

# Engineering Core (ECOR)

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## Engineering Core (ECOR) Courses

### ECOR 1010 [0.5 credit]

#### Introduction to Engineering

Technology, society and the environment. Graphical design communication: sketching, graphical projections; CAD. Managing data: statistical methods; spreadsheets. Design analysis: matrix programming software; symbolic computer algebra systems. Design process: proposals; reports; presentations; reporting software.

Includes: Experiential Learning Activity

Precludes additional credit for ECOR 1000 (no longer offered), ECOR 1047, ECOR 1054.

Lectures four hours per week, laboratories two hours per week.

### ECOR 1041 [0.25 credit]

#### Computation and Programming

Software development as an engineering discipline, using a modern programming language. Language syntax and semantics. Tracing and visualizing program execution.

Program style and documentation. Testing and debugging tools and techniques. Binary number system to represent data in a computer.

Precludes additional credit for COMP 1005, COMP 1405, ECOR 1051, ECOR 1606, SYSC 1005.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

### ECOR 1042 [0.25 credit]

#### Data Management

Software development using container data types (sequences, sets, maps) for data management. Modules. Data files. Incremental, iterative development of programs. Introduction to designing and implementing numerical algorithms.

Precludes additional credit for COMP 1005, COMP 1405, ECOR 1051, ECOR 1606, SYSC 1005.

Prerequisite(s): ECOR 1041 with a minimum grade of C- and MATH 1004 (may be taken concurrently). This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

### ECOR 1043 [0.25 credit]

#### Circuits

Electrical Quantities (Voltage, Charge, Current, Power). Conservation of charge and energy. Mathematical models of simple devices. Elementary circuit theory for passive elements. Thévenin's and superposition theorem. Signal filtering and amplification. Time and frequency domain. Circuit design and simulation.

Precludes additional credit for ECOR 1052.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

### ECOR 1044 [0.25 credit]

#### Mechatronics

Mechatronics applications. Analog to digital signal conversion. Control systems and PID controllers. Input devices, including sensors. Data collection and processing. Output devices, including displays, actuators, and motors. Project design and economics. Environmental Impact of mechatronics engineering. System failures and failsafe design.

Precludes additional credit for ECOR 1052.

Prerequisite(s): ECOR 1041 with a minimum grade of C- and ECOR 1043 with a minimum grade of C-. This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

### ECOR 1045 [0.25 credit]

#### Statics

Cartesian vector representation of forces. Components of forces. Particle equilibrium and free body diagrams. Moments and cross product. Centre of gravity and centroids. Rigid body equilibrium.

Precludes additional credit for ECOR 1053, ECOR 1101.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

### ECOR 1046 [0.25 credit]

#### Mechanics

2D truss analysis (method of joints/sections). Normal stress/strain and shear stress/strain. 2D frames and machines. Internal loads - normal, shear and moment at a point. Shear and moment diagrams.

Precludes additional credit for ECOR 1053.

Prerequisite(s): ECOR 1045 with a minimum grade of C-. This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

**ECOR 1047 [0.25 credit]****Visual Communication**

Graphs and sketches, flow charts, block diagrams. Visual presentation, projection and perspectives of objects. 3D sketching. Free hand drawing. Reading engineering drawings and schematics. Introduction to scaling, dimensioning and tolerancing. Introduction to CAD.

Precludes additional credit for ECOR 1054, ECOR 1010.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

**ECOR 1048 [0.25 credit]****Dynamics**

Kinematics and kinetics of a particle. Principle of work and energy. Conservation of energy, conservative forces, potential energy. Principles of impulse and momentum, conservation of momentum for a system of particles.

Precludes additional credit for ECOR 1054, ECOR 1101.

Prerequisite(s): ECOR 1045 with a minimum grade of C-. This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

**ECOR 1051 [0.5 credit]****Fundamentals of Engineering I**

Software development as an engineering discipline, using a modern programming language. Tracing and visualization of program execution. Testing and debugging. Data management: digital representation of numbers; numerical algorithms; storing data in files; container data types: sequences, sets, maps.

Includes: Experiential Learning Activity

Precludes additional credit for COMP 1005, COMP 1405, ECOR 1041, ECOR 1042, ECOR 1606, SYSC 1005.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

**ECOR 1052 [0.5 credit]****Fundamentals of Engineering II**

Electrical Quantities. Conservation of mass and energy. Mathematical models of simple devices. Elementary circuit theory for passive elements. Signal filtering and amplification. Time and frequency domain. Circuit design and simulation. Digital and analog signals. Mechatronics applications. Output devices. System failures and failsafe design.

Includes: Experiential Learning Activity

Precludes additional credit for ECOR 1043, ECOR 1044.

Prerequisite(s): ECOR 1051 (may be taken concurrently).

Lectures three hours per week, laboratories three hours per week.

**ECOR 1053 [0.5 credit]****Fundamentals of Engineering III**

Components of forces. Particle equilibrium and free body diagrams. Moments and cross product. Centre of gravity and centroids. Rigid body equilibrium. 2D Truss analysis (method of joints/sections). Normal stress/strain and Shear stress/strain. 2D frames and machines.

Includes: Experiential Learning Activity

Precludes additional credit for ECOR 1045, ECOR 1046, ECOR 1101.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures three hours per week, laboratories three hours per week.

**ECOR 1054 [0.5 credit]****Fundamentals of Engineering IV**

Engineering drawings and schematics. Graphs and sketches, flow charts, block diagrams. Computer-assisted design. Kinematics/Kinetics of a particle. Principles of work and energy. The Engineering Profession and Act.

Organization and time management. Project management. Business, entrepreneurship and intellectual property.

Includes: Experiential Learning Activity

Precludes additional credit for ECOR 1010, ECOR 1047, ECOR 1048.

