from term to term according to current policies and events influencing the distribution and benefits of work and labour including migration, technological and environmental change, privatization, austerity, and transnational legislation.

PECO 5900 [0.5 credit]**Tutorial in Political Economy**

Directed readings on selected aspects of political economy, involving preparation of papers as the basis for discussion with the tutor. Offered when no regular course offering meets a candidate's specific needs.

Prerequisite(s): permission of the Director.

PECO 5906 [0.5 credit]**Reflective Practice on Work and Labour**

Through a reflection on their current work environment, it is expected that students that are working would apply the knowledge received to enrich their work place. Students will provide relevant reflections and proposals to enrich their work-practices over the period of one-semester.

Includes: Experiential Learning Activity

Prerequisite(s): PECO 5002 and permission of the department.

PECO 5907 [0.5 credit]**Placement in Political Economy**

This course offers an opportunity to earn academic credit by engaging in research activities under the supervision of professional researchers in the community. Placement possibilities may be initiated by the student or arranged through community contacts established by the Institute of Political Economy.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Director.

PECO 5908 [1.0 credit]**Research Essay**

Directly linked to the student's course work, the research essay must be interdisciplinary in approach.

Includes: Experiential Learning Activity

PECO 5909 [2.0 credits]**M.A. Thesis**

The thesis is an alternative to the research essay. It must also be interdisciplinary in approach, and requires greater substance and originality than the Research Essay.

Normally, a student's thesis committee will be composed of members from more than one discipline.

Includes: Experiential Learning Activity

PECO 6000 [0.5 credit]**Political Economy: Core Concepts**

Core concepts in political economy, drawn from classical and contemporary writings. Topics will be selected in consultation with participating units, taking into account the potential number of students, their research interests and those of the participating units.

Political Management (POLM)

Political Management (POLM) Courses**POLM 5001 [0.5 credit]****Parliament and Parties in Canada**

A critical introduction to the development of public policy and the exercise of political power in Canada, concentrating on political management in the context of Parliament and political parties.

Includes: Experiential Learning Activity

POLM 5002 [0.5 credit]**The Core Executive in Canada**

An examination of how public policy originates, and how its development is managed within the executive branch, with particular emphasis on the Cabinet process and the relationship between political actors and the public service.

Includes: Experiential Learning Activity

POLM 5004 [0.5 credit]**Advanced Strategic Communications**

An exploration of how to understand an issue environment, develop positive and productive social media and mainstream media approaches, create a crisis communications strategy, and ensure a strong reputation management capacity.

Includes: Experiential Learning Activity

Prerequisite(s): POLM 5018.

POLM 5005 [0.5 credit]**Political Offices**

A critical examination of the diverse roles of political staffers working in the offices of elected officials in Canada, with a focus on federal executive and parliamentary offices but also including work in the context of election campaigns, political parties, municipal and provincial governments.

Includes: Experiential Learning Activity

POLM 5007 [0.25 credit]**Writing in a Political Context**

The craft of effective political writing, focusing on how to optimize messages in speeches, press releases, policy papers and other written products.

POLM 5008 [0.25 credit]**Ethics in Political Management**

An examination of the ethical codes that should guide activities and professional relationships of individuals working in the political system.

Includes: Experiential Learning Activity

POLM 5009 [0.25 credit]**Media Relations**

The theory and practice of media relations in a political environment.

Includes: Experiential Learning Activity

POLM 5010 [0.5 credit]**Polling and Opinion Research**

Exploring theory, design, and execution of public opinion research to support campaign and advocacy strategies.

Overview of ways to incorporate research in strategy development, methodologies used, and how to use opinion research to make better decisions. No statistical or mathematical background required.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as POLM 4010, for which additional credit is precluded.

POLM 5011 [0.5 credit]**Political Campaigns**

A strategic approach to developing and executing political campaigns (national, regional, local and issue-based), including: campaign ethics; campaign organization; use of new technology and social media; fundraising and budget; development and delivery of messages; GOTV efforts; policy and platform; issue management; tour; innovations and trends.

Includes: Experiential Learning Activity

POLM 5012 [0.5 credit]**Advocacy and Government Relations in Canada**

Through applied exercises, case studies and a project with an external organization, students will build knowledge and skills required for advocacy and government relations in the private and voluntary sectors.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as POLM 4012, for which additional credit is precluded.

POLM 5013 [0.5 credit]**Political Management and the Media**

An examination of the organization and practices of major media. Coverage of public officials, public policy issues and legislative battles, paying particular attention to the current and seismic changes in the media as agencies of public address, and the consequences for politics and governance.

Includes: Experiential Learning Activity

POLM 5014 [0.5 credit]**Political Marketing**

Using case studies and simulation exercises, the course will provide students with an understanding of political marketing strategy, market intelligence, consultation and participation, political product development and branding, and marketing practices in government.

Includes: Experiential Learning Activity

POLM 5015 [0.5 credit]**Public Policy for Political Advisors**

An introduction to policy analysis and policy process for political advisors. Topics include agenda setting, instrument choice, policy arguments, and communicating policy ideas and decisions.

Includes: Experiential Learning Activity

POLM 5016 [0.5 credit]**Applied Policy Analysis**

A critical examination of one or more current policy debates from a political management perspective.

Includes: Experiential Learning Activity

Prerequisite(s): POLM 5015 or permission of the instructor.

POLM 5017 [0.5 credit]**Political Institutions in a Comparative Context**

A comparative study of the political institutions of several nations or sub-national jurisdictions, including both formal structures and accepted practices.

POLM 5018 [0.25 credit]**Strategic Communications**

An introduction to the range of issues involved in formulating and implementing a political strategic communications strategy.

Includes: Experiential Learning Activity

POLM 5019 [0.5 credit]**Comparative Ethics Regimes**

Examination and critique of ethics regulations including conflict of interest, lobbying, and post-employment at the federal, provincial and municipal levels in Canada with comparison to select other jurisdictions such as the United States, United Kingdom and the European Union.

Includes: Experiential Learning Activity

POLM 5020 [0.5 credit]**Political Office Management**

A focused examination of particular activities conducted by Canadian political staffers in ministerial and parliamentary offices and development of applied skills in areas such as human resource management, office budget management, opposition research, issues management.

Includes: Experiential Learning Activity

POLM 5021 [0.25 credit]**Political Speechwriting**

The development of effective speechwriting techniques.

Includes: Experiential Learning Activity

Prerequisite(s): POLM 5007.

POLM 5022 [0.5 credit]**Prime Ministerial Leadership in Canada**

The application of a political management perspective to the exercise of prime ministerial power in Canada. Using several theories and case studies, examining which styles of leadership are most successful in a variety of political contexts.

POLM 5099 [1.0 credit]**Practicum Placement**

375 hours of supervised full-time work experience in an appropriate ten-week placement relevant to political management and approved by the practicum graduate supervisor. Graded SAT/UNS.

Includes: Experiential Learning Activity

POLM 5900 [0.5 credit]**Directed Study**

A program of supervised reading and preparation of written work in an area not covered by an existing graduate seminar may be arranged with permission of the Department.

POLM 5905 [0.5 credit]**Special Topics in Political Management**

Topics vary from year to year. Students should check with the Department regarding the topic offered.

POLM 5906 [0.25 credit]**Selected Topics in Political Management**

Topics vary from year to year. Students should check with the program regarding the topic.

Political Science (PSCI)

Political Science (PSCI) Courses**PSCI 5003 [0.5 credit]****Political Parties in Canada**

A seminar on political parties and party systems in Canadian federal politics, including an examination of patterns of historical development, party organization and finance, relationships with social movements, and the impact of Canadian federalism.

PSCI 5006 [0.5 credit]**Legislatures and Representation in Canada**

The role of Parliament and of the individual M.P. in terms of policy making, party discipline, and differing conceptions of representation.

Also offered at the undergraduate level, with different requirements, as PSCI 4006, for which additional credit is precluded.

PSCI 5008 [0.5 credit]**The Politics of Climate Change**

The politics and policy of climate change. Development of the climate change issues, international negotiations and agreements, national response strategies, perspectives on social and technological change, and the Canadian policy approach.

PSCI 5009 [0.5 credit]**Canadian Political Economy**

A seminar on political economy as a traditional and contemporary approach to the study of Canadian politics and the Canadian state. Canada's economic development, social relations (including gender and race relations), and position in the international political economy is explored.

PSCI 5010 [0.5 credit]**Executive Power in Canadian Politics**

Consideration of prime ministers, premiers, cabinet ministers and senior public service leadership in Canadian politics and government.

Also listed as PSCI 4010.

PSCI 5100 [0.5 credit]**Indigenous Politics of North America**

Issues of governance regarding the original peoples of Canada, Mexico and the United States before and since the European invasion, including: movement for restoration of cultural, socio-economic, political, land and self-government rights.

Also offered at the undergraduate level, with different requirements, as PSCI 4206, for which additional credit is precluded.

PSCI 5101 [0.5 credit]**Canadian Federalism**

A study of the evolution and contemporary operation of the Canadian federal system, noting particularly the specific social, political, economic, and structural features which underlie its operational performance, its resilience in crisis, and its potential for adaptation.

Also offered at the undergraduate level, with different requirements, as PSCI 4005, for which additional credit is precluded.

PSCI 5103 [0.5 credit]**Canada-EU Relations**

Relations between Canada and Europe in the context of European integration, with attention to policy issues affecting the relationship and/or areas of common policy challenges.

Also listed as EURR 5108.

Prerequisite(s): previous course in European integration or permission of the instructor.

PSCI 5105 [0.5 credit]**Post-Communist Politics in East Central Europe**

A comparative examination of the emergence of post-communist political systems in East Central Europe.

PSCI 5106 [0.5 credit]**The Politics of Post-Soviet Successor States**

A seminar on selected problems of nation-building in Russia, Ukraine, and other Soviet successor states.

PSCI 5107 [0.5 credit]**Globalization, Adjustment and Democracy in Africa**

The nature of global pressures in Africa as states go through a "second wind" of political and economic change.

Also offered at the undergraduate level, with different requirements, as PSCI 4207, for which additional credit is precluded.

PSCI 5109 [0.5 credit]**Comparative Public Policy**

A review of approaches to the study of policy, of the impact of political factors on policy, and of the substance of policy choices in such domestic fields as communications, social security, health, industrial and rural development policies in selected countries.

PSCI 5110 [0.5 credit]**Post-Soviet States and Societies**

The relationship between social forces and state structures at both the national and local levels in the USSR and the post-soviet states.

Also listed as EURR 5002.

Also offered at the undergraduate level, with different requirements, as EURR 4002, for which additional credit is precluded.

PSCI 5111 [0.5 credit]**The European Union and its Eastern Neighbours**

The EU's European Neighbourhood Policy and Eastern partnership policy, the Russia-EU "strategic partnership". Policies and reactions of non-EU East European countries toward the EU. The interaction of Member state policies and EU policies. May include attention to historical legacies, cultural factors, public opinion, energy security.

Includes: Experiential Learning Activity

Also listed as EURR 5205, INAF 5807.

PSCI 5112 [0.5 credit]**Russian Domestic Politics**

Examination of the evolution of Russian domestic politics and society since the collapse of the Soviet Union. Themes discussed include the transformation of Russia's political system, changes in the behavior of political elites, the evolution of Russia's social structure, and federal-regional relations.

Also listed as EURR 5101.

PSCI 5113 [0.5 credit]**Democracy in the European Union**

Survey of empirical research and normative theorizing about democracy in the EU. Topics include: European Parliament and other channels for democratic input, patterns of citizen participation, impact of European integration on democracy in EU member states, Euroscepticism, theories of EU democracy.

Also listed as EURR 5113.

PSCI 5114 [0.5 credit]**The Politics of Israel/Palestine**

The history and politics of Israel/Palestine. An examination of the interests and identities of Israelis and Palestinians, and the role of external actors and public opinion in shaping regional dynamics.

PSCI 5200 [0.5 credit]**Nationalism**

A seminar on the historical and comparative study of nationalism, with emphasis on its role in the promotion of political change.

Includes: Experiential Learning Activity

PSCI 5201 [0.5 credit]**Politics in Plural Societies**

A seminar on politics in multicultural societies and multi-national states, including settler and post-colonial societies. Topics may include: conflict relating to race, religion, language, regionalism, intra-state nationalism, multicultural policies and theories of pluralism.

PSCI 5202 [0.5 credit]**Development Theory and Issues**

A seminar on historical and current debates in development theory, including the origins, nature, and critiques of development processes in the Global South.

PSCI 5203 [0.5 credit]**Southern Africa After Apartheid**

An exploration of the pathology of apartheid, the reasons for its end, and prospects for democratization and development in southern Africa in the era of globalization. Also offered at the undergraduate level, with different requirements, as PSCI 4203, for which additional credit is precluded.

PSCI 5204 [0.5 credit]**Elections**

The conduct and meaning of elections in contemporary states. Attention to the connection of elections to concepts of representation, policy mandates, and political parties, and to electoral systems and referenda. Also offered at the undergraduate level, with different requirements, as PSCI 4204, for which additional credit is precluded.

PSCI 5207 [0.5 credit]**International Political Sociology**

A seminar exploring classical and contemporary social and political thought in relation to international, transnational, and global practices and institutions. Topics may include borders, capitalism, citizenship, civil society, constitutionalization, empire, governance, power, public spheres, risk, security, sovereignty, and world society.

PSCI 5208 [0.5 credit]**Global Social Policy**

The seminar explores global initiatives in poverty reduction, inequality, development assistance and internationalization of the provision of social services. The seminar considers theoretical, institutional and policy implications of debates about global justice, policy transfer and global government of social policies.

PSCI 5209 [0.5 credit]**Forced Migration and Global Politics**

Critical examination of the relationship between different aspects of forced migration and debates within global politics. Topics may include borders, global governance, political agency, sovereignty, security, globalization, gender and public policy.

Includes: Experiential Learning Activity

PSCI 5210 [0.5 credit]**Politics and Popular Culture**

A critical examination of the increasingly important intersections of politics and popular culture. Theoretical approaches such as structuralism, semiotics, political economy, feminism, and postmodernism explore such core themes as political power, dissent, globalization, (post)colonialism, gender, race, class, and sexuality in various media.

PSCI 5211 [0.5 credit]**Migration, Globalization and Governance**

Critical examination of the politics of mobility in a globalizing context. Seminar topics may include migration regimes, securitization of migration, temporary and permanent migration streams and patterns of inclusion and exclusion.

PSCI 5212 [0.5 credit]**Advanced International Relations Theory**

Close reading and analysis of theoretical research in the academic discipline of International Relations; may include analysis of methodology, normative and critical theory, and key theoretical concepts such as anarchy, sovereignty, power, inequality, coloniality, security, gender.

PSCI 5302 [0.5 credit]**Democratic Theories**

Analysis of various theories of democracy and community, from classical to modern.

PSCI 5303 [0.5 credit]**Governmentality and Politics**

Examination of Foucault's concept of governmentality and work which has developed this idea, especially the relevance of governmentality for global political studies. Topics may include: sovereignty, biopolitics, technopolitics, neoliberalism and citizenship.

Also listed as SOCI 5407.

Also offered at the undergraduate level, with different requirements, as PSCI 4303, for which additional credit is precluded.

PSCI 5305 [0.5 credit]**Political Thought in the Modern Muslim Middle East**

Contemporary political thought in the Muslim Middle East. Secular and religious responses to the challenges of modernity. Readings may include writings of Arab, Turkish, and Iranian intellectuals.

Also offered at the undergraduate level, with different requirements, as PSCI 4302, for which additional credit is precluded.

PSCI 5308 [0.5 credit]**Concepts of Political Community I**

A critical survey of concepts of political community, including the common good, justice, citizenship, statesmanship, democracy, and legitimacy, from ancient, modern, and contemporary political theory.

Also offered at the undergraduate level, with different requirements, as PSCI 4318, for which additional credit is precluded.

PSCI 5309 [0.5 credit]**Concepts of Political Community II**

A continued critical survey of concepts of political community, including the common good, justice, citizenship, statesmanship, democracy, and legitimacy, from ancient, modern, and contemporary political theory. Prerequisite(s): PSCI 5308 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PSCI 4319, for which additional credit is precluded.

PSCI 5310 [0.5 credit]**History of Political Thought**

Western political thought from classical times to the nineteenth century: may include the study of Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, Marx and other thinkers.

PSCI 5405 [0.5 credit]**Public Administration in Developing Countries**

A seminar on the literature and characteristics of development administration; comparison by region, country, and topic.

PSCI 5407 [0.5 credit]**Reproductive Rights Policy in North America**

The interaction between social movements, legislatures and courts in formulating reproductive rights policy in Canada, the U.S. and Mexico.

Also offered at the undergraduate level, with different requirements, as PSCI 4403, for which additional credit is precluded.

PSCI 5410 [0.5 credit]**Postcolonial Theories and Practices**

This seminar familiarizes students with different approaches to postcolonial theory, discussing issues like the decolonization of knowledge and development and examining colonial practices of states and responses by indigenous movements.

PSCI 5501 [0.5 credit]**Selected Issues in Political Economy I**

A research seminar exploring a selected topic of current research having a political economy perspective, such as power and stratification; dynamics of state action; contrasting views on administration as an instrument of political economy; culture, ideology, and social relations; and the labour process.

Also listed as PECO 5501, SOCI 5404.

PSCI 5502 [0.5 credit]**Selected Issues in Political Economy II**

A research seminar exploring a selected topic of current research having a political economy perspective, such as power and stratification; dynamics of state action; contrasting views on administration as an instrument of political economy; culture, ideology, and social relations; and the labour process.

Also listed as PECO 5502, SOCI 5505.

PSCI 5503 [0.5 credit]**Topics in European Politics**

A research seminar dealing with a central theme of current research in European politics.

Precludes additional credit for PSCI 5500.

PSCI 5506 [0.5 credit]**Gender and Politics**

Selected gender dimensions of politics in a comparative perspective. Topics may include: gendered nature of authority, gender regimes and state forms, feminist accounts of citizenship, representation, power and democracy, women's movements and anti-feminist movements, identity politics, gendered accounts of nationalism and multiculturalism.

PSCI 5509 [0.5 credit]**Governing in the Global Economy**

The course examines how national states respond to challenges of governing in an increasingly interdependent global economy. The course will be comparative in its focus, emphasizing advanced industrial societies primarily in western Europe and Canada.

PSCI 5601 [0.5 credit]**Analysis of Canadian Foreign Policy**

A research seminar on contemporary Canadian external policies, with emphasis on the analysis of cases and issues, and comparisons with other national actors.

Includes: Experiential Learning Activity

PSCI 5602 [0.5 credit]**Ethics in International Relations**

Historical and contemporary approaches to normative theory and ethics in international relations, including Kantian, Hegelian, Marxist, postmodern and feminist ethics. Issues may include poverty and justice, human rights and humanitarian intervention.

PSCI 5607 [0.5 credit]**Politics of North America**

Continentalism in Canadian foreign policy during the twentieth century, charting regional, economic, political, and defence relations in North America.

Precludes additional credit for PSCI 4607 if taken before 2006-07.

PSCI 5608 [0.5 credit]**European Integration and European Security**

A seminar focusing on issues related to the formation of supra-national decision-making structures in Europe.

Includes: Experiential Learning Activity

Also listed as EURR 4104/5104.

Also offered at the undergraduate level, with different requirements, as PSCI 4608, for which additional credit is precluded.

PSCI 5609 [0.5 credit]**Selected Topics in European Integration Studies**

A seminar focusing on selected topics related to European integration in the post-World War II period.

Also listed as EURR 5106.

PSCI 5700 [0.5 credit]**Basic Research Methods**

A course in applied research design and methodology, with emphasis on empirical research strategies that are amenable to quantification. Master's students who have not completed PSCI 2700 (or its equivalent) with high honours or better standing may be required to take this course.

PSCI 5701 [0.5 credit]**Intermediate Polimetrics for Micro Data**

Intermediate research designs and statistical techniques primarily used in analyzing survey data. Selected topics may vary from year to year. Students intending to do research based on micro data are advised to take this course.

Prerequisite(s): PSCI 5700 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PSCI 4701, for which additional credit is precluded.

PSCI 5702 [0.5 credit]**Intermediate Research Methods for Applied Political Science**

Applied methods for policy, politics and public affairs. Primarily quantitative but may have qualitative elements. Prerequisite(s): PSCI 5700 or permission of the Department.

Also offered at the undergraduate level, with different requirements, as PSCI 4702, for which additional credit is precluded.

PSCI 5704 [0.5 credit]**The Discipline of Political Science**

This course familiarizes students with the discipline of Political Science. Students will gain an understanding of the field's evolution as a precursor to understanding its contemporary configuration, including major debates, main points of contention, and epistemological and methodological divides.

PSCI 5705 [0.5 credit]**Approaches to the Study of Political Theory**

This course explores different methodological approaches to the study of texts in political theory. It examines the essential methodological considerations that are involved in designing and conducting a study in political theory.

PSCI 5802 [0.5 credit]**Political Economy of Global Money and Finance**

An exploration of the organization of the global monetary and financial system. Issues covered include the relationship between global finance and the state, the politics of world money, and the problems associated with regulating internationally-active financial institutions.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as PSCI 4805, for which additional credit is precluded.

PSCI 5803 [0.5 credit]**Transatlantic Security Issues**

NATO as a political and military alliance. NATO and 21st-century threats. Security roles for the European Union. Broader transatlantic security issues.

Precludes additional credit for PSCI 4806 if taken before 2006-07.

PSCI 5805 [0.5 credit]**Foreign Policy Analysis**

A research seminar dealing with selected problems in the study of foreign policy formulations and outcomes.

PSCI 5806 [0.5 credit]**Strategic Thought and Issues in International Security**

A research seminar on the evolution of classical and contemporary strategic thought, and on current issues in international security.

PSCI 5807 [0.5 credit]**Analysis of International Organizations**

A research seminar on process and change in contemporary forms of international organization.

PSCI 5808 [0.5 credit]**International Political Economy**

A seminar on the changing international division of labour, and its consequences for world politics. Topics include differing patterns of industrialization, colonial relations, the role of the state, and current issues in international political economy.

Includes: Experiential Learning Activity

Prerequisite(s): Work at a senior undergraduate level in at least two of the following: international relations, development studies, international trade, or political economy; or permission of the Department.

PSCI 5810 [0.5 credit]**Approaches to Environmental Politics**

Theoretical and methodological approaches to research in the field of environmental politics, including but not limited to public policy research. A variety of institutionalist, political economy, political ecology, and post-modern approaches will be examined.

PSCI 5900 [1.0 credit]**Tutorial in a Selected Field**

Tutorials or reading courses on selected topics may be arranged with the permission of the Department. Students cannot accumulate more than 1.0 credit in tutorials towards their degree requirements.

PSCI 5901 [0.5 credit]**Tutorial in a Selected Field**

Tutorials or reading courses on selected topics may be arranged with the permission of the Department. Students cannot accumulate more than 1.0 credit in tutorials towards their degree requirements.

PSCI 5904 [0.5 credit]**Washington Center Internship**

A one-term internship in the NAFTA Leaders Program of The Washington Center, offered in Washington D.C.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PSCI 5905 [0.5 credit]**Washington Center Seminar I**

A seminar offered by The Washington Center.

Prerequisite(s): permission of the Department.

PSCI 5906 [0.5 credit]**Washington Center Seminar II**

A seminar offered by The Washington Center.

Prerequisite(s): permission of the Department.

PSCI 5908 [1.0 credit]**M.A. Research Essay**

Tutorial for students who write a research essay rather than a thesis.

Includes: Experiential Learning Activity

PSCI 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

PSCI 5913 [0.0 credit]**Co-operative Work Term**

Students may register in the co-op option according to the guidelines listed under Co-op Option in the Calendar of Graduate Studies.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PSCI 5915 [0.5 credit]**Special Topics in Political Science**

A seminar on a selected topic in political science, to be determined by faculty, research, and teaching interests.

PSCI 6000 [0.5 credit]**The Political Process in Canada I**

An analytical study of the democratic political process, with particular reference to political parties and elections, pressure groups, and political leadership in Canada.

PSCI 6001 [0.5 credit]**The Political Process in Canada II**

An analytical study of the democratic political process, with particular reference to political parties and elections, pressure groups, and political leadership in Canada.

PSCI 6105 [0.5 credit]**Comparative Politics I**

A research seminar dealing with theories, methods, and problems of comparison.

PSCI 6106 [0.5 credit]**Comparative Politics II**

A research seminar dealing with particular themes.

PSCI 6200 [0.5 credit]**Theorizing Gender and Diversity**

This course will provide students with the theoretical and methodological approaches necessary to study gender and diversity in the context of politics. The course will include feminist political theories, critical race theory, postcolonial theory, theories from sexuality studies and political economy.

PSCI 6201 [0.5 credit]**Gender and Diversity: Comparative and International Politics**

Topics may include: representation and electoral politics; reproductive rights; social policy and welfare regimes; governance, resistance and transition; citizenship and migration; health and environment; security and violence (including sexual violence), and analysis of reproductive, informal and formal labour.

PSCI 6300 [0.5 credit]**Political Theory I**

An intensive examination of the major questions in classical, medieval, modern, and contemporary political philosophy. This course is historically comprehensive in scope and thematically oriented in depth.

PSCI 6301 [0.5 credit]**Political Theory II**

An intensive examination of the major questions in classical, medieval, modern, and contemporary political philosophy. This course is historically comprehensive in scope and thematically oriented in depth.

PSCI 6407 [0.5 credit]**Public Policy: Theory and Analysis**

Introduction to major theoretical approaches in the study and analysis of public policy and to current topics and debates in the field.

PSCI 6408 [0.5 credit]**Public Affairs Management and Analysis**

A seminar on theories and practice in the management of public affairs, including the environment and administration of the public sector, public opinion, and public communications.

PSCI 6600 [0.5 credit]**Theory and Research in International Politics I**

An examination of the principal problems in contemporary international relations theory and research, emphasizing the state of the field and current directions in it.

PSCI 6601 [0.5 credit]**Theory and Research in International Politics II**

An examination of the principal problems in contemporary international relations theory and research, emphasizing the state of the field and current directions in it.

PSCI 6900 [0.5 credit]**Ph.D. Field Examination I**

Ph.D. preparation for the major field examination I. The grade to be awarded will be that obtained on the field examination.

PSCI 6905 [0.5 credit]**Ph.D. Field Examination II**

Ph.D. preparation for the major field examination II. The grade to be awarded will be that obtained on the field examination.

PSCI 6907 [0.5 credit]**Thesis Proposal Workshop I**

A survey of research methods and approaches to research design designed to assist in the preparation of thesis proposals. Coordinated by one instructor, but faculty from other fields will also participate. The grade for this course will be Satisfactory or Unsatisfactory.

Prerequisite(s): permission of the Department.

PSCI 6908 [0.5 credit]**Thesis Proposal Workshop II**

Student-led workshop focused on the preparation, presentation, and discussion of drafts of students' thesis proposals. The final assignment for the course will be the presentation of a full written draft of the thesis proposal. Graded Satisfactory or Unsatisfactory.

Includes: Experiential Learning Activity

Prerequisite(s): successful completion of comprehensive examinations or permission of the Department.

PSCI 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Psychology (PSYC)

Psychology (PSYC) Courses**PSYC 5001 [0.5 credit]****Qualitative Research Methods in Psychology**

Introduction to various non-numerical, interpretive research methods. Attention will be devoted to the philosophical underpinnings of qualitative research, methods collecting and analyzing qualitative data, and issues regarding sampling, reliability, and validity.

Includes: Experiential Learning Activity

PSYC 5002 [0.5 credit]**Ethics in Psychology**

Ethical concepts and controversies related to research and practice in psychology. Topics may include ethical dilemmas and debates, professional codes of ethics, confidentiality, informed consent, legal rights and responsibilities, use of deception, or guidelines for research with special populations.

PSYC 5003 [0.5 credit]**Open Science and Methodological Improvements**

Exploring recent debates around reproducibility and openness in psychology. Practical objectives involving the improvement of research practices, publication strategies, and evaluation of past findings. Topics may include basic issues in measurement, statistical inference, ethics, and philosophy of science.

PSYC 5004 [0.5 credit]**Knowledge Translation**

Knowledge translation encompasses a wide variety of activities designed to support the flow of knowledge from creators (e.g., researchers) to users (e.g., policy makers) and back. This course explores theory and practice concerning the creation, synthesis, sharing, and uptake of knowledge, and communication skills.

PSYC 5011 [0.5 credit]**Topics in Social Psychology**

A critical examination of scientific theory and research in social psychology. Topics may include social cognition, social influence, group processes, conflict resolution and social change.

PSYC 5012 [0.5 credit]**Topics in Organizational Psychology**

A critical examination of scientific theory and research in organizational psychology. Topics may include personnel selection, work motivation, morale and productivity, organizational decision making, leadership and social action.

PSYC 5015 [0.5 credit]**Methods in Social and Personality Psychology**

An overview of traditional and emerging research methods in social and personality psychology. Students will learn a variety of experimental and nonexperimental procedures for assessing individual differences, cognitions, emotions, attitudes, and behaviours in the laboratory and the field.

PSYC 5020 [0.5 credit]**Applications of Psychology to Policing and the Courts**

A review of theory and research related to the application of psychology to various components of the criminal justice system, particularly policing and the courts. Topics may include criminal investigations, police use of force, eyewitness testimony and identification, victim rights, and jury decision making.

Includes: Experiential Learning Activity

PSYC 5021 [0.5 credit]**Forensic Assessment**

Theoretical and empirical issues of the biopsychosocial antecedents of criminal behaviour. Classification and assessment of offenders for courts, probation and parole services. Risk assessment, management and service planning are addressed in both correctional and mental health contexts.

Includes: Experiential Learning Activity

PSYC 5022 [0.5 credit]**Adult Offenders**

Theoretical and empirical issues on the use of different types of interventions in modifying adult criminal behaviour. Institutional treatment and community-based approaches are discussed.

PSYC 5024 [0.5 credit]**Juvenile Delinquency**

An examination of the development of delinquency with a focus on etiology, risk factors, assessment, prediction, and developmental trajectories. Individual, group, and family institutional and community treatment approaches are examined.

PSYC 5025 [0.5 credit]**Topics in Forensic Psychology: Theory and Research**

In-depth examination of theories and research in forensic psychology. Police stress, eyewitness memory, and risk assessment; theories and research that inform the assessment, treatment, and management of offenders.

PSYC 5026 [0.5 credit]**Topics in Forensic Psychology: Methodology**

Overview of research methods in forensic psychology. Topics may include research ethics, the use of archival records, observational and interview techniques, questionnaire development, reaction time studies, longitudinal designs, and the analysis of physiological data.

PSYC 5104 [0.5 credit]**Psychology of Women**

This seminar will consider and evaluate research concerning the psychology of women, including research methods, gender roles and gender differences.

PSYC 5107 [0.5 credit]**Psychology of Family Violence**

Biopsychosocial antecedents and consequences of the abuse and neglect of children, partners and elders within the family. The efficacy of preventive and treatment strategies is also assessed, as are current controversies and research methods in the area.

PSYC 5208 [0.5 credit]**Advances in Positive Psychology**

Overview and critical analysis of current theory and research in positive psychology; application of principles in organizations, schools, and the community. Topics may include positive youth development, perspectives on psychological wellness and growth, positive emotions, resilience, and mindfulness.

PSYC 5209 [0.5 credit]**Topics in Health Psychology**

A critical examination of scientific theory and research in health psychology. Topics may include the biopsychological model of illness, stress and coping, psychoneuroimmunology, personality, and stress management.

PSYC 5300 [0.5 credit]**Perceptual Processes**

Theoretical and empirical issues of the area of perception. Topics may include: psychophysics, constancies, depth perception, pattern recognition, iconic memory, attention, hemispheric specialization.

PSYC 5301 [0.5 credit]**Psychophysics**

A study of classic and contemporary psychophysical methods. Applications to cognition will be included.

PSYC 5401 [0.5 credit]**Multivariate Techniques**

Applications of multivariate statistical techniques with psychological data including multivariate analysis of variance, canonical correlation, discriminant function analysis, and factor analysis. Extensive use is made of statistical software.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411.

PSYC 5407 [0.5 credit]**Scale Development and Psychometrics**

This course will typically be designed to provide an in-depth understanding of the process of psychological scale development with respect to both the classical (i.e., reliability, validity) and the more modern (item response theory) psychometric approaches.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5411.

PSYC 5410 [0.5 credit]**Advanced Analysis of Variance**

Concepts and applications of advanced analysis of variance designs, including factorial, within groups, and hierarchical designs, and analysis of covariance. Extensive use is made of statistical software.

Includes: Experiential Learning Activity

PSYC 5411 [0.5 credit]**Advanced Regression**

Concepts and applications of advanced regression analyses, including multiple regression, hierarchical and polynomial techniques. Extensive use is made of statistical software.

Includes: Experiential Learning Activity

PSYC 5412 [0.5 credit]**Topics in Advanced Statistics and Methods**

Selected topics in advanced statistics and research methods relevant to broad areas of psychology, varying from year to year. Topics may include broad analytic approaches, such as, program evaluation, qualitative methods, nonparametric statistics, among others.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5413 [0.25 credit]**Workshops in Advanced Statistics and Methods**

Intensive focus on specific statistical or methodological approaches relevant to psychological research such as advanced factor analysis, meta-analysis, observational methods.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5414 [0.5 credit]**Structural Equation Modeling**

An in depth examination of structural equation modeling (SEM) techniques. SEM involves the integration of path analysis and factor analysis. Basic issues such as model fitting and identification will be covered as well as more applied issues surrounding mediation and moderation testing in SEM.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5415 [0.5 credit]**Multilevel Modeling**

An in depth examination of multilevel modeling (MLM). Students will develop the skills required to interpret and conduct multi-level data analysis, including longitudinal and nested designs, using hierarchical linear modeling software. The primary focus will be on two- level and three-level hierarchies.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5416 [0.5 credit]**Advanced Survey Methods**

Analysis of data from complex sample designs, including the development of selection and non-response weights, methods for handling and imputing missing data, the effects of stratification and clustering on estimation, and methods of variance estimation for complex sample designs.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5417 [0.5 credit]**Categorical Data Analysis**

This course will provide students with an in-depth understanding of several statistical techniques that can be used to analyze categorical data. Topics include contingency tables, log-linear analysis, logistic regression analysis with categorical predictors, continuous predictors, and interaction terms, and receiver operator characteristic (ROC) analysis.

Includes: Experiential Learning Activity

Prerequisite(s): PSYC 5410 and PSYC 5411. This course also requires permission of the Department.

PSYC 5500 [0.5 credit]**Topics in Developmental Psychology: Methodology**

A critical examination of methodology in developmental psychology. Topics may include observational and interview techniques, use of archival data, longitudinal designs, questionnaire development, and basic assessment methods. A research project will be required.

Includes: Experiential Learning Activity

PSYC 5503 [0.5 credit]**Advanced Topics in Developmental Psychology: Social and Emotional Development**

Recent developments in developmental psychology theory and research related to the study of social and emotional development. Topics may include child temperament, parenting and the family, peer relationships, self-system, and developmental psychopathology.

PSYC 5504 [0.5 credit]**Advanced Topics in Developmental Psychology: Cognitive Development**

Recent developments in developmental psychology theory and research related to the study of cognitive development. Topics may include: language, literacy, numeracy, and theory of mind.

PSYC 5505 [0.5 credit]**Topics in Developmental Psychology: Theory and Research**

Critical examination of scientific theory and research in developmental psychology. Special attention will be given to the mechanisms that account for change. Although most theories speak to the developmental of children, students will also have the opportunity to investigate theories of ageing.