Prerequisite(s): ECOR 1053 (may be taken concurrently).

Lectures three hours per week, laboratories three hours per week.

**ECOR 1055 [0.0 credit]****Introduction to Engineering Disciplines I**

Overview of professional activities oriented to the student's discipline of study: Architectural Conservation and Sustainability. Civil and Environmental. Aerospace and Mechanical. Electrical. Engineering Physics.

Computer Systems, Communications and Software.

Biomedical (Electrical and Mechanical). Sustainable and Renewable Energy. Graded SAT/UNS.

Prerequisite(s): This course may not be taken concurrently with ESLA 1300 or ESLA 1500.

Lectures 1.5 hours per week.

**ECOR 1056 [0.0 credit]****Introduction to Engineering Disciplines II**

Selected lectures designed to provide students with exposure to the breadth of Engineering disciplines.

Graded SAT/UNS.

Online course.

**ECOR 1057 [0.0 credit]****Engineering Profession**

Professional Engineers Act. Engineering documentation. History of the profession. Engineering practice: system life cycle, practice within the discipline, designing with others. Health and safety. Engineering Ethics, Equity and Diversity. Introduction to engineering law : Business, Entrepreneurship and Intellectual Property. Graded SAT/ UNS.

Online course

**ECOR 1101 [0.5 credit]****Mechanics I**

Introduction to mechanics. Scalars and vectors. Concurrent forces: resultant and components. Statics of particles. Moments and couples. Force system resultants. Rigid body equilibrium. Frames and machines. Internal forces. Kinematics and kinetics of particles. Conservation theorems: work-energy; impulse-momentum. Centroids and centres of gravity.

Includes: Experiential Learning Activity

Precludes additional credit for ECOR 1045, ECOR 1048, ECOR 1053.

Prerequisite(s): MATH 1004 and MATH 1104.

Lectures three hours a week, tutorials and problem analysis three hours a week.

**ECOR 1606 [0.5 credit]****Problem Solving and Computers**

Introduction to engineering problem solving. Defining and modeling problems, designing algorithmic solutions, using procedural programming, selection and iteration constructs, functions, arrays, converting algorithms to a program, testing and debugging. Program style, documentation, reliability. Applications to engineering problems; may include numerical methods, sorting and searching.

Includes: Experiential Learning Activity

Precludes additional credit for SYSC 1005, SYSC 1100 (no longer offered), SYSC 1102 (no longer offered), COMP 1005, COMP 1405, ECOR 1041, ECOR 1042, ECOR 1051.

Lectures three hours a week, laboratory three hours a week.

**ECOR 2050 [0.5 credit]****Design and Analysis of Engineering Experiments**

Statistics and the design of engineering experiments. Basic exploratory data analysis. Central limit theorem. Hypothesis testing: t-test, chi-square test, type-I and type-II errors, multiple-comparison problem. Statistical bias. Design of experiments: randomization, blocking and replication, randomized blocking designs, factorial design. Statistical software packages.

Includes: Experiential Learning Activity

Prerequisite(s): 2nd Year Status in Engineering.

Lectures three hours a week, problem analysis and laboratory three hours a week.

**ECOR 2606 [0.5 credit]****Numerical Methods**

Numerical algorithms and tools for engineering and problem solving. Sources of error and error propagation, solution of systems of linear equations, curve fitting, polynomial interpolation and splines, numerical differentiation and integration, root finding, solution of differential equations. Software tools.

Includes: Experiential Learning Activity

Precludes additional credit for SYSC 2606 (no longer offered).

Prerequisite(s): MATH 1005 and (ECOR 1606 or SYSC 1005) and (ECOR 1010 or ELEC 1908).

Lectures three hours a week, laboratory one hour a week.

**ECOR 2995 [0.0 credit]****Engineering Portfolio**

Students will be asked to reflect on their skills, strengths and weaknesses as preparation for the professional practice course. Engineering students must submit samples of their writing and communications (including, for example, laboratory reports and professional memos).

Online

**ECOR 3800 [0.5 credit]****Engineering Economics**

Introduction to engineering economics; cash flow calculations; methods of comparison of alternatives; structural analysis; replacement analysis; public projects; depreciation and income tax; effects of inflation; sensitivity analysis; break-even analysis; decision making under risk and uncertainty.

Prerequisite(s): third-year status in Engineering or (second-year status in Engineering and permission of the department).

Lectures three hours a week.

**ECOR 4907 [1.0 credit]****Multidisciplinary Engineering Project**

Student teams develop professional-level experience by applying, honing, integrating, and extending previously acquired knowledge in an approved major multidisciplinary engineering design project. Lectures devoted to discussing project-related issues and student presentations. A project proposal, interim report, oral presentations, and comprehensive final report are required.

Includes: Experiential Learning Activity

Precludes additional credit for ACSE 4918, CIVE 4918, ELEC 4907, ELEC 4908, ENVE 4918, MAAE 4907, SREE 4907, SYSC 4907, SYSC 4917, SYSC 4927, SYSC 4937.

Prerequisite(s): (ECOR 3800 or SYSC 4106), fourth-year status in Engineering and Permission of the faculty.

**ECOR 4995 [0.5 credit]****Professional Practice**

Presentations by faculty and external lecturers on the Professional Engineers Act, professional ethics and responsibilities, practice within the discipline and its relationship with other disciplines and to society, health and safety, environmental stewardship, principles and practice of sustainable development. Communication skills are emphasized.

Precludes additional credit for MAAE 4905, CIVE 4905, SYSC 3905 or ELEC 3905 (all no longer offered).

Prerequisite(s): ECOR 2995 and fourth-year status in Engineering.

Lectures three hours a week.