PSYC 5601 [0.5 credit]**Topics in Personality Psychology**

Current debates in personality research, with contemporary theoretical and research papers in personality. Topics may include the structure of personality and its evolutionary, experiential, biological, social, and cultural processes.

PSYC 5700 [0.5 credit]**Advanced Topics in Cognition I**

An in-depth study of a specific topic in the area of basic cognitive processes. Topics will vary from year to year and may include judgmental processes, object identification, selective attention and spatial cognition.

PSYC 5703 [0.5 credit]**Topics in Cognitive Psychology**

A critical examination of scientific theory and research in cognitive psychology. Topics may include detection and processing of sensory signals, pattern recognition, attention, mental imagery and automaticity.

PSYC 5800 [0.5 credit]**Special Topics in Psychology**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5801 [0.5 credit]**Special Topics: Statistics**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5802 [0.5 credit]**Special Topics: Professional Development**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5804 [0.5 credit]**Special Topics in Health Psychology**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 5900 [0.5 credit]**Directed Studies**

In-depth investigation of selected problems in psychology by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade. Includes: Experiential Learning Activity

PSYC 5901 [0.5 credit]**Independent Research**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

Includes: Experiential Learning Activity

PSYC 5903 [0.5 credit]**Practicum in Psychology**

The practicum offers master's level students the opportunity to gain experience in a range of applied psychology settings with the goal of integrating academic and practical aspects of psychology. This course cannot be repeated for credit. Students will receive a grade of satisfactory or unsatisfactory.

Includes: Experiential Learning Activity

PSYC 5904 [0.5 credit]**Community Mental Health and Well-Being Practicum**

Graded Sat/Uns.

Prerequisite(s): PSYC 5410 and PSYC 5411 with a grade of A- or higher and PSYC 5209 or other health-oriented course approved by the graduate supervisor, with a grade of A- or higher; and approval of the graduate supervisor.

PSYC 5906 [0.0 credit]**Pro-Seminar in Psychology**

The pro-seminar is based on the departmental invited colloquia series. This course provides breadth in terms of exposure to research. Colloquia are offered from September to April.

PSYC 5909 [2.5 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

PSYC 6101 [0.5 credit]**Advanced Topics in Social Psychology**

A higher-level critical examination of scientific theory and research in social psychology. Topics are taken from recent publications and debates in the discipline.

PSYC 6102 [0.5 credit]**Advanced Topics in Organizational Psychology**

A higher-level critical examination of scientific theory and research in organizational psychology. Topics are taken from recent publications and debates in the discipline.

PSYC 6104 [0.5 credit]**Seminar in University Teaching**

Theoretical and empirical work related to teaching in higher education. Analysis of instructional discourse, use of language in classroom decision-making, bases of effective practice and methods of instruction. Constructivist principles of teaching and learning. Role of teaching in university scholarship. Also offered at the undergraduate level, with different requirements, as ALDS 5204., for which additional credit is precluded.

PSYC 6114 [0.5 credit]**Teaching Practicum**

The purpose of this course is to provide doctoral students who have an interest in developing their teaching skills with the opportunity for mentored practice within the discipline of psychology. Graded SAT/UNS.

Includes: Experiential Learning Activity

PSYC 6410 [0.5 credit]**Capstone Research Project in Quantitative Methods**

Conduct an independent quantitative data analysis project that demonstrates a student's mastery of advanced quantitative techniques. This project may involve practical experience with an organization or agency when the principal activity extends the student's knowledge of quantitative techniques.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

PSYC 6700 [0.5 credit]**Advanced Topics in Cognition II**

An in-depth study of a specific topic in higher-level cognitive processes. Topics will vary from year to year and may include mathematical knowledge and processes, problem solving, or models of reading.

PSYC 6704 [0.5 credit]**Advanced Topics in Cognitive Psychology**

A higher-level critical examination of scientific theory and research in cognitive psychology. Topics are taken from recent publications and debates in the discipline.

Precludes additional credit for PSYC 5704 (no longer offered).

PSYC 6800 [0.5 credit]**Special Topics in Psychology**

The topics of this course will vary from year to year, and will be announced in advance of the registration period.

PSYC 6900 [0.5 credit]**Directed Studies**

In-depth investigation of selected problems in psychology by means of directed library research. Registration is restricted, permission to register being granted only by the graduate committee. A final report must be filed in the departmental office prior to submission of course grade. Includes: Experiential Learning Activity

PSYC 6901 [0.5 credit]**Independent Research**

Permission to register and approval of research plan must be obtained from the graduate committee. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

Includes: Experiential Learning Activity

PSYC 6903 [0.5 credit]**Practicum in Psychology**

The practicum offers Ph.D. students the opportunity to gain experience in a range of applied psychology settings with the goal of integrating academic and practical aspects of psychology. This course cannot be repeated for credit. Students will receive a grade of satisfactory or unsatisfactory.

Includes: Experiential Learning Activity

PSYC 6906 [0.0 credit]**Pro-Seminar in Psychology I**

The pro-seminar is based on the departmental invited colloquia series. This course provides breadth in terms of exposure to research. Colloquia are offered from September to April.

Includes: Experiential Learning Activity

PSYC 6907 [0.0 credit]**Pro-Seminar in Psychology II**

The pro-seminar is based on the departmental invited colloquia series. This course provides breadth in terms of exposure to research. Colloquia are offered from September to April.

Includes: Experiential Learning Activity

PSYC 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Public Administration (PADM)

Public Administration (PADM) Courses

PADM 5120 [0.5 credit]**Modern Challenges to Governance**

Modern challenges to states, citizens, and policy-making, explored with the help of contemporary and historical thinkers. Topics may include: inequality; national security and intelligence gathering; identity; globalization and global finance; trade agreements and property rights; climate change and environmental challenges.

Precludes additional credit for PADM 5115 (no longer offered).

PADM 5121 [0.5 credit]**Policy Analysis: The Practical Art of Change**

Contemporary techniques of policy analysis. Topics may include: risk assessment, policy design, options analysis, and scenario-writing.

Precludes additional credit for PADM 5116 (no longer offered).

PADM 5122 [0.5 credit]**Public Management: Principles and Approaches**

Principles and processes of public-sector management as they function through cabinet-parliamentary government, federalism, the public service and the judiciary. Institutional reforms and changes in the philosophy of public sector management.

Precludes additional credit for PADM 5117 (no longer offered).

PADM 5123 [0.5 credit]**Public Management in Practice**

Contemporary public management practices. Topics may include: financial management, leadership, performance management, organizational design, human resource management, implementation.

PADM 5124 [0.5 credit]**Law and Ethics**

The legal and normative environment of Canadian public administration, law, institutions and processes. The relationship between ethics, accountability and good governance. Canadian legal history, adjudicative procedures, delegation of powers to public authorities, procedural justice in decision making.

Precludes additional credit for PADM 5412 and PADM 5413.

PADM 5125 [0.5 credit]**Qualitative Methods for Public Policy**

Qualitative methods and dimensions of policy research. Topics may include the formulation of research problems, research design and techniques for collecting and managing evidence, and the role of qualitative research in the analysis of public policies and programs.

Precludes additional credit for PADM 5715, PADM 5113 (no longer offered).

PADM 5126 [0.5 credit]**Quantitative Methods for Public Policy**

Descriptive statistics, probability theory and sampling distributions, hypothesis testing of quantitative and qualitative population parameters, and regression analysis.

Precludes additional credit for PADM 5114 (no longer offered).

PADM 5127 [0.5 credit]**Microeconomics for Policy Analysis**

Key concepts in microeconomic theory and their application to public policy. Topics may include incentives, rational choice theory, market structure, welfare economics, and strategic behaviour.

Precludes additional credit for PADM 5111 (no longer offered).

Prerequisite(s): ECON 1001 or equivalent.

PADM 5128 [0.5 credit]**Macroeconomics for Policy Analysis**

Theoretical foundations and current policy issues that relate to the level and growth of expenditure and production are analyzed in the Canadian and international context.

Precludes additional credit for PADM 5112 (no longer offered).

Prerequisite(s): ECON 1002 or equivalent.

PADM 5129 [0.5 credit]**Capstone Course**

An integrative workshop-based course in which teams of students develop and present strategies to address a policy problem.

Includes: Experiential Learning Activity

PADM 5211 [0.5 credit]**Intergovernmental Relations**

Major cost-sharing and fiscal transfer agreements.

The intergovernmental mechanisms for policy and administrative coordination in selected policy fields.

Precludes additional credit for PADM 5003 (no longer offered).

PADM 5212 [0.5 credit]**Civil Society and Public Policy**

The influence of various interests, social movements, voluntary organizations and citizens in the policy process in a Canadian and comparative context.

PADM 5213 [0.5 credit]**Gender and Public Policy**

The impact of public policy on gender relations and how gender relations shape policy. Topics covered may include gender inequalities in earnings and employment, macroeconomic policy, gender and development, and gender-based analysis.

Precludes additional credit for PADM 4701 and PADM 5701 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4213, for which additional credit is precluded.

PADM 5214 [0.5 credit]**Budgetary Policy in the Public Sector**

Selected aspects of the expenditure and revenue budget and budgetary process at all levels of government. Critical review of actual budgets and budgetary processes.

Precludes additional credit for PADM 5103 (no longer offered).

Also offered at the undergraduate level, with different requirements, as PADM 4214, for which additional credit is precluded.

PADM 5215 [0.5 credit]**Benefit-Cost Analysis**

Benefit-cost analysis and its application to public-sector investment, pricing policy, discount rates, marginal cost and shadow pricing, and the handling of risk and uncertainty.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5216 [0.5 credit]**Economic Models of Politics and Public Policy**

Microfoundations of collective action, majority rule, political institutions and bureaucracy. Applications to various issues in Canadian and international public policy.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5217 [0.5 credit]**Applied Microeconomic Policy Analysis**

Microeconomic theory applied to public policy problems and issues.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5218 [0.5 credit]**Analysis of Socio-economic Data**

Correlation and regression analyses to test hypotheses about the relationships between socio-economic variables.

Prerequisite(s): PADM 5126 or equivalent.

PADM 5219 [0.5 credit]**Advanced Statistical Policy Analysis**

Econometric research on selected policy issues using selected econometric techniques.

Prerequisite(s): PADM 5218 or equivalent.

PADM 5220 [0.5 credit]**Regulation and Public Policy**

Political, economic, legal, and organizational theories of regulation in the Canadian and comparative context. Processes and consequences of regulatory practice in selected Canadian public policy fields.

Also offered at the undergraduate level, with different requirements, as PADM 4220, for which additional credit is precluded.

PADM 5221 [0.5 credit]**Health Policy in Canada**

Canadian health policies and programs set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4221, for which additional credit is precluded.

PADM 5222 [0.5 credit]**Economics and Health Policy**

This course applies microeconomic theory to a discussion of health policy. Focus on issues of particular interest to a student of Canadian health care policy.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5223 [0.5 credit]**Canadian Economic Policy**

Overview of Canadian economic development and how it has been affected by governments. Topics may be drawn from monetary, fiscal, industrial, trade, labour market or competition policies, viewed in contemporary and historical contexts.

Prerequisite(s): PADM 5128 or equivalent.

PADM 5224 [0.5 credit]**Indigenous Policy**

Canadian policies and programs on Indigenous peoples and Indigenous peoples' own policies as nations set in a comparative political-economic and institutional context. Precludes additional credit for PADM 5711, PADM 4806 (no longer offered) and PADM 5806 (no longer offered). Also offered at the undergraduate level, with different requirements, as PADM 4224, for which additional credit is precluded.

PADM 5225 [0.5 credit]**Trade Policy**

Canadian multilateral and regional trade policies and programs set in a comparative political-economic and institutional context.

Prerequisite(s): PADM 5127 or equivalent.

Also offered at the undergraduate level, with different requirements, as PADM 4225, for which additional credit is precluded.

PADM 5226 [0.5 credit]**Tax Policy**

Canadian tax policies set in a comparative political-economic and institutional context.

Prerequisite(s): PADM 5127 or equivalent.

Also offered at the undergraduate level, with different requirements, as PADM 4226, for which additional credit is precluded.

PADM 5227 [0.5 credit]**Education Policy**

Canadian policies and programs on education set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4227, for which additional credit is precluded.

PADM 5228 [0.5 credit]**Social Policy**

The nature and historical development of social programs in capitalist countries, with particular focus on Canada.

The course will concentrate on developing a critical understanding of the social forces shaping these programs.

Also offered at the undergraduate level, with different requirements, as PADM 4228, for which additional credit is precluded.

PADM 5229 [0.5 credit]**The Health of Populations**

Assessment of the medical model, and perspectives on the social and economic determinants of health, population health, and community health. The health of particular groups in Canada (e.g., women, Aboriginal peoples). International comparisons will be made.

PADM 5230 [0.5 credit]**Ethics for Public Policy**

The development and application of ethical theories to examine not simply what governments could do, but what they should do on the basis of consequences, principles, or motivations. Applications could include policies affecting climate change, income inequality, end of life, privacy, use of force.

Also offered at the undergraduate level, with different requirements, as PADM 4230, for which additional credit is precluded.

PADM 5291 [0.5 credit]**Directed Studies**

A tutorial or directed reading course on selected subjects related to policy analysis.

PADM 5372 [0.5 credit]**Policy Seminar (Data Science Specialization)**

One or more selected policy areas and topics related to policy and administration in the data science context. Topics will change each year.

PADM 5391 [0.5 credit]**Directed Studies (Data Science Specialization)**

A tutorial of directed reading on selected subjects related to data science.

PADM 5411 [0.5 credit]**Organization Theory**

Focusing on major theoretical approaches to organizations, the course develops practical insights into issues such as organizational design, leadership, technology, culture and diversity, motivation and power. It applies these insights to organizations in both the public and private sectors in a variety of national contexts.

PADM 5414 [0.5 credit]**Law of Public Authorities II**

Characteristics and selected problems of control of administrative action. Topics may include: varieties of constitutional, legal and judicial control, impact of the Charter, reforms to administrative law control systems in Canada, and comparisons with developments outside Canada.

Prerequisite(s): PADM 5124 or equivalent.

PADM 5415 [0.5 credit]**Strategic Management in the Public Sector**

Key concepts, principles and tools of strategic management, and their use in planning and policy implementation in the public sector. Reviews critical perspectives and cases in order to identify some of the limitations of strategic management.

Includes: Experiential Learning Activity

PADM 5416 [0.5 credit]**Budgetary Management for the Public Sector**

Theory and practice of budgeting in the public sector. From a management perspective, the course focuses on the objectives, methods and systems for the control and reporting of expenditures.

PADM 5417 [0.5 credit]**Principles of Finance**

The use of financial assets to obtain funds, evaluative criteria to compare alternative uses of funds, and derivative contracts to manage risk. Public sector applications of these practices are emphasized.

PADM 5418 [0.5 credit]**Human Resources Management**

The field of human resources management including the roles of human resource departments, employee motivation, staffing, compensation, benefits, training and development and employee relations.

PADM 5419 [0.5 credit]**Industrial Relations and Public Sector Collective Bargaining**

The basic concepts of industrial relations, with respect to both public and private sector employees and organizations.

PADM 5420 [0.5 credit]**Policy and Program Evaluation**

Selected concepts, issues, and processes in applied governmental planning and evaluation, utilizing both Canadian and comparative experiences.

PADM 5421 [0.5 credit]**Globalizing Public Management**

Public sector reform has swept the developed and developing world in the last two decades. The dynamics of this global movement, the models exported and adopted, and the success and failure of these exports.

PADM 5422 [0.5 credit]**Urban and Local Government**

The role of municipal government in the context of Canadian federalism. Current economic, political and social trends affecting Canada's major urban centres including growth, amalgamation, fiscal reform, immigration, housing, community engagement, and sustainable development.

PADM 5423 [0.5 credit]**Third Sector Governance and Management**

Governance and management of voluntary/nonprofit organizations and their role in democracy, public policy, and service delivery.

PADM 5424 [0.5 credit]**Evaluation Cases and Applications**

Selected case studies and emerging theories and issues in the development, design, management and implementation of policy and program evaluation.

Includes: Experiential Learning Activity

Prerequisite(s): PADM 5420.

PADM 5441 [0.5 credit]**Introduction to Policy and Program Evaluation**

Survey of evaluation in Canada and internationally. Topics include: Canadian context for public sector evaluation practice; approaches to research in evaluation; essentials of effective evaluation design, including logic modeling, theories of change/action, and contribution/attribution constructs.

PADM 5442 [0.5 credit]**Quantitative Research Methods in Evaluation**

Descriptive and inferential statistics, probability theory and sampling distributions, hypothesis testing of quantitative and qualitative population parameters, and regression analysis as these apply to the field of program evaluation.

PADM 5443 [0.5 credit]**Qualitative Research Methods in Evaluation**

Methods used in qualitative evaluation research. Topics include: formulating evaluation research questions; deriving research designs from questions; qualitative data gathering techniques and approaches; managing evidence, ethics reviews, and analysis of qualitative data.

PADM 5444 [0.5 credit]**Benefit-Cost Analysis for Program Evaluation**

Approaches to benefit-cost analysis in the Canadian evaluation context. Topics include: the role of benefit-cost analysis within program evaluation; its application to public sector investments, pricing and other forms of policy valuation; discount rates, marginal cost, and shadow pricing; risk and uncertainty.

PADM 5445 [0.5 credit]**Program Evaluation Planning and Designs**

Application of specific evaluation research designs to actual projects. Topics include: designs for formative, summative and developmental programs; designs for policy evaluation; attribution and contribution analysis; applied logic modeling; and managing evaluation projects at the planning stages.

Includes: Experiential Learning Activity

Prerequisite(s): PADM 5441, PADM 5442, PADM 5443, PADM 5444.

PADM 5446 [0.5 credit]**Program Evaluation Conduct, Analysis and Reporting**

Application of evaluation conduct to actual projects. Topics include: selecting data analysis methods specific to a project; forming evaluation findings and recommendations; data visualization; reporting techniques; and management of evaluation projects at the conduct stages.

Includes: Experiential Learning Activity

PADM 5510 [0.5 credit]**Energy Economics**

Micro- and macroeconomic concepts and techniques applied to such topics as international energy markets, energy production, and energy consumption.

PADM 5511 [0.5 credit]**Energy Management**

The fundamentals of energy management, focusing on current practices in both private and public sector organizations.

PADM 5512 [0.5 credit]**International Politics of Sustainable Energy**

Recent historical and contemporary developments in the role of energy in inter- and intranational relations, involving such topics as Canada/US relations, the international political economy of oil, energy security, and climate change.

PADM 5515 [0.5 credit]**Sustainable Energy Policy**

The institutions involved in energy policy, the processes through which policy is made, and the substantive energy-related issues currently preoccupying policy makers.

Precludes additional credit for PADM 5615.

PADM 5572 [0.5 credit]**Policy Seminar (Sustainable Energy)**

One or more selected topics or specialized aspects of sustainable energy policy. The topic will change each year.

PADM 5611 [0.5 credit]**Science and Technology Policies**

Theory and practice regarding governmental policies for science and technology, and the use of scientific knowledge in the policy and regulatory processes of government. Concerns regarding the ethical issues and the transparency of science in government.

Also offered at the undergraduate level, with different requirements, as PADM 4611, for which additional credit is precluded.

PADM 5612 [0.5 credit]**Industrial Policy, Innovation and Sustainable Production**

Sustainable production theory and key drivers, barriers and opportunities influencing innovation in industrial systems and processes. The relationship of public policies and industry practices are explored in a number of sectors. Also offered at the undergraduate level, with different requirements, as PADM 4612, for which additional credit is precluded.

PADM 5613 [0.5 credit]**Science, Risk and Evaluation**

Risk-benefit theories and practices and related issues in the evaluation of science and technology; how they are handled in applied regulatory and policy institutions in selected sectors (e.g. pesticides; health protection; biotechnology).

PADM 5614 [0.5 credit]**Natural Resource Management**

Governance and management of natural resources from a Canadian and international perspective. The use of various management instruments, regulatory approaches and community-based and co-management institutions are evaluated with evidence from several case studies from around the world.

PADM 5615 [0.5 credit]**Politics and Policy of Energy in Canada**

Dilemmas associated with energy policy in Canada. Economic, social and environmental dimensions of energy decision making; Canadian issues within the context of a changing international scene and long term energy transitions.

Precludes additional credit for PADM 5515.

Also offered at the undergraduate level, with different requirements, as PADM 4615, for which additional credit is precluded.

PADM 5616 [0.5 credit]**Environmental Policy**

Canadian environmental policies and programs set in a comparative political-economic and institutional context.

Also offered at the undergraduate level, with different requirements, as PADM 4616, for which additional credit is precluded.

PADM 5617 [0.5 credit]**Implementing Sustainable Development in Industrialized Countries**

Genesis and evolution of the idea of sustainable development and the ways in which it is influencing public policy and public sector structures and processes. Canada's performance in implementing sustainable development will be assessed in comparison with other industrialized countries.

PADM 5618 [0.5 credit]**Environmental and Ecological Economics**

Environmental and ecological economics with applications to public policy and environmental management issues. Concepts of sustainability, non-market valuation and ecological stability, the determination of environmental targets, and the use of policy instruments, incentives and emissions markets.

Prerequisite(s): PADM 5127 or equivalent.

PADM 5619 [0.5 credit]**Urban Sustainability**

Impact of economic growth and social change on cities and their attempts to forge sustainable growth. Incorporating political and fiscal issues, the focus is on 'smart growth' policies and initiatives in areas such as environmental control, transport, land use, housing and infrastructure.

PADM 5620 [0.5 credit]**The Science, Politics and Economics of Global Climate Change**

Scientific issues at the core of climate change and the domestic and international policy responses. Various environmental, economic, and political implications for both the developed and developing worlds and for the various regions of Canada.

PADM 5702 [0.5 credit]**Policy Seminars****PADM 5703 [0.5 credit]****Directed Studies (Indigenous Public Administration)**

A tutorial or directed reading course on selected subjects.

PADM 5711 [0.5 credit]**Indigenous-Canada Relations: Governance and Policy History**

Introduction to pre-contact history of select Indigenous nations and peoples, overview of contact period: the treaty relationship, evolving jurisprudence, changing power dynamics, federal and provincial administrative practices, contemporary and traditional forms of First Nations, Métis and Inuit governance. Contrasting approaches to understanding foundational events.

Includes: Experiential Learning Activity

Precludes additional credit for PADM 5224.

PADM 5712 [0.5 credit]**Issues in Contemporary Governance: First Nations, Métis and Inuit**

Diverse approaches to understanding and responding to the main governance issues facing contemporary and traditional First Nations, Inuit and Métis governments and organizations in Ontario and in the rest of Canada.

PADM 5713 [0.5 credit]**Leadership and Management in Indigenous Organizations and Governments**

Leadership, organizational development and innovation in various cultural contexts relevant to Indigenous peoples, organizational design, recruitment and human resources management, decision-making, project planning and implementation, media and communications. Practicum included.

Includes: Experiential Learning Activity

PADM 5714 [0.5 credit]**Financial Management in First Nations, Métis and Inuit Governments and Organizations**

Legislation, regulations, and financial management practices that apply in First Nations, Métis, Inuit organizations and governments. Sources and measures to mitigate and eliminate historical disparity, including asset management, strategic investment, and capital aggregation.

PADM 5715 [0.5 credit]**Policy Research and Evaluation for Indigenous Policy and Administration**

Policy research and program evaluation; applied research ethics, cultural and community protocols, legal frameworks, formulation of research problems, research design, and techniques for collecting and managing community-based and other data; research methodologies of specific Indigenous nations and peoples, and scholarly debates about epistemology and practice.

Precludes additional credit for PADM 5125.

PADM 5716 [0.5 credit]**Economic and Community Development in Indigenous Territories**

Community economic development theories; the ethics, benefits and costs of traditional, current and new approaches pertinent to building stable economies in rural and urban Aboriginal settings.

Includes: Experiential Learning Activity

PADM 5717 [0.5 credit]**Indigenous Peoples and Canadian Law**

Canadian law relating to Indigenous peoples from colonial times to the present. Jurisprudence on Indigenous and treaty rights: the duty to consult, fiduciary duties, the honour of the Crown, nation-to-nation relations; introduction to First Nations, Métis and Inuit legal traditions, and international law.

PADM 5718 [0.5 credit]
Indigenous Peoples and Urban Policy and Administration
 Policies and programs of and for Indigenous peoples living in Canadian cities, with a focus on institutional and intergovernmental challenges and opportunities for change.

PADM 5719 [0.5 credit]
Indigenous Health and Social Policy
 Development and delivery of health and social policies pertinent to Indigenous peoples living in diverse circumstances in Canada; theories and practices.

PADM 5772 [0.5 credit]
Policy Seminar (Indigenous Policy and Administration)
 One or more selected policy areas or specialized aspects of Indigenous Policy and Administration. The policy field or topic will change each year.

PADM 5811 [0.5 credit]
The International Policy Framework
 The evolution of the main international rules and institutions governing the economic relationships among nation states, with emphasis on the changing roles of the Bretton Woods institutions (IMF, World Bank, GATT/ WTO).

PADM 5812 [0.5 credit]
Governance in Developing Countries
 The roles of the state and civil society in the governance of developing countries in the context of public sector reform and globalization.

PADM 5813 [0.5 credit]
The Evolution of World Bank/IMF Policy Conditionality
 The changing nature of World Bank/IMF policy conditionality with emphasis on the period since the onset of the 1982 debt crisis.

PADM 5814 [0.5 credit]
Program and Project Management
 The context, critical issues and methods relating to the planning and implementation of development programs and projects.

PADM 5815 [0.5 credit]
Civil Society Organizations and Development
 The context, roles, structures and strategies of nongovernmental organizations in the development process at the global, national and local levels. The role of development aid and NGOs is considered.
 Also listed as IDMG 5615.

PADM 5816 [0.5 credit]
Program Evaluation in Developing Countries
 The context, critical issues and methods relating to the evaluation of development interventions.
 Also listed as IDMG 5616.
 Prerequisite(s): PADM 5126 or equivalent.

PADM 5817 [0.5 credit]
Health Policy in Developing Countries
 Debates regarding health policy in the developing world, in the context of the global health sector reform movement, trade and intellectual property regimes, and strategies of corporate and NGO actors. Issues of gender, class and the determinants of health.
 Also listed as IDMG 5617.
 Also offered at the undergraduate level, with different requirements, as PADM 4817, for which additional credit is precluded.

PADM 5818 [0.5 credit]
Theories of Development
 A survey of the theories and evidence to explain processes of growth and development, and their unevenness, in low-income countries and transition economies.
 Precludes additional credit for INAF 5007.

PADM 5908 [1.0 credit]
Research Essay
 Includes: Experiential Learning Activity

PADM 5909 [2.0 credits]
M.P.P.A. Thesis
 Includes: Experiential Learning Activity

PADM 5913 [0.0 credit]
Co-operative Work Term
 Includes: Experiential Learning Activity
 Prerequisite(s): registration in the Co-operative Education Option of the M.A. program and permission of the Co-op Supervisor.

PADM 6010 [0.5 credit]
Current Issues in Public Policy
 Current issues in Canadian public policy, their historical contexts, and interdisciplinary approaches to analyzing them. Issues may include inequality, gender, environment, Indigenous governance, US/Canada relations, populism. Approaches to analysis may include contemporary and classic thinkers.
 Precludes additional credit for PADM 6114 (no longer offered).

PADM 6011 [0.5 credit]
Theoretical Foundations of Public Policy
 Normative and explanatory theories fundamental to public policy, drawing on multiple social science disciplines and incorporating ethical, economic, and political/administrative perspectives. Topics may include utilitarianism, rights-based traditions, contractualism, market failure, life-course dynamics.
 Precludes additional credit for PADM 6111(no longer offered).

PADM 6012 [0.5 credit]**Policy Process and Institutions**

Various theoretical approaches to policy-making. Topics may include policy formation, agenda-setting, institutionalism, theories of the bureau, theories of policy change, policy design and implementation, policy evaluation, advocacy and coalitions, private policy-making. Precludes additional credit for PADM 6112(no longer offered).

PADM 6013 [0.5 credit]**Research Design for Public Policy**

Introduction to the analytical challenges to the study of public policy, and ways of addressing them. Exploration of why particular explanatory, interpretive and normative research questions are asked; and why particular theories, units of analysis, concepts, methods and data are used. Precludes additional credit for PADM 6113 (no longer offered).

PADM 6200 [0.5 credit]**Doctoral Research Seminar**

Issues in developing research proposals and conducting public policy research; includes research presentations by senior doctoral students and faculty. Required for second-year doctoral students who present their thesis proposals. Issues surrounding quantitative or qualitative methods in public policy analysis may be discussed. Graded Pass/Fail.

PADM 6201 [0.5 credit]**Doctoral Research Seminar**

Presentations on research skills and strategies such as ethics approval, bibliographic software, work-flow management, subsequent publication. Supervised independent research projects preliminary to Ph.D. Thesis, drawing upon interdisciplinary approaches to study of public policy.

Precludes additional credit for PADM 6200.

Prerequisite(s): PADM 6900.

PADM 6900 [0.5 credit]**Ph.D. Comprehensive Examination**

Ph.D. preparation for the comprehensive examination. The grade to be awarded will be that obtained on the comprehensive examination.

PADM 6901 [0.5 credit]**Ph.D. Specialization Tutorial**

A Ph.D. tutorial covering advanced theory and research in an area of specialization generally related to public policy. Specific topics will be selected in consultation with, and must be approved by, the academic supervisor and Ph.D. co-ordinator.

PADM 6902 [0.5 credit]**Ph.D. Specialization Tutorial**

A Ph.D. tutorial covering advanced theory and research in an area of specialization generally related to public policy. Specific topics will be selected in consultation with, and must be approved by, the academic supervisor and Ph.D. co-ordinator.

PADM 6909 [0.0 credit]**Ph.D. Thesis**

A thorough investigation of a public policy issue that integrates multiple disciplines into the analysis. Includes: Experiential Learning Activity
Prerequisite(s): successful public defence of written thesis proposal.

Religion (RELI)

Religion (RELI) Courses**RELI 5701 [0.5 credit]****Directed Studies: Western Religions**

Directed study course focused on one or more Western religious traditions.

RELI 5702 [0.5 credit]**Directed Studies: Eastern Religions**

Directed study course focused on one or more Eastern religious traditions.

RELI 5780 [0.5 credit]**Graduate Research Seminar**

This mandatory seminar, intended as a workshop, guides students through the process of producing a major paper proposal and the initial stages of writing the research essay.

RELI 5801 [0.5 credit]**Seminar in the Discipline**

This mandatory seminar introduces students to graduate level work in Religious Studies. A faculty team addresses current debates and practices in both the discipline and profession. Students are evaluated on a pass/fail basis. Includes: Experiential Learning Activity

RELI 5802 [0.5 credit]**Seminar in Religion and Public Life**

This mandatory seminar introduces the main methodological and theoretical tools of the program. The course focuses on key thinkers and case studies to approach "religion and public life" from Religious Studies perspectives.

Includes: Experiential Learning Activity

RELI 5820 [0.5 credit]**Directed Studies: Themes in the Study of Religion**

Directed study course focused one or more themes in the study of religion.

RELI 5840 [0.5 credit]**Directed Studies I**

A program of supervised reading and preparation of written work to impart ability in particular research methods beyond the level of regular seminar offerings. Unscheduled/Requires permission of the department.

RELI 5841 [0.5 credit]**Directed Studies II**

A program of supervised reading and preparation of written work to impart ability in particular research methods beyond the level of regular seminar offerings. Unscheduled/Requires permission of the department.

RELI 5850 [0.5 credit]**Seminar in the Study of Religion**

Thematic seminar related to the comparative or general study of Religion and Public Life.

Includes: Experiential Learning Activity

Also offered at the undergraduate level, with different requirements, as RELI 4850, for which additional credit is precluded.

RELI 5851 [0.5 credit]**Seminar in Western Traditions**

Thematic seminar related to the study of Religion and Public Life with a focus on one or more Western traditions.

RELI 5852 [0.5 credit]**Seminar in Asian Religions**

Thematic seminar related to the study of Religion and Public Life with a focus on one or more Eastern traditions.

RELI 5908 [1.5 credit]**Research Essay**

A research essay on a topic related to the theme of Religion and Public Life. The topic must be chosen with the approval of the Research Essay supervisor.

Includes: Experiential Learning Activity

Social Work (SOWK)

Social Work (SOWK) Courses**SOWK 5000 [0.5 credit]****Theoretical Foundations of Social Work: A Critical Perspective**

History of social work and progressive social work. Introduction to critical theories and approaches informing contemporary social work in Canada: structural, anti-racist, Indigenous, anti-oppressive, queer, critical disability, post-structural, and political economy.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5001 [1.0 credit]**Interpersonal Practice in Social Work: Ethics, Knowledge and Skills**

Theoretical exploration of the values, ethics, and historical development of direct social work knowledge and skills for practice. Focus on student skills development for beginning practice, including building therapeutic alliance, differential use of interviewing skills, contracting, biopsychosocial assessment, goal setting, and treatment planning.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5003 [0.5 credit]**Policy Context of Social Work**

Historical context, theories and approaches to social policy analysis, development, and practice in Social Work. Examination of federal, provincial, municipal and organizational policies. Focus on processes for policy development, consultation, collaboration, political struggle, and challenges of bridging policy with individual services.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5004 [0.5 credit]**Group Work**

History, theories, and models of social work practice with groups. A range of group practice approaches, including task-focused, mutual aid, psychoeducational, and process-oriented therapeutic groups.

Includes: Experiential Learning Activity

Prerequisite(s): SOWK 5000 and SOWK 5001.

SOWK 5011 [0.5 credit]**Social Work and Social Justice**

Relationships between social work professionals and social justice movements. Indigenous, anti-racist, queer, disability, trans, class, and feminist knowledge, politics, and activism informing social work practice in Canada.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of MSW program.

SOWK 5012 [0.5 credit]**Social Work Research Foundations**

Foundations of social work research with a focus on understanding evidence-based practice. Students will learn how to understand research to inform social work practice, and how to use research in social work practice.

Prerequisite(s): BSW or Foundation Year of MSW program.

SOWK 5013 [0.5 credit]**Community-Based Participatory Research**

Using community-based participatory research approaches, students will assist community organizations using qualitative and/or quantitative techniques to address research questions with a social justice focus. Emphasizes an understanding of different research paradigms, ethics, and the importance of self-reflection and integration.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of MSW program.

SOWK 5014 [0.5 credit]**Social Policy**

Advanced study of social work contributions and strategies for policy development and analysis. Focus on policy change and negotiation within the contemporary context and the impact on clients' lives and social work practice.

Attention to alternative policy processes, e.g., Indigenous, and social justice practice.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5015 [0.5 credit]**Indigenous Knowledge and Theory for Social Work**

Exploration of Indigenous knowledge and Indigenous approaches to social work. Understanding history of social work with Indigenous peoples in Canada and strategies for reconciliation.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5016 [0.5 credit]**Social Work Practice with Individuals and Families**

Biopsychosocial theories and practice models (i.e., psychodynamic, cognitive-behavioural, narrative) for working with individuals and families in a contemporary practice environment. A critical approach to theories and models.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5017 [0.5 credit]**Advanced Organizational Administration and Practice**

Theories of organizational behaviour, approaches to management, skills for developing funding proposals, program development, managing budgets, program evaluation and creating organizational change.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5018 [0.5 credit]**Advanced Clinical Social Work Practice**

Clinical concepts for relationship-based, theoretically and empirically grounded, social justice-seeking practice, e.g., reflexive use of self, transference/countertransference, and navigating power. Focus on development of one's individualized clinical practice framework.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5020 [0.5 credit]**Social Work in Health Care Settings**

Social work practice in a range of health-care settings with a focus on health-care policy practice and direct intervention in various areas of health care.

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5021 [0.5 credit]**Advanced Social Work Practice with Groups and Communities**

Focus on practice with groups and communities, particularly implementing approaches reviewed in undergraduate programs and/or Foundation Year, dealing with tensions in practice, critical reflection, advanced practice techniques and evaluation.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or Foundation Year of the MSW program.

SOWK 5302 [0.5 credit]**Mental Health**

Historical development, legislative framework, institutional and service structure, and practice issues related to mental health services in Canada. The interface between mental health and sexual abuse, family violence, racism, corrections, aging and immigration.

Includes: Experiential Learning Activity

SOWK 5502 [0.5 credit]**History of Social Welfare and Social Work**

Development of social welfare in Canada from the 19th century to the present. Federal and provincial state formation and colonialism, imperialism, class, and racism. Transformations in the politics of struggle for social and economic justice.

Prerequisite(s): registration in MSW Foundation Year (Year I).

SOWK 5504 [1.0 credit]**Directed Studies**

Individual exploration of selected theoretical perspectives for social work practice under the direct supervision of a member of faculty or visiting scholar.

SOWK 5506 [0.5 credit]**Directed Studies**

Individual exploration of selected theoretical perspectives for social work practice under the direct supervision of a member of faculty or visiting scholar.

Includes: Experiential Learning Activity

SOWK 5606 [2.0 credits]**Practicum I**

Integration of academic and practical aspects of social-work education. 450 hours of guided learning in a community-based setting. Field seminar required.

Includes: Experiential Learning Activity

Prerequisite(s): registration in MSW Foundation Year (Year I); completion of SOWK 5000, SOWK 5001, SOWK 5003, and SOWK 5608; and completion of or concurrent registration in SOWK 5004.

SOWK 5607 [2.0 credits]**Practicum II**

450 hours integrating advanced social work theories and practice in clinical, policy, research or other settings. Field seminar required. Offered spring/summer of advanced or second year.

Includes: Experiential Learning Activity

Prerequisite(s): BSW or completion of MSW Foundation Year (Year I); completion of SOWK 5011, SOWK 5012.

SOWK 5608 [0.5 credit]**Community Practice**

Exploration of history, theory and practice of community work in social work. Engagement, assessment, and interventions with communities will be explored using a variety of community-based approaches including: Indigenous community change, and critical approaches to community work.

Includes: Experiential Learning Activity

Prerequisite(s): enrolment in MSW Foundation Year.

SOWK 5700 [0.5 credit]**Special Topics in Social Policy**

The School will offer courses on substantive topics related to social administration and policy. Topics vary depending on the interests of faculty and students and the availability of instructors. Students outside of the School may register with permission from the School.

SOWK 5701 [0.5 credit]**Special Topics in Direct Intervention**

The School will offer courses on substantive topics related to direct intervention including community development. Topics vary depending on the interests of faculty and students and the availability of instructors. Students outside of the School may register with permission from the School.

Includes: Experiential Learning Activity

SOWK 5702 [0.5 credit]**Special Topics in Social Work**

The School will offer lecture courses on substantive topics related to social work and social welfare. Topics will vary each year depending on the interests of faculty and students. Students from outside the School of Social Work may register with permission of the School.

SOWK 5703 [0.5 credit]**Special Topics in Social Work**

The School will offer lecture courses on substantive topics related to social work and social welfare. Topics will vary each year depending on the interests of faculty and students. Students from outside the School of Social Work may register with permission of the School.

SOWK 5903 [1.0 credit]**Independent Research Studies in Social Work**

Individually-arranged independent research study. Requires a written proposal that outlines a research project with clear learning objectives, and practice objectives (where relevant).

Includes: Experiential Learning Activity

SOWK 5904 [0.5 credit]**Independent Research Studies in Social Work**

Individually-arranged independent research study. Requires a written proposal that outlines a research project with clear learning objectives, and practice objectives (where relevant).

Includes: Experiential Learning Activity

SOWK 5909 [2.0 credits]**Thesis**

Includes: Experiential Learning Activity

Prerequisite(s): registration in MSW Advanced Year (Year II).

SOWK 6101 [0.5 credit]**Theoretical Foundations**

A focus on human rights and social justice that explores the dynamic tensions of life in an advanced capitalist, globalized political economy and the relevance for social work practices. This course will assist students in developing the theoretical frameworks for their dissertations.

Precludes additional credit for SOWK 6100 (no longer offered).

SOWK 6102 [0.5 credit]**Ethical Foundations**

This seminar examines notions of the subject and subjectivity, and the attendant concept of the other in the context of ethics in social work practice. What is the ethics of our social doing? What are we advancing and for whom?.

Precludes additional credit for SOWK 6100 (no longer offered).

SOWK 6201 [0.5 credit]**Theory and Methods**

Theories and methods from the social sciences and humanities as applied in social work research. Emphasis on theories and methods most consistent with structural approaches. Through engagement with the research literature, students acquire skills in assessing and comparing research approaches.

Includes: Experiential Learning Activity

SOWK 6202 [0.5 credit]**Research Design**

Building on SOWK 6201, this course supports students in learning how to design a critically-oriented research project, including how to ensure methodological coherence, ethics, rigour, timeliness and relevance to the field of structurally-informed social work.

Includes: Experiential Learning Activity

SOWK 6301 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6302 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6303 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6304 [0.25 credit]**Ph.D. Seminar**

Students engage in scholarly discussion with the goal of developing mutual, collegial support and skills in critical scholarship. Students will present, discuss and critique their own papers and research; and discuss presentations by social work faculty and other university scholars.

Includes: Experiential Learning Activity

SOWK 6401 [0.5 credit]**Critical Pedagogy**

Application of educational theory, models, practices, design and technology for post-secondary education. Theory and practice of critical pedagogy, curriculum development, teaching methods, skills and strategies.

Includes: Experiential Learning Activity

SOWK 6405 [0.5 credit]**Directed Studies**

Individually-arranged independent exploration of selected areas of inquiry that are offered subject to the availability of faculty. Requires a written proposal with clear learning objectives and study plan.

SOWK 6406 [0.5 credit]**Directed Studies**

Individually-arranged independent exploration of selected areas of inquiry that are offered subject to the availability of faculty. Requires a written proposal with clear learning objectives and study plan.

SOWK 6600 [0.5 credit]**Advocacy Practicum**

Students will work collaboratively with a community agency to create a social justice oriented project that will be completed for the agency. The project work will be guided by the student's advisor. Graded Sat/Uns.

Includes: Experiential Learning Activity

SOWK 6800 [0.5 credit]**Qualifying Examination**

A critical assessment and demonstration of mastery in an area of inquiry related to the research project, involving theoretical, methodological and substantive components. Requires a proposal to the Exam Committee, the successful completion of a Qualifying Exam paper and an Oral Qualifying Exam.

SOWK 6909 [0.0 credit]**PhD Dissertation**

An original scholarly research contribution constituting a significant contribution to the field of social welfare and the profession of social work. Dissertation must meet standards including a formal oral defense governed by the regulations of the Faculty of Graduate Studies and Postdoctoral Affairs.

Includes: Experiential Learning Activity

Sociology (SOCl)

Sociology (SOCl) Courses

SOCl 5000 [0.5 credit]**Classical Sociological Theory**

Crucial sociological concepts and ideas by the founders of sociology. Attention will be given to Marx, Weber, Durkheim, Pareto, Comte, and Husserl.

SOCl 5001 [0.5 credit]**Selected Topics in Classical Theory**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCl 5002 [0.5 credit]**Contemporary Sociological Theory**

Major theoretical perspectives in sociology, including social behaviourism; social action theories such as symbolic interactionism, phenomenological sociology, ethnomethodology; and structuralist theories such as structural functionalism, neo-Marxism and critical theory.

SOCl 5003 [0.5 credit]**Selected Topics in Contemporary Theory**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCl 5005 [0.5 credit]**Recurring Debates in Social Thought**

Recurring issues and debates in the discipline. Topics such as the nature of social science; the objective world versus social construction; questions of evidence, meaning and measurement; agency versus structure; the relation between research and praxis; knowledge and power, may be considered.

Prerequisite(s): restricted to graduate students in sociology. Others may be admitted by permission of the Department.

SOCI 5007 [0.5 credit]**Social Change and Economic Development**

Critical examination of studies of change and development in historical and contemporary national and transnational systems.

SOCI 5102 [0.5 credit]**Multiple Regression Analysis**

An in-depth study of multiple regression analysis and its application in social science research. Interpretation and communication of the results are emphasized. The course provides an overview of descriptive and inferential statistics. Students learn how to use STATA/SAS to analyze social survey data.

Includes: Experiential Learning Activity

SOCI 5104 [0.5 credit]**Advanced Multivariate Analysis**

Commonly-used advanced statistical techniques. Topics may include factor analysis, multinomial logistic regression analysis, event history analysis, analysis of covariance, multilevel models and structural equation modeling. STATA/SAS is used in addition to specialized statistical software.

Includes: Experiential Learning Activity

SOCI 5105 [0.5 credit]**Selected Topics in Social Research**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5106 [0.5 credit]**Research Design and Data Analysis**

An integrated approach to the problems involved in the analysis of quantitative data, research design and procedures.

Includes: Experiential Learning Activity

SOCI 5107 [0.5 credit]**Advanced Qualitative Research Methods**

In-depth study of a range of qualitative research methodologies. Students will sharpen their practical skills in developing research questions, gathering and analyzing data and presenting results. Students will engage in discussions of theoretical, methodological, and ethical issues and challenges in qualitative research.

SOCI 5201 [0.5 credit]**Comparative Methods in Social Research**

Current analytical problems and applications of comparative methods in social research. Students are expected to individually conduct research or to participate in a group research project in which one or more of these methods will be applied.

Includes: Experiential Learning Activity

SOCI 5204 [0.5 credit]**Consuming Passions: The Regulation of Consumption, Appearance and Sexuality**

Examination of the rise of consumption and private pleasures and their regulation and self-regulation.

Also listed as LAWS 5008.

SOCI 5205 [1.0 credit]**Canadian Society**

A critical examination of sociological models of modern societies and their relevance to Canada.

SOCI 5206 [0.5 credit]**Sociology of Occupations and Professions**

A consideration of the development of occupational recruitment patterns and workforce issues, with attention to their sociological implications.

SOCI 5207 [0.5 credit]**Sociology of Formal Organizations**

A consideration of the forms and processes of bureaucracy in modern society, government and industry.

SOCI 5209 [0.5 credit]**Sociology of Science and Technology**

Study of the interaction among science, technology and change in modern societies.

SOCI 5303 [0.5 credit]**Sociology of Education**

The relations between education and other social institutions, the structure of educational opportunity, educational systems and organizations, and the sociology of learning.

SOCI 5304 [0.5 credit]**Food Studies**

A sociological analysis of food cultures. Possible topics include: the relationship between food and identity; social movements organized around food; and the production, preparation, consumption, and disposal of food.

SOCI 5305 [0.5 credit]**Police and Capital**

The idea of 'police' as a general historical project aimed at the fabrication of social order and the development of liberal philosophy, political economy and security. Contemporary public and private security provision considered in light of commodification, class conflict, and risk thinking.

Also listed as LAWS 5306.

SOCI 5306 [0.5 credit]**Cultural Studies**

The relations between cultural practices and other social practices in definite social formations. Discussions are grounded through the choice of specific Canadian research on topics such as media, art, music, education, pedagogy, etc.

SOCI 5308 [0.5 credit]**Feminist Analyses**

Current theory and research in recent feminist analysis.

SOCI 5309 [0.5 credit]**Cultural Theory**

A survey of developments in European and North American Marxist and Post-Marxist cultural theories of the past quarter century.

SOCI 5400 [0.5 credit]**Political Sociology**

An examination of theoretical and empirical work on selected aspects of the state, politics and political behaviour, primarily in North America and Europe.

SOCI 5401 [0.5 credit]**Critical Disability Studies**

Course engages contemporary disability theory, culture, and activism to consider bodily difference and its relation to the workings of power and social control, accessibility, normalization, ableism, and medicalization. Students will gain an understanding of the contemporary debates, theories, and methodologies of critical disability studies.

SOCI 5403 [0.5 credit]**The Sociology of Solidarity**

The possibilities and practices of solidarity raise core questions about how we understand the social, the other and how we can live together. The course explores these questions in inter-personal, community and global contexts.

SOCI 5404 [0.5 credit]**Race, Ethnicity and Class in Contemporary Societies**

Various theoretical approaches concerning the persistence and re-emergence of ethnic and/or racial groups are examined. Particular emphasis is given to the intersection and overlap of ethnicity and race with social class.

SOCI 5405 [0.5 credit]**Power and Stratification**

An examination of theories of elite behaviour, social class, and ideology.

SOCI 5406 [0.5 credit]**Citizenship and Globalization**

Examination of debates about the changing nature of citizenship in the context of globalization of capital, culture and peoples. Employing post-Marshallian, political economic, post-structuralist, post-colonial and feminist perspectives, the seminar explores the emergence of market-driven, hierarchical and cosmopolitan notions of citizenship and transnational identities.

SOCI 5407 [0.5 credit]**Governmentality and Politics**

Examination of Foucault's concept of governmentality and work which has developed this idea, especially the relevance of governmentality for global political studies. Topics may include: sovereignty, biopolitics, technopolitics, neoliberalism and citizenship.

Also listed as PSCI 5303.

Also offered at the undergraduate level, with different requirements, as PSCI 4303, for which additional credit is precluded.

SOCI 5408 [0.5 credit]**Feminism and Materialism**

Recent developments of feminist materialist theory and analyses. Topics may include: the gender division of labour; family and economy; gender and class; gender, race and ethnicity; sexuality; reproduction; theory and politics.

SOCI 5409 [0.5 credit]**The Politics of Social Movements and the State**

Origins, ideologies, strategies and political implications of social and popular movements. May include attention to the peace, feminist, LGBT2SQ, disability, ecology, and anti-racism movements, as well as conservative, religious, and ethnonationalist movements.

SOCI 5501 [0.5 credit]**Phenomenology for Anthropologists and Sociologists**

This seminar builds theoretical and methodological bridges between phenomenology and anthropology/sociology. Students read key texts from, among others, Husserl, Heidegger, Merleau-Ponty, Plessner, Schütz, and Waldenfels and learn to apply concepts in research. Topics include body and senses, intersubjectivity and life-world, selfhood and otherness.

Also listed as ANTH 5501.

Seminar

SOCI 5504 [0.5 credit]**Selected Problems in Political Economy I**

A selected topic from current research in political economy. As the topic varies from year to year, students should check with the Department regarding the current offering.

Also listed as PECO 5501, PSCI 5501.

SOCI 5505 [0.5 credit]**Selected Problems in Political Economy II**

A selected topic from current research in political economy. As the topic varies from year to year, students should check with the Department regarding the current offering.

Also listed as PECO 5502, PSCI 5502.

SOCI 5600 [0.5 credit]**Critical Discourse Analysis**

Examination of the relations between discourse, social semiotics, extradiscursive semiotics and social organization.

SOCI 5605 [0.5 credit]**Demographic Analysis**

Examination of classical debates and contemporary demographic issues such as low fertility, population aging and migration policies. Introduction to the concepts, tools and techniques that demographers use; focus on empirical demographic research.

SOCI 5606 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5607 [0.5 credit]**Contemporary Theories of Crime and Social Regulation**

Recent developments in theories of criminality and social regulation. Particular reference will be made to the regulatory mechanisms of both public and private spheres within legal institutions, corrections, economic institutions, and the family.

SOCI 5707 [0.5 credit]**Crime, Social Control and Social Change**

An examination of the role of the discourses and ideologies surrounding crime, criminal processes, and social change. Topics may include such issues as juvenile justice, victimization, corporate crime, criminalization of indigenous peoples, substance use and abuse.

SOCI 5802 [0.5 credit]**Departmental Seminar**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5803 [0.5 credit]**Critical Theory**

Recent developments in critical theory based upon its initial formulation by the Frankfurt School, with emphasis upon particular contemporary theories in a given year, e.g., J. Habermas, H. Willems, etc.

SOCI 5804 [0.5 credit]**Modern Marxist Theory**

An examination of topics of theory and research in modern Marxist literature; the central focus is on problems of class analysis, the state, and politics in advanced capitalist societies.

SOCI 5805 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5806 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 5809 [0.5 credit]**The Logic of the Research Process**

An examination of the research process, including the phases of conceptualization, choice of indicators, sampling, data collection, and analysis. Published articles will be studied as exemplars of the range of possible research strategies.

Includes: Experiential Learning Activity

SOCI 5900 [0.5 credit]**Tutorial****SOCI 5906 [0.5 credit]****Placement in Sociology**

This course provides an opportunity to enhance educational experience through work placement. Students may not be enrolled in the Co-operative Work Term (SOCI 5913) and the Placement in Sociology (SOCI 5906) simultaneously.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the Department.

SOCI 5908 [1.0 credit]**M.A. Research Essay**

Students may enrol in this course for a maximum of three consecutive terms of study, including one summer term. Students must enrol in this course not later than the beginning of the second full year of study.

Includes: Experiential Learning Activity

SOCI 5909 [2.0 credits]**M.A. Thesis**

Includes: Experiential Learning Activity

SOCI 5913 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

Prerequisite(s): registration in the Sociology Master of Arts Cooperative Education program.

SOCI 6001 [0.5 credit]**Selected Topics in Sociology**

Topic varies from year to year. Students should check with the Department regarding the topic offered.

SOCI 6002 [0.5 credit]**Doctoral Seminar Year 1**

Development of self-awareness and skills as sociological scholars and writers. Foundations of sociological research, research techniques, and attendant theoretical issues. Research project design, grant applications writing, research work management, scholarly writing and presentation.

SOCI 6003 [0.5 credit]**Doctoral Seminar Year 2**

Support for writing comprehensive papers and dissertation research proposal, continued attention to research project design, research work management, scholarly writing and presentation.

SOCI 6900 [0.5 credit]**Tutorial****SOCI 6909 [0.0 credit]****Ph.D. Thesis**

Includes: Experiential Learning Activity

Statistics (STAT)

Statistics (STAT) Courses

STAT 5500 [0.5 credit] (MAT 5177)

Multivariate Normal Theory

Multivariate normal distribution properties, characterization, estimation of means, and covariance matrix. Regression approach to distribution theory of statistics; multivariate tests; correlations; classification of observations; Wilks' criteria.

STAT 5501 [0.5 credit] (MAT 5191)

Mathematical Statistics II

Confidence intervals and pivots; Bayesian intervals; optimal tests and Neyman-Pearson theory; likelihood ratio and score tests; significance tests; goodness-of-fit tests; large sample theory and applications to maximum likelihood and robust estimation.

Prerequisite(s): STAT 5600 or permission of the School. Also offered at the undergraduate level, with different requirements, as STAT 4507, for which additional credit is precluded.

STAT 5502 [0.5 credit] (MAT 5192)

Sampling Theory and Methods

Unequal probability sampling with and without replacement; unified theory for standard errors; prediction approach; ratio and regression estimation; stratification and optimal designs; multistage cluster sampling; double sampling; domains of study; post-stratification; nonresponse; measurement errors; related topics.

STAT 5503 [0.5 credit] (MAT 5193)

Linear Models

Theory of non full rank linear models; estimable functions, best linear unbiased estimators, hypotheses testing, confidence regions; multi-way classifications; analysis of covariance; variance component models; maximum likelihood estimation, Minque, Anova methods; miscellaneous topics.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5504 [0.5 credit] (MAT 5194)

Stochastic Processes and Time Series Analysis

Stationary stochastic processes, inference for stochastic processes, applications to time series and spatial series analysis.

STAT 5505 [0.5 credit] (MAT 5195)

Design of Experiments

Overview of linear model theory; orthogonality; randomized block and split plot designs; latin square designs; randomization theory; incomplete block designs; factorial experiments: confounding and fractional replication; response surface methodology. Miscellaneous topics.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5506 [0.5 credit] (MAT 5175)

Robust Statistical Inference

Tests for location, scale, and regression parameters; derivation of rank tests; distribution theory of linear rank statistics and their efficiency. Robust estimation of location, scale and regression parameters; Huber's M-estimators, Rank-methods, L-estimators. Influence function. Adaptive procedures.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5507 [0.5 credit] (MAT 5176)

Advanced Statistical Inference

Pure significance test; uniformly most powerful unbiased and invariant tests; asymptotic comparison of tests; confidence intervals; large-sample theory of likelihood ratio and chi-square tests; likelihood inference; Bayesian inference; fiducial and structural methods; resampling methods.

Prerequisite(s): STAT 5501 or permission of the School.

STAT 5508 [0.5 credit] (MAT 5172)

Topics in Stochastic Processes

Course contents will vary, but will include topics drawn from Markov processes. Brownian motion, stochastic differential equations, martingales, Markov random fields, random measures, and infinite particle systems, advanced topics in modeling, population models.

STAT 5509 [0.5 credit] (MAT 5196)

Multivariate Analysis

Multivariate methods of data analysis, including principal components, cluster analysis, factor analysis, canonical correlation, MANOVA, profile analysis, discriminant analysis, path analysis.

Prerequisite(s): STAT 5600 or permission of the School.

STAT 5516 [0.5 credit] (MAT 5197)

Nonparametric Statistics

Order statistics; projections; U-statistics; L-estimators; rank, sign, and permutation test statistics; nonparametric tests of goodness-of-fit, homogeneity, symmetry, and independence; nonparametric density estimation; nonparametric regression analysis: kernel estimators, orthogonal series estimators, smoothing splines; high-dimensional inference problems and false discovery.

Prerequisite(s): STAT 5600 or permission of the School. Also offered at the undergraduate level, with different requirements, as STAT 4506, for which additional credit is precluded. Lectures three hours a week.

STAT 5600 [0.5 credit] (MAT 5190)**Mathematical Statistics I**

Statistical decision theory; likelihood functions; sufficiency; factorization theorem; exponential families; UMVU estimators; Fisher's information; Cramer-Rao lower bound; maximum likelihood, moment estimation; invariant and robust point estimation; asymptotic properties; Bayesian point estimation.

Also offered at the undergraduate level, with different requirements, as STAT 4500, for which additional credit is precluded.

STAT 5601 [0.5 credit] (MAT 5197)**Stochastic Optimization**

Topics chosen from stochastic dynamic programming, Markov decision processes, search theory, optimal stopping.

STAT 5602 [0.5 credit] (MAT 5317)**Analysis of Categorical Data**

Analysis of one-way and two-way tables of nominal data; multi-dimensional contingency tables, log-linear models; tests of symmetry, marginal homogeneity in square tables; incomplete tables; tables with ordered categories; fixed margins, logistic models with binary response; measures of association and agreement.

Prerequisite(s): STAT 5600 and STAT 5501, or permission of the School.

STAT 5603 [0.5 credit] (MAT 5318)**Reliability and Survival Analysis**

Types of censored data; nonparametric estimation of survival function; graphical procedures for model identification; parametric models and maximum likelihood estimation; exponential and Weibull regression models; nonparametric hazard function models and associated statistical inference; rank tests with censored data applications.

Prerequisite(s): STAT 5600 and STAT 5501 or permission of the School.

STAT 5604 [0.5 credit] (MAT 5173)**Stochastic Analysis**

Brownian motion, continuous martingales, and stochastic integration.

Prerequisite(s): STAT 5708 or permission of the School.

STAT 5610 [0.5 credit] (MAT 5375)**Introduction to Mathematical Statistics**

Limit theorems. Sampling distributions. Parametric estimation. Concepts of sufficiency and efficiency. Neyman-Pearson paradigm, likelihood ratio tests. Parametric and non-parametric methods for two- sample comparisons. Notions of experimental design, categorical data analysis, the general linear model, decision theory and Bayesian inference.

Precludes additional credit for STAT 5600.

Also offered at the undergraduate level, with different requirements, as STAT 4500, for which additional credit is precluded.

STAT 5701 [0.5 credit] (MAT 5198)**Stochastic Models**

Markov systems, stochastic networks, queuing networks, spatial processes, approximation methods in stochastic processes and queuing theory. Applications to the modeling and analysis of computer-communications systems and other distributed networks.

Also offered at the undergraduate level, with different requirements, as STAT 4508, for which additional credit is precluded.

STAT 5702 [0.5 credit] (MAT 5182)**Modern Applied and Computational Statistics**

Resampling and computer intensive methods: bootstrap, jackknife with applications to bias estimation, variance estimation, confidence intervals, and regression analysis. Smoothing methods in curve estimation; statistical classification and pattern recognition: error counting methods, optimal classifiers, bootstrap estimates of the bias of the misclassification error.

STAT 5703 [0.5 credit] (MAT 5181)**Data Mining**

Visualization and knowledge discovery in massive datasets; unsupervised learning: clustering algorithms; dimension reduction; supervised learning: pattern recognition, smoothing techniques, classification. Computer software will be used.

Includes: Experiential Learning Activity

STAT 5704 [0.5 credit] (MAT 5174)**Network Performance**

Advanced techniques in performance evaluation of large complex networks. Topics may include classical queueing theory and simulation analysis; models of packet networks; loss and delay systems; blocking probabilities.

STAT 5705 [0.5 credit] (MAT 5373)**Statistical Machine Learning**

Discriminant analysis, principal component analysis, support vector machines; reproducing kernel Hilbert spaces and kernel methods; neural networks; VC Theory, PAC learning. Additional topics may include: Bayesian modelling, manifold learning, boosting.

Includes: Experiential Learning Activity

STAT 5708 [0.5 credit] (MAT 5170)**Probability Theory I**

Probability spaces, random variables, expected values as integrals, joint distributions, independence and product measures, cumulative distribution functions and extensions of probability measures, Borel-Cantelli lemmas, convergence concepts, independent identically distributed sequences of random variables.

STAT 5709 [0.5 credit] (MAT 5171)
Probability Theory II

Laws of large numbers, characteristic functions, central limit theorem, conditional probabilities and expectations, basic properties and convergence theorems for martingales, introduction to Brownian motion.
Prerequisite(s): STAT 5708 (MAT 5170) or permission of the School.

STAT 5713 [0.5 credit]
Advanced Data Mining

Topics from recent literature on mining complex data structures and data such as: tree/graph, sequence, web/test, stream, spatiotemporal, high-dimensional, multivariate time series, mixed-mode; clustering (EM, topic modeling, fuzzy), SVM; multi-label learning; deep learning; combining learners, network analysis/link prediction/graphical models (Bayesian, Markov networks); anomaly detection.

STAT 5900 [0.5 credit] (MAT 5990)
Seminar

STAT 5901 [0.5 credit] (MAT 6991)
Directed Studies

STAT 5902 [0.5 credit] (MAT 5992)
Seminar in Biostatistics

Students work in teams on the analysis of experimental data or experimental plans. The participation of experimenters in these teams is encouraged. Student teams present their results in the seminar, and prepare a brief written report on their work.

STAT 5904 [0.5 credit] (MAT 5993)
Statistical Internship

This project-oriented course allows students to undertake statistical research and data analysis projects as a cooperative project with governmental or industrial sponsors. Practical data analysis and consulting skills will be emphasized. The grade will be based upon oral and written presentation of results.

Includes: Experiential Learning Activity

Prerequisite(s): permission of the graduate director.

STAT 5909 [2.0 credits]
M.Sc. Thesis in Statistics

STAT 5910 [1.0 credit]
M.Sc. Project in Statistics

Project in statistics supervised by a professor approved by the graduate director resulting in a major report (approximately 30-40 pages), together with a short presentation on the report. Graded by the supervisor and another professor appointed by the graduate director.

Includes: Experiential Learning Activity

STAT 6508 [0.5 credit] (MAT 5314)
Topics in Probability and Statistics

STAT 6900 [0.5 credit] (MAT 6990)
Seminar

STAT 6901 [0.5 credit] (MAT 6991)
Directed Studies

STAT 6909 [0.0 credit] (MAT 9999)
Ph.D. Thesis

Includes: Experiential Learning Activity

Strategic Management (STGY)

Strategic Management (STGY) Courses

STGY 5900 [0.5 credit]

Corporate and Business Strategy

Strategic management focuses on evaluation of opportunities and threats in external environments in light of an organization's strengths and weaknesses, in order to determine a sustainable competitive advantage. Emphasis on corporate and business level strategic analysis and formulation. Organizational capstone project required.

Includes: Experiential Learning Activity

Prerequisite(s): all other MBA core courses.

STGY 5903 [0.5 credit]

Strategic Concepts

An overview of business models and key strategic concepts facing firms in a global environment. Core functional area concepts in accounting, marketing, operations and HR are introduced and integrated through simulation. Skills in managing teams, meetings, business planning and presenting business plans.

Includes: Experiential Learning Activity

Sustainable Energy (SERG)

Sustainable Energy (SERG) Courses

SERG 5001 [0.5 credit]

Sustainable Energy Policy for Engineers

This course introduces engineering students to the policy world by examining political and policy institutions, and covering basic principles of policy analysis, as they relate to the energy realm.

SERG 5002 [0.5 credit]

Sustainable Energy Engineering for Policy Students

This course introduces policy students to fundamental principles of engineering, particularly as they relate to energy production, transformation and consumption.

SERG 5003 [0.5 credit]

Energy Evaluation and Assessment Tools

Introduction to principles and tools for financial and performance analysis of energy projects, systems and technologies, and their application. Topics may include: probability theory, regression analysis, cost-benefit analysis, life cycle analysis, carbon accounting and emissions modeling, and other techniques particular to the energy field.

SERG 5004 [1.0 credit]**Applied Interdisciplinary Project**

Application of assessment tools, energy evaluation methods, engineering, economics and policy studies to actual sustainable energy projects.

Includes: Experiential Learning Activity

Precludes additional credit for SERG 5000 (no longer offered).

Prerequisite(s): SERG 5003 and one of SERG 5001 or SERG 5002.

SERG 5800 [0.0 credit]**Sustainable Energy Seminar**

A series of seminars presented by researchers and practitioners in the area of sustainable energy. To complete this course, a student must attend at least ten seminars during their program.

SERG 5906 [0.5 credit]**Directed Studies in Sustainable Energy**

A directed course on selected subjects related to sustainable energy as approved by a course supervisor.

SERG 5913 [0.0 credit]**Co-operative Work term**

Includes: Experiential Learning Activity

Systems and Computer Engineering (SYSC)

Systems and Computer Engineering (SYSC) Courses

SYSC 5001 [0.5 credit] (ELG 6101)**Simulation and Modeling**

Simulation as a problem solving tool. Random variable generation, general discrete simulation procedure: event table and statistical gathering. Analyses of simulation data: point and interval estimation. Confidence intervals. Overview of modeling, simulation and problem solving using SIMSCRIPT, MODSIM and other languages. Also offered at the undergraduate level, with different requirements, as SYSC 4005, for which additional credit is precluded.

SYSC 5003 [0.5 credit] (ELG 6103)**Discrete Stochastic Models**

Models for software, computer systems, and communications networks, with discrete states, instantaneous transitions and stochastic behaviour. Communicating finite state machines and Petri Nets. Review of concepts of probability, and of Markov Chains with discrete and continuous parameters. Basic queuing theory. Numerical methods for Markov Models.

SYSC 5004 [0.5 credit] (ELG 6104)**Optimization for Engineering Applications**

Introduction to algorithms and computer methods for optimizing complex engineering systems. Includes linear programming, networks, nonlinear programming, integer and mixed-integer programming, genetic algorithms and search methods, and dynamic programming. Emphasizes practical algorithms and computer methods for engineering applications.

SYSC 5005 [0.5 credit] (ELG 6105)**Optimization Theory and Methods**

Advanced theory, algorithms and computer methods for optimization. Interior point methods for linear optimization, advanced methods for nonlinear and mixed-integer optimization. Search methods. Applications in engineering. Prerequisite(s): SYSC 5004 (ELG 6104) or equivalent.

SYSC 5006 [0.5 credit] (ELG 6106)**Design of Real-Time and Distributed Systems**

Characteristics of real-time and distributed systems. Modern middleware systems, such as CORBA, DCE, RMI for building distributed applications: advantages and disadvantages. Analyzing designs for robustness, modularity, extensibility, portability and performance. Implementation issues. Major course project. Includes: Experiential Learning Activity Prerequisite(s): SYSC 3303 and SYSC 5708 (ELG 6178) or similar experience.

SYSC 5007 [0.5 credit] (ELG 6107)**Expert Systems**

Survey of some landmark expert systems; types of architecture and knowledge representation; interfering techniques; approximate reasoning; truth maintenance; explanation facilities; knowledge acquisition. A project to implement a small expert system will be assigned. Also listed as COMP 5007. Prerequisite(s): COMP 4007 or COMP 5001 (CSI 5113) or permission of the Department.

SYSC 5101 [0.5 credit] (ELG 6111)**Design of High Performance Software**

Designing software to demanding performance specifications. Design analysis using models of computation, workload, and performance. Principles to govern design improvement for sequential, concurrent and parallel execution, based on resource architecture and quantitative analysis. Prerequisite(s): SYSC 5704 (ELG 6174) and a course in software engineering, or equivalent. Also offered at the undergraduate level, with different requirements, as SYSC 4102, for which additional credit is precluded.

SYSC 5102 [0.5 credit] (ELG 6112)**Performance Measurement and Modeling of Distributed Applications**

Performance measurements, metrics and models of middleware based systems and applications. Benchmarks, workload characterization, and methods for capacity planning and system sizing. Performance monitoring infrastructures for operating systems and applications. Introduction to the design and analysis of experiments and the interpretation of measurements.
Prerequisite(s): SYSC 5101 (ELG 6611) or equivalent.

SYSC 5103 [0.5 credit] (ELG 6113)**Software Agents**

Agent-based programming; elements of Distributed Artificial Intelligence; beliefs, desires and intentions; component-based technology; languages for agent implementations; interface agents; information sharing and coordination; KIF; collaboration; communication; ontologies; KQML; autonomy; adaptability; security issues; mobility; standards; agent design issues and frameworks, applications in telecommunications.
Prerequisite(s): Knowledge of Java, C/C++ or Smalltalk.

SYSC 5104 [0.5 credit] (ELG 6114)**Methodologies For Discrete-Event Modeling And Simulation**

Methodological aspects of simulation. Modeling discrete events systems. Modeling formalisms: FSA, FSM, Petri Nets, DEVS, others. Verification and validation. Cellular models: Cellular Automata, Cell-DEVS. Continuous and hybrid models. Parallel and Distributed simulation (PADS) techniques. PADS middleware: HLA, Parallel-DEVS, Time-Warp.
Prerequisite(s): knowledge of C++ and of basic concepts of concurrency and distributed systems.

SYSC 5105 [0.5 credit] (ELG 6115)**Software Quality Engineering and Management**

All aspects of software quality engineering. Software testing, at all stages of the software development and maintenance life cycle. Software reviews and inspections. Use of software measurement and quantitative modeling for the purpose of software quality control and improvement.
Precludes additional credit for CSI 5111 (COMP 5501).
Prerequisite(s): an undergraduate course in software engineering such as SYSC 4800 or SEG 3300, or equivalent, and basic statistics.

SYSC 5108 [0.5 credit] (ELG 6118)**Topics in Information Systems**

Recent and advanced topics in the field of Information Systems and its related areas.

SYSC 5109 [0.5 credit] (ELG 6119)**Teletraffic Engineering**

Congestion phenomena in telephone systems, and related telecommunications networks and systems, with an emphasis on the problems, notation, terminology, and typical switching systems and networks of the operating telephone companies. Analytical queuing models and applications to these systems.
Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent.

SYSC 5200 [0.5 credit] (ELG 6120)**Algebraic Coding Theory**

Review of Algebra, Finite Fields, Linear Block Codes and their Properties, Hamming Codes, Cyclic Codes, Hadamard Matrices and Hadamard Codes, Golay Codes, Reed-Muller Codes, BCH and Reed-Solomon Codes, Decoding Algorithms, Coding Bounds.
Precludes additional credit for SYSC 5507 (ELG 6157).

SYSC 5201 [0.5 credit] (ELG 6121)**Computer Communication**

Computer network types, introductory queuing theory and performance analysis. OSI layering and BISDN layering modifications. Data link layer. Local area networks and random access (CSMA- CD, switched ethernet, token ring, wireless LAN). Public Networks. IP networks, addressing, routing. Transport layer, flow control. Introduction to ISDN.
Precludes additional credit for EACJ 5607 (ELG 5374) or SYSC 4602 (ELG 4181).
Prerequisite(s): Undergraduate preparation in probability theory equivalent to STAT 3502.

SYSC 5202 [0.5 credit] (BMG 5107)**Applications in Biomedical Image Processing**

Image processing methods applied to biomedical images. Overview of medical imaging modalities. Image enhancement, segmentation, registration and fusion. Image quality metrics. Image formats. Application examples.
Includes: Experiential Learning Activity
Also listed as BIOM 5202.

SYSC 5206 [0.5 credit]**Resource Management on Distributed Systems**

Principles and techniques for resource management on distributed systems including clouds, grids and data analytics platforms; management of computing and storage resources; service level agreements; performance and energy aware techniques for scheduling, allocation, dynamic resource provisioning; cyber-physical systems and BigData; resource management for BigData analytics.
Includes: Experiential Learning Activity

SYSC 5207 [0.5 credit] (ELG 6127)**Distributed Systems Engineering**

Techniques for representing distributed systems: graphical and textual models. Processes, threads, synchronization and inter-process communication techniques, RPC.

Middleware: client-server (CORBA), grids, Web services.

Resource management: processor allocation, load sharing, Grid scheduling, real-time issues. Protocol: OSI model, application and presentation layers.

Prerequisite(s): permission of the Department.

SYSC 5300 [0.5 credit] (ELG 6130)**Advanced Health Care Engineering**

Healthcare and technology; overview of medical devices and sensors; safe and effective use and management of technology; telemedicine; medical databases, data collection, storage, retrieval and computers in medicine; electronic patient records, PACS; clinical decision-support systems.

Also listed as BIOM 5401 (BMG 5318).

Precludes additional credit for EACJ 5303 (ELG 5123).

Prerequisite(s): permission of the instructor.

SYSC 5301 [0.5 credit] (ELG 6131)**Advanced Topics in Biomedical Engineering**

Topics vary from year to year.

Also listed as EACJ 5127 (ELG 6131).

Prerequisite(s): permission of the Department.

SYSC 5302 [0.5 credit] (ELG 6321)**Biomedical Instrumentation**

Instrumentation designed to measure physiological variables related to the function of the heart, lungs, kidney, nervous and musculo-skeletal system; emergency, critical care, surgery and anaesthesia equipment.

Also listed as EACJ 5302 (ELG 6321).

Precludes additional credit for BIOM 5100 (BMG 5103).

Prerequisite(s): permission of the instructor.

SYSC 5303 [0.5 credit] (ELG 6133)**Interactive Networked Systems and Telemedicine**

Telemicromanipulator; human motoring and sensory capabilities; typical interface devices; mathematical model of haptic interfaces; haptic rendering; stability and transparency; remote control schemes; time delay compensation; networking and realtime protocols, history and challenges of telemedicine; telemedicine applications: telesurgery, telemonitoring, telediagnosis and telehomecare.

Also listed as BIOM 5402 (BMG 5304).

Prerequisite(s): permission of the Department.

SYSC 5304 [0.5 credit] (ELG 5127)**Medical Imaging Modalities**

Mathematical models of image formation based on the image modality and tissue properties. Linear models of image degradation and reconstruction. Inverse problems and regularization for image reconstruction. Image formation in radiology, computed tomography, magnetic resonance imaging, nuclear medicine, ultrasound, positron emission tomography.

Also listed as BIOM 5200 (BMG 5105).

SYSC 5306 [0.5 credit] (ELG 6136)**Mobile Computing Systems**

Systems to build mobile applications. Covers data link layer to application layer. Emphasis on existing wireless infrastructure and IETF protocols. Focuses on view of mobile application developer; communication systems, middleware and application frameworks, defacto standards proposed/developed by industry consortia. Precludes additional credit for COMP 5402 (CSI 5142). Prerequisite(s): EACJ 5607 (ELG 5374) or SYSC 5201 (ELG 6121) or permission of the Department.

SYSC 5307 [0.5 credit] (ELG 6307)**Biological Signals**

Modeling of neuromuscular biological signals, including subthreshold phenomena, active behaviour of cell membranes, and innervation processes. Measurement of biological signals, including electrode effects. Time domain, frequency domain, and adaptive filtering techniques for noise reduction.

Precludes additional credit for BIOM 5101 (BMG 5104).

SYSC 5370 [0.5 credit] (ELG 5370)**Multiresolution Signal Decomposition: Analysis and Applications**

Multirate signal processing: sampling rate conversion, polyphase representation. Bases, filter banks: series expansion of discrete-time signals, series expansion of continuous-time signals, multiresolution concept and analysis, construction of wavelet, wavelet series. Complexity of multirate discrete-time processing, filter banks, and wavelet series computation.

SYSC 5401 [0.5 credit] (ELG 6141)**Adaptive and Learning Systems**

System identification. Least squares and recursive identification techniques. Asymptotic and theoretical properties. Model structure selection. Prediction and estimation. Model reference adaptive control and self-tuning regulators. Nonlinear adaptive systems. Stability. Neural networks and neuro-control. Applications to robotics, control and pattern recognition.

Prerequisite(s): SYSC 5502 (ELG 6152) or equivalent.

SYSC 5402 [0.5 credit] (ELG 6142)**Advanced Dynamics With Applications to Robotics**

Lagrange equations and Hamilton's principle. Dynamics of lumped parameter and continuous systems. Natural modes and natural frequencies. Forced vibrations. Stability and bifurcation. Kinematics and dynamics of rigid bodies. Gyroscopic effects. Forward and inverse kinematics of robot manipulators. Denavit-Hartenberg notation. Derivation of manipulator dynamics.

SYSC 5403 [0.5 credit] (ELG 6143)**Network Access Techniques**

A range of access technologies with emphasis on broadband access. Physical channels and the state-of-the-art of coding, modulation, multiplexing strategies to overcome physical impairments. including high-speed transmission over twisted pair, wireless, fibre and co-axial media.

Prerequisite(s): SYSC 5503 (ELG 6153), and SYSC 5504 (ELG 6154) or ELG 5375 (EACJ 5506).

SYSC 5404 [0.5 credit]**Multimedia Compression, Scalability, and Adaptation**

This course covers media compression, in-depth issues of scalability in the compression domain (including audio, images, video, 2D and 3D graphics), and adaptation towards various contexts; as well is covering various popular media encoding standards (including JPEG and MPEG).

SYSC 5405 [0.5 credit] (ELG 6102)**Pattern Classification and Experiment Design**

Introduction to a variety of supervised and unsupervised pattern classification techniques with emphasis on correct application. Statistically rigorous experimental design and reporting of performance results. Case studies will be drawn from various fields including biomedical informatics. Includes: Experiential Learning Activity

Also listed as BIOM 5405.

Prerequisite(s): undergraduate introductory probability and statistics.

SYSC 5406 [0.5 credit]**Network Routing Technologies**

The course covers routing technologies for high-speed networks. The course addresses in-depth issues and technologies in traffic engineering, MPLS (Multiprotocol Label Switching) system components and architecture, constraint-based routing, quality of service, protection and restoration, virtual private networks, cross layer interworking, and special topics.

SYSC 5407 [0.5 credit]**Planning and Design of Computer Networks**

Planning process of computer networks; needs and technical requirements; modeling of different network planning problems; exact and approximate algorithms; topological planning and expansion problems; equipment (switch, router) location problem; approximate and optimal routing algorithms; presentation of various case studies. Includes: Experiential Learning Activity

SYSC 5408 [0.5 credit]**Cross Layer Design for Wireless Networks**

Quality of service measures at different layers. Parameter adaptation, tradeoffs, and optimization at physical, data-link, network, transport, and application layers. Examples of cross-layer design in cellular, ad hoc, sensor, local area, green, and cognitive radio networks.

SYSC 5409 [0.5 credit]**Interactive Media and Digital Art**

Interactive digital technologies as new media for art and entertainment. Topics include essential features of the digital media, interactivity, computer games and gamification, interactive stories, serious games, virtual worlds and social networks, and digital art.

Precludes additional credit for SYSC 5807 (ELG 6187).

SYSC 5500 [0.5 credit]**Designing Secure Networking and Computer Systems**

Network security with coverage of computer security in support of networking concepts. Covers various security issues in data networks at different protocol layers. Routing security, worm attacks, and botnets. Security of new mobile networks and emerging networked paradigms such as social networks and cloud computing.

Precludes additional credit for SYSC 5801 Section "X" (ELG 6181).

SYSC 5502 [0.5 credit] (ELG 6152)**Advanced Linear Systems**

Modeling and state space realization. Review of signals and systems. Solution to the matrix DE. Discrete time systems and the Z transform. Canonical representations and transformations. Controllability, observability and controller and observer design. LQR design and the Kalman filter. Numerous examples and applications.

Precludes additional credit for MECH 4501.

SYSC 5503 [0.5 credit] (ELG 6153)**Stochastic Processes**

Basic concepts of randomness, as applied to communications, signal processing, and queuing systems; probability theory, random variables, stochastic processes; random signals in linear systems; introduction to decision and estimation; Markov chains and elements of queuing theory.

Precludes additional credit for EACJ 5109 (ELG 5119).

SYSC 5504 [0.5 credit] (ELG 6154)**Principles of Digital Communication**

Elements of communication theory and information theory applied to digital communications systems. Characterization of noise and channel models. Optimum Receiver theory. Modulation and coding for reliable transmission: MPSK, MQAM, M-ary orthogonal modulation. Channel coding, trellis coded modulation. Spread spectrum and CDMA communications.

Precludes additional credit for EACJ 5506 (ELG 5375).

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent (may be taken concurrently).

SYSC 5506 [0.5 credit] (ELG 5170)**Information Theory**

Measure of information: entropy, relative entropy, mutual information, asymptotic equipartition property, entropy rates for stochastic processes; data compression: Huffman code, arithmetic coding; channel capacity: random coding bound, reliability function, Blahut-Arimoto algorithm, Gaussian channels, coloured Gaussian noise and 'water-filling'; rate distortion theory; network information theory. Precludes additional credit for EACJ 5501 (ELG 5170). Prerequisite(s): SYSC 5503 (ELG 6153) or EACJ 5109 (ELG 5119) or equivalent.

SYSC 5508 [0.5 credit] (ELG 6158)**Digital Systems Architecture**

New architectural concepts are introduced. Discussion of programmable architectures (micro-controllers, DSPs, GP) and FPGAs. Memory interfacing. Scalable, superscalar, RISC, CISC, and VLIW concepts. Parallel structures: SIMD, MISD and MIMD. Fault tolerant systems and DSP architectures. Examples of current systems are used for discussions.

Prerequisite(s): SYSC 4507 or equivalent.

SYSC 5600 [0.5 credit] (ELG 6160)**Adaptive Signal Processing**

Theory and techniques of adaptive filtering, including Wiener filters, gradient and LMS methods; adaptive transversal and lattice filters; recursive and fast recursive least squares; convergence and tracking performance; implementation. Applications, such as adaptive prediction, channel equalization, echo cancellation, source coding, antenna beamforming, spectral estimation.

Precludes additional credit for EACJ 5800 (ELG 5377).

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent; SYSC 5602 (ELG 6162) or ELG 5376 (EACJ 5507) or equivalent.

SYSC 5601 [0.5 credit] (ELG 6161)**Neural Signal Processing**

Multidimensional function approximation. The least squares adaptive algorithm and the generalized delta rule. Multi-layered perceptrons and the back-propagation algorithm. Approximation of non-linear functions. Radial basis functions. Self-organizing maps. Applications of neural signal processing to control, communications and pattern recognition.

Precludes additional credit for EACJ 5709 (ELG 5796).

Prerequisite(s): SYSC 5503 (ELG 6153) or equivalent. May be taken concurrently with SYSC 5503 (ELG 5503).

SYSC 5602 [0.5 credit] (ELG 6162)**Digital Signal Processing**

Review of discrete time signals and systems, A/D and D/A conversions, representation in time, frequency, and Z domain, DFT/FFT transforms, FIR/IIR filter design, quantization effects. Correlation functions. Cepstrum analysis. Multi-rate signal processing. Power spectrum estimation. Introduction to joint time-frequency analysis. DSP architecture: implementation approaches. Applications.

Precludes additional credit for EACJ 5507 (ELG 5376).

SYSC 5603 [0.5 credit] (ELG 6163)**Digital Signal Processing: Microprocessors, Software and Applications**

Characteristics of DSP algorithms and architectural features of current DSP chips: TMS320, DSP-56xxx, AD-21xxx and SHARC. DSP multiprocessors and fault tolerant systems. Algorithm/software/hardware architecture interaction, program activity analysis, development cycle, and design tools. Case studies: LPC, codecs, FFT, echo cancellation, Viterbi decoding.

Includes: Experiential Learning Activity

Prerequisite(s): SYSC 5602 (ELG 6162) or ELG 5376 (EACJ 5507) or equivalent.

SYSC 5604 [0.5 credit] (ELG 6164)**Advanced Topics in Digital Signal Processing**

Recent and advanced topics in the field of digital signal processing and its related areas.

Prerequisite(s): SYSC 5602 (ELG 6162) or ELG 5376 (EACJ 5507) or equivalent.

SYSC 5605 [0.5 credit] (ELG 6165)**Advanced Digital Communication**

Techniques and performance of digital signalling and equalization over linear bandlimited channels with additive Gaussian noise. Fading multipath channels: diversity concepts, modeling and error probability performance evaluation. Synchronization in digital communications. Spread spectrum in digital transmission over multipath fading channels.

Precludes additional credit for EACJ 5704 (ELG 5780).

Prerequisite(s): SYSC 5504 (ELG 6154) or equivalent.

SYSC 5606 [0.5 credit] (ELG 6166)**Introduction to Mobile Communications**

Mobile radio channel characterization: signal strength prediction techniques and statistical coverage; fading; delay spread; interference models and outage probabilities. Digital modulation and transmission system performance. Signal processing techniques: diversity and beamforming, adaptive equalization, coding. Applications to TDMA and CDMA cellular systems.

Prerequisite(s): SYSC 5503 (ELG 5503) and SYSC 5504 (ELG 6154) (may be taken concurrently with SYSC 5606).

SYSC 5607 [0.5 credit] (ELG 6167)**Source Coding and Data Compression**

Discrete and continuous sources. Discrete sources: Huffman coding & run length encoding. Continuous sources: waveform construction coding; PCM, DPMC, delta modulation; speech compression by parameter extraction; predictive encoding; image coding by transformation and block quantization. Fourier and Walsh transform coding. Applications to speech, television, facsimile.

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109) or equivalent.

SYSC 5608 [0.5 credit] (ELG 6168)**Wireless Communications Systems Engineering**

Multi-user cellular and personal radio communication systems; frequency reuse, traffic engineering, system capacity, mobility and channel resource allocation. Multiple access principles, cellular radio systems, signalling and interworking. Security and authentication. Wireless ATM, satellite systems, mobile location, wireless LANs, wireless local loops, broadband wireless, etc.

Prerequisite(s): SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109), and SYSC 5504 (ELG 6154) or ELG 5375 (EACJ 5506), or their equivalents. May be taken concurrently.

SYSC 5609 [0.5 credit] (ELG 6169)**Digital Television**

Television standards: NTSC, PAL, SECAM, and HDTV. Sampling and quantization of television signals: rec 601-1. Digital video compression: inter and intra-frame methods, spatial and transform/wavelet coding; H.261 and MPEG standards. Video conferencing systems and other digital video processing applications.

SYSC 5700 [0.5 credit] (ELG 6170)**Spread Spectrum Systems**

Types of spread spectrum systems, FH, DS-SS, TH-SS using impulse-radio. Hybrid DS/FH-SS. Pseudo-noise generators: statistical properties of M sequences, Galois field connections, Gold codes, OVFSF codes. Code tracking loops, initial synchronization of receiver spreading code. Performance in interference environments and fading channels. CDMA systems. SS applications.

Prerequisite(s): SYSC 5504 (ELG 6154) or equivalent.

SYSC 5701 [0.5 credit] (CSI 5117)**Operating System Methods for Real-Time Applications**

Principles and methods for operating system design with application to real-time, embedded systems. Concurrent programming: mechanisms and languages; design approaches and issues; run-time support (kernel). Methods for hard real-time applications. Methods for distributed systems. Programming assignments in a suitable programming language.

Prerequisite(s): SYSC 3303 or SYSC 5704 (ELG 6174) or equivalent courses and/or experience. Programming experience in high level and assembly languages.

SYSC 5703 [0.5 credit] (ELG 6173)**Integrated Database and Cloud Systems**

Database definitions, applications, architectures. Conceptual design based on entity-relationship, object-oriented models. Relational data model: relational algebra and calculus, normal forms, data definition and manipulation languages. Database management systems: transaction management, recovery and concurrency control. Current trends: object-oriented, knowledge-based, multimedia, distributed databases.

SYSC 5704 [0.5 credit] (ELG 6174)**Elements of Computer Systems**

Concepts in basic computer architecture, assembly languages, high level languages including object orientation, compilers and operating system concepts (including concurrency mechanisms such as processes and threads and computer communication). Designed for graduate students without extensive undergraduate preparation in computer system engineering (or equivalent experience).

Prerequisite(s): programming experience with at least one high level language and permission of the Department.

SYSC 5706 [0.5 credit] (ELG 6176)**Analytical Performance Models of Computer Systems**

Analytical modeling techniques for performance analysis of computing systems. Theoretical techniques covered include single and multiple class queuing network models, together with a treatment of computational techniques, approximations, and limitations. Applications include scheduling, memory management, peripheral devices, databases, multiprocessing, and distributed computing.

Prerequisite(s): SYSC 5003 (ELG 6103), SYSC 5503 (ELG 5503) or ELG 5119 (EACJ 5109), or equivalent.

SYSC 5708 [0.5 credit] (ELG 6178)**Model-Driven Development of Real-Time and Distributed Software**

Advanced development of real-time and distributed systems by model-driven development that shifts the focus from coding to modeling. Different types of models. Generating code by model transformations. Design patterns for distributed/concurrent systems with examples from communication applications. Design issues for reusable software.

Prerequisite(s): knowledge of UML and operating systems concepts, and permission of the Department.

SYSC 5709 [0.5 credit] (ELG 6179)**Advanced Topics in Software Engineering**

Recent and advanced topics in the field of software engineering and related areas. Primary references are recent publications in the field.

Prerequisite(s): permission of the Department.

SYSC 5800 [0.5 credit] (ELG 6180)**Network Computing**

Design and Java implementation of distributed applications that use telecommunication networks as their computing platform. Basics of networking; Java networking facilities. Introduction to open distributed processing; CORBA, JavaIDL, JavaRMI, CGI/HTTP, DCOM, Componentware; Enterprise JavaBeans, ActiveX. Agents: Java code mobility facilities. Security issues; Java security model.

SYSC 5801 [0.5 credit] (ELG 6181)**Advanced Topics in Computer Communications**

Recent and advanced topics in computer-communication networks intended as a preparation for research. Students are expected to contribute to seminars or present lectures on selected topics.

Prerequisite(s): SYSC 5201(ELG 6121) or ELG 5374 (EACJ 5607) or equivalent and permission of the Department.

SYSC 5802 [0.5 credit] (ELG 6182)**Introduction to Information and System Science**

An introduction to the process of applying computers in problem solving. Emphasis on the design and analysis of efficient computer algorithms for large, complex problems. Applications in a number of areas are presented: data manipulation, databases, computer networks, queuing systems, optimization.

Also listed as MATH 5802, COMP 5802, ISYS 5802.

SYSC 5803 [0.5 credit] (ELG 6183)**Logic Programming**

Review of relational databases, first order predicate calculus, semantics of first order models, deductive querying. Proof theory, unification and resolution strategies. Introduction to Prolog, and/or parallelism and Concurrent Prolog. Applications in knowledge representation and rule-based expert systems.

SYSC 5804 [0.5 credit] (ELG 6184)**Advanced Topics in Communications Systems**

Recent and advanced topics in communications systems. Prerequisite(s): permission of the Department.

SYSC 5806 [0.5 credit] (ELG 6186)**Object Oriented Design of Real-Time and Distributed Systems**

Advanced course in software design dealing with design issues at a high level of abstraction. Design models: use case maps for high-level behaviour description; UML for traditional object-oriented concerns. Design patterns. Forward, reverse, and re-engineering. Substantial course project on applications chosen by students.

Includes: Experiential Learning Activity
Prerequisite(s): permission of the Department.

SYSC 5807 [0.5 credit] (ELG 6187)**Advanced Topics in Computer Systems**

Recent and advanced topics in computer systems. The course will generally focus on one or more of the following areas: specification, design, implementation, and modeling/analysis. Students may be expected to contribute to lectures or seminars on selected topics. Prerequisite(s): permission of the Department.

SYSC 5808 [0.5 credit] (ELG 6188)**Communications Network Management**

Network management issues. WANs and LANs. The Internet and ISO models of network management. Network management protocols SNMP, CMIP, CMOT, etc. Events, Managed Objects and MIBs. Fault management techniques. Current diagnostic theory and its limitations. AI and Machine learning approaches. Monitoring and fault management tools.

Prerequisite(s): SYSC 5201 (ELG 6121) or equivalent.

SYSC 5900 [0.5 credit] (ELG 6188)**Systems Engineering Project**

Students pursuing the non-thesis M.Eng. program conduct an engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity

SYSC 5902 [0.5 credit]**Research Methods for Engineers**

Topics required to perform engineering research including literature surveys, identifying issues, objectives, and methodology. Technical writing, documenting and presenting engineering ideas and a review of statistics, simulation, optimization and data analysis.

Includes: Experiential Learning Activity

SYSC 5903 [0.5 credit]**Systems Engineering Project II**

Students pursuing the non-thesis M.Eng. program conduct an engineering study, analysis, and/or design project under the supervision of a faculty member.

Includes: Experiential Learning Activity
Prerequisite(s): permission of the Department.

SYSC 5905 [2.0 credits] (ELG 6188)**M.C.S. Thesis**

Also listed as MATH 5905, COMP 5905.

SYSC 5906 [0.5 credit]**Directed Studies****SYSC 5908 [1.5 credit] (ELG 6196)****M.Sc. Thesis in Information and Systems Science**

Includes: Experiential Learning Activity
Also listed as MATH 5908, ISYS 5908, COMP 5908.

SYSC 5909 [2.5 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

SYSC 6909 [0.0 credit]**Ph.D. Thesis**

Includes: Experiential Learning Activity

Technology and Operations Management (TOMS)

Technology Management (TOMS) Courses**TOMS 5301 [0.25 credit]****Modeling Business Decisions**

Quantitative methods for strategic, tactical, and operational business decision making. Optimization, simulation, project management, decision analysis, and multi-criteria analysis. Underlying ideas, model formulation, computer implementation, and analysis of model results, with applications from various business functions.

Includes: Experiential Learning Activity

TOMS 5302 [0.25 credit]**Operations Management**

The provision of services and goods to customers, with focus on efficiency, effectiveness, and productivity. Planning and control of processes involving products, workers, equipment, suppliers, and customers. Effects of variation and uncertainty on lead time, inventory, quality, and customer service.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5600 (no longer offered).

Prerequisite(s): BUSI 5801.

TOMS 5303 [0.25 credit]**Managing Projects**

Foundations and core principles of managing projects with an emphasis on supporting techniques, practices, and methods as means for structuring, analyzing, scoping, planning, executing, monitoring, controlling, and reporting.

Includes: Experiential Learning Activity

TOMS 5305 [0.25 credit]**International Development Projects Preparation and Formulation**

Processes, assessment methodologies and tools, and practices for designing international development projects, developing funding proposals, managing calls for proposals, organizing procurement, and evaluating the implementation of the project's activities.

Includes: Experiential Learning Activity

TOMS 5311 [0.25 credit]**Quality Management**

Defining quality, quality improvement, six sigma, lean enterprise, benchmarking and control charts; quality audits, ISO 9000, ISO 20000 and the progressive excellence program; role of quality assurance in service and product development; Process management and performance excellence.

Precludes additional credit for BUSI 5805 (no longer offered).

Prerequisite(s): BUSI 5801, TOMS 5301 and TOMS 5302.

TOMS 5312 [0.25 credit]**Technology Development**

Transformation of knowledge and ideas into products, processes and services. Development/innovation process models, successful and efficient integrated product/process/service development, cross functional teams, quality function deployment, lead-user approach, open innovations paradigm, disruptive innovations, and intellectual property management.

Precludes additional credit for BUSI 5805 (no longer offered).

Prerequisite(s): TOMS 5301 and TOMS 5302.

TOMS 5313 [0.25 credit]**Technology Adoption for Services**

Adoption and implementation of technology-driven products and processes for enhanced services. Technology forecasting and scanning; transfer of technologies including technology sourcing, pricing, transfer modes, and success factors; selection of appropriate technology, its vendor and consultant; risk management; managing change.

Precludes additional credit for BUSI 5700 (no longer offered).

Prerequisite(s): TOMS 5301 and TOMS 5302.

TOMS 5314 [0.25 credit]**Supply Chain Management**

Organizational, strategic and operational aspects of managing supply chain from domestic and international perspectives. Outsourcing strategies, supplier relationship and information sharing, supplier networks, contracting and procurement management, logistic integration, role of information technology, and supply chain performance and metrics.

Includes: Experiential Learning Activity

Precludes additional credit for BUSI 5601 (no longer offered).

Prerequisite(s): BUSI 5801.

Technology Innovation Management (TIMG)

Technology Innovation Management (TIMG) Courses

TIMG 5001 [0.5 credit]

Principles of Technology Innovation Management

Develops a common level of knowledge among students on topics in product and service development, technology entrepreneurship, and commercialization. These topics build on the literature in the fields of project management, leadership, industrial marketing, managerial economics and organizational behaviour. Precludes additional credit for TTMG 5001 (no longer offered).

TIMG 5002 [0.5 credit]

Technology Entrepreneurship

Key theories and models of technology entrepreneurship. Topics include the nature of technology products, collaborative experimentation and production of new products, assets, and their attributes, and the firm's asset ownership rights. Precludes additional credit for TTMG 5002 (no longer offered).

TIMG 5003 [0.5 credit]

Issues in Technology Innovation Management

Key readings relevant to technology innovation management. Topics include the introduction of new products to the global market, technology sourcing, intellectual property rights, industry trends, technology and ethics, new business opportunities and product identification, industry characteristics, regulation, international competition, ecosystems, economic development, and open source. Precludes additional credit for TTMG 5003 (no longer offered).

TIMG 5004 [0.5 credit]

Research Methods in Technology Innovation Management

Prepares students to undertake research in technology innovation management. Students learn to define interesting research problems and hypotheses relevant to technology innovation management, and learn the different research approaches used in the field of technology innovation management. Precludes additional credit for TTMG 5004 (no longer offered).

Prerequisite(s): TIMG 5001 and one of TIMG 5002 or TIMG 5003.

TIMG 5005 [0.5 credit]

Customer Value Creation in Technology Firms

Topics include: architecture, product/service management; technology and complementary assets; latent needs; co-design and user innovation; life-cycle management; pricing; alignment of technology and business strategy; user experience; customer retention.

Precludes additional credit for TTMG 5005 (no longer offered).

Prerequisite(s): TIMG 5001 and TIMG 5002.

TIMG 5006 [0.5 credit]

Management of Software Engineering Projects

Models for the development of software. Software project management tools. Quality control. Risk assessment and management. Examples are drawn from the development of new technology products.

Includes: Experiential Learning Activity

Precludes additional credit for TTMG 5006 (no longer offered).

Prerequisite(s): TIMG 5001 or TTMG 5001 and TIMG 5002 or TTMG 5002.

TIMG 5101 [0.5 credit]

Integrated Product Development

The new product introduction process and time-based competition, basic concepts of integrated product development, parallelism and concurrency of development activities, flexibility and agility, the voice of the customer, cross-functional teams, organizing for innovation, collaboration across firm boundaries, manufacturing and design.

Prerequisite(s): TIMG 5001 and TIMG 5002.

TIMG 5103 [0.5 credit]

Advanced Topics in Technology Innovation Management

In-depth exploration of an advanced topic in the field of technology innovation management. A different topic is covered each semester and more than one section, with different topics, may be offered in the same semester.

Prerequisite(s): one of TIMG 5004, TIMG 5005, or TIMG 5101.

TIMG 5104 [0.5 credit]

Directed Studies in Technology Innovation Management

The student explores, through extensive literature surveys, specific topics in the areas of technology innovation management. The objective is to enable study on a specific topic to acquire a suitable background to initiate and complete thesis work.

Precludes additional credit for TTMG 5104 (no longer offered). any other directed studies.

TIMG 5105 [0.5 credit]

Designing Innovation Communities

This course helps entrepreneurs and product managers understand the role of communities in innovation (eg. peer production and crowdsourcing). It provides them with tools for designing communities, and guidelines for selecting the technology for supporting a community.

TIMG 5106 [0.5 credit]**Open Source Business**

The management of open source businesses. Topics may include company participation in open source projects, capturing value from open source projects, creating and managing open source ecosystems, open-source development, role of architecture in open source projects.

TIMG 5201 [0.5 credit]**Technology and Wealth**

Tools, models, approaches, theories and frameworks used to deploy technology to create and appropriate wealth.

TIMG 5301 [0.5 credit]**Applied Analytics for Technology Innovation Management**

Application of advanced business analytics in the domain of technology innovation management and technology entrepreneurship. Topics include supervised and unsupervised machine learning, anticipatory thinking, and anomaly detection, to inform managerial judgement and support strategic and operating decisions faced by managers and entrepreneurs.

Includes: Experiential Learning Activity

Prerequisite(s): TIMG 5001.

TIMG 5303 [0.5 credit]**Machine Learning for Technology Entrepreneurship Problem-Solving**

Application of machine learning tools to co-create solutions to entrepreneurial problems, with an emphasis on unstructured text analytics. Topics include machine learning tools, application of topic modeling and text analytics, generation of practical competitive insights for managers, and analysis of publicly-available sources including websites.

Includes: Experiential Learning Activity

Prerequisite(s): TIMG 5002.

TIMG 5901 [1.0 credit]**M.Eng. Project**

Includes: Experiential Learning Activity

Precludes additional credit for TTMG 5901 (no longer offered).

TIMG 5905 [1.0 credit]**M.Ent. Project**

Includes: Experiential Learning Activity

TIMG 5907 [1.0 credit]**M.A.B.A. Project**

Master of Applied Business Analytics Project.

Includes: Experiential Learning Activity

TIMG 5909 [2.0 credits]**M.A.Sc. Thesis**

Includes: Experiential Learning Activity

Precludes additional credit for TTMG 5909 (no longer offered).

Women's and Gender Studies (WGST)

Women's and Gender Studies (WGST) Courses**WGST 5000 [0.5 credit]****Issues for Feminist Scholarship**

Selected issues based on the research expertise of the Instructor, designed to provide students with a broad introduction to the diversity of women's experiences within that issue. Critical issues related to race, class, gender and ability.

WGST 5001 [0.5 credit]**Research Seminar in Women's and Gender Studies**

An examination of the Instructor's research focus (topics will vary from year-to-year) with respect to issues of feminist methodologies and epistemology related to developing and conducting feminist or women-centred research. The focus is interdisciplinary.

WGST 5003 [0.5 credit]**Traversing Feminisms**

Interdisciplinary overview of key historical concepts in Women's and Gender Studies in the areas of theory, epistemology, and research design. Topics will vary from year to year. The course provides additional background for students entering Women's and Gender Studies from other disciplines.

Prerequisite(s): permission of the Institute.

Also offered at the undergraduate level, with different requirements, as WGST 4003, for which additional credit is precluded.

WGST 5102 [0.5 credit]**Queer Theory**

A critical approach to gender and sexuality by engaging in key debates and texts in the field of queer theory and studies.

Includes: Experiential Learning Activity

Prerequisite(s): Graduate student standing and permission of the institute.

Also offered at the undergraduate level, with different requirements, as SXST 4102, for which additional credit is precluded.

WGST 5900 [0.5 credit]**Program Seminar**

MA candidates are required to take part in a seminar in which faculty members and students discuss new work in the field, analyze current issues in Women's and Gender Studies, and pursue topics of professional development. Students will prepare their thesis or research paper.

Includes: Experiential Learning Activity

Precludes additional credit for WGST 5905 (no longer offered).

Prerequisite(s): Permission of the Institute.

WGST 5901 [0.5 credit]**Advanced Topics in Women's and Gender Studies I**

The applications of gender to different fields of knowledge, cultural expression, and institutional regulation. Gender will be interrogated as it intersects with race, class, ethnicity, age, ability and cross-cultural perspectives.

WGST 5902 [0.5 credit]**Advanced Topics in Women's and Gender Studies II**

Selected topics may include: gender, power and social inequalities; women's writing; gender history; gender, sexuality and music embodiment; race, gender and imperialism; gender, criminology and criminal justice; queer theory; transnational feminisms.

WGST 5906 [0.5 credit]**Feminist Theory**

An analysis of contemporary feminist theoretical debates that provides students with competence in the application of a range of theoretical models, and an appreciation of their specific historical contexts and development.

WGST 5907 [0.5 credit]**Researching Women's and Gender Issues**

Consideration of a range of research methodologies and approaches relevant to women's and gender studies. In particular, students will examine the impact of gender studies on epistemological and methodological issues in a variety of academic disciplines.

WGST 5908 [1.0 credit]**Research Essay**

An examination of an approved topic in an area of specialization of either the Institute faculty or associated faculty from across the University. Students will have a supervisor and a second reader.

Includes: Experiential Learning Activity

WGST 5909 [2.0 credits]**M.A. Thesis**

A substantial investigation of a topic in Women's and Gender Studies that will be determined in consultation with the Institute. Students will have a primary supervisor selected from within the Institute or from associated Faculty across the University. The candidate will be examined orally on.

Includes: Experiential Learning Activity

WGST 5910 [0.5 credit]**Directed Studies**

Directed study on selected topics may be arranged with a faculty member or visiting scholar with the permission of the Institute. Students cannot accumulate more than 1.0 credit in directed studies towards their degree requirements.

WGST 5911 [0.5 credit]**Directed Studies**

Directed study on selected topics may be arranged with a faculty member or visiting scholar with the permission of the Institute. Students cannot accumulate more than 1.0 credit in directed studies towards their degree requirements.

WGST 5920 [1.0 credit]**Internship in Women's and Gender Studies**

Experience in applied feminisms through a combination of classroom seminars and internship. Each project will be negotiated individually as a contract between the student, instructor and institutional partner. Students must complete both the in-class and the internship portion of the course.

Includes: Experiential Learning Activity

Prerequisite(s): Enrollment in the M.A. Women's and Gender Studies program.

Also offered at the undergraduate level, with different requirements, as WGST 4801, for which additional credit is precluded.

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