

ENGINEERING (EGR)

EGR-100 INTRO TO ENGINEERING (1 Credit)

An introduction to the different engineering fields and the industries that these fields support. Study techniques for students to be successful in the engineering program will be presented. Students will have the opportunity to work in groups, identify problems, brainstorm ideas, prototype solutions, and communicate their results. (lecture only)

Prerequisite: None

EGR-111 INTRO TO ENGINEERING GRAPHICS (1 Credit)

This course introduces students to the principles of drafting used by engineers through a hands-on learning environment. Topics of instruction include drawing interpretation, visualization (including pictorials and orthographic drawings), geometric construction, sectioning, working drawings, and mechanical drawings (including but not limited to sectioning and working drawings). (lab only)

Prerequisite: None

EGR-112 INTRO PROGRAMMING USING C++ (2 Credits)

An introduction to programming using the C++ programming language. Topics include structured imperative program design, data types, control structures, strings, lists, program implementation, testing and debugging.

Prerequisite: Take MAT-122 previously or concurrently

EGR-113 INTRO TO CAD/CAM (1 Credit)

This course is to introduce computer-aided design (CAD) and computer-aided manufacturing (CAM) theory and applications. The course topics include CAD/CAM systems, geometric modeling, tool path generation, integration of CAD/CAM with the production machine, NC machining, and additive manufacturing. (lecture and discussion)

Prerequisite: EGR-111

EGR-185 FIRST YEAR ENGINEERING DESIGN (2 Credits)

A cornerstone course in the principles and practice of multi-disciplinary engineering analysis and design. Students will work as part of a team to design and construct a working physical prototype of an electro-mechanical system. Students will learn to communicate their design ideas effectively. Lab fee applied.

Prerequisite: EGR-112 (C or higher)

EGR-209 MECHANICS AND MACHINES (4 Credits)

Lecture only. Forces and momentum, equilibrium, Free Body Diagrams. Introduction of machine elements: gears, belts, chains, shafts. Stress/strain: normal and shear stresses due to bending and torsion. Design and analysis of welds, fasteners: bolts and rivets in engineering structures. Principles of mechanical design: synthesis and selection methods of basic off-the-shelf machine components.

Prerequisite: Take MAT-132 and PHY-211, PHY-221

EGR-214 CIRCUIT ANALYSIS I (3 Credits)

Topics include Ohm's Law, Kirchhoff's Laws, node voltage and mesh current analysis, Thevenin's and Norton's Theorems, superposition, basic operation of diodes, transistors, operational amplifiers and transformers, capacitance, inductance, and time-domain analysis of first order circuits.

Prerequisite: PHY-222 (C or higher)

EGR-215 CIRCUITS LAB (1 Credit)

Laboratory activities associated with linear circuit analysis. Including the use of power supplies, multimeters, function generators, oscilloscopes, and electronic circuit CAD/CAM software packages. Lab fee applied.

Prerequisite: PHY-222 (C or higher), Take EGR-214 concurrently

EGR-220 MEASUREMENT & DATA ANALYSIS (1 Credit)

Measurement and data analysis lab that complements MAT-251.

This course uses hands-on engineering tests and experiments to build understanding of applied statistical analysis. The use of various measurement and data-acquisition tools and data analysis techniques are introduced. Technical writing in the form of lab reports is introduced and emphasized. Lab fee applied.

Prerequisite: Take MAT-251 concurrently, MAT-131, ENG-212

EGR-226 INTRODUCTION TO DIGITAL SYSTEMS (3 Credits)

An introduction to the analysis and design of digital systems. Topics include boolean algebra, combinational and sequential logic circuits, models of hardware and software at various levels of abstraction, computer organization and architecture, machine language, and microcontroller architecture, programming, and interfaces.

Prerequisite: EGR-112 (C or higher), PHY-222 (C or higher)

EGR-227 DIGITAL SYSTEMS LAB (1 Credit)

Laboratory activities to design, build, and test various digital systems. Projects include combinational and sequential logic circuits, finite state machines, programming of microcontrollers, and microcontroller interfaces. Lab fee applied.

Prerequisite: Take EGR-226 concurrently

EGR-250 MATERIALS SCIENCE & ENGINEERING (3 Credits)

An introduction to the field of Materials Engineering will begin with an investigation of the contributions of atomic and crystalline structures on the physical properties of materials. A thorough review of metals, polymers, ceramics and composites will then be conducted. Key concepts will be explored and highlighted through a series of weekly lab exercises. The successful completion of this course shall provide Engineers with the necessary understanding of materials to select the most appropriate material for specific design applications. The final area of study shall assess the economic and environmental impacts of material selection in a complex world.

Prerequisite: Take CHM-111, PHY-222

EGR-251 MATERIALS LAB (1 Credit)

The laboratory sessions will acquaint students with modern experimental techniques and devices used in: (i) the characterization of the microstructures and properties of engineering materials, and (ii) laboratory simulation of industrial manufacturing processes. Application of the scientific method and technical report writing will be emphasized. Lab fee applied.

Prerequisite: Take CHM-111 and PHY-222 (C or higher), Take EGR-250 concurrently

EGR-309 MACHINE DESIGN I (3 Credits)

Topics include shear and bending stresses in beams, beam deflections, statically indeterminate beams, planar combined loading, triaxial stress and strain transformations, static failure theories, fatigue failure theories, surface failures, belt and chain drives, clutches and brakes, finite element analysis for planar loading, and introduction to strain gauges and rosettes.

Prerequisite: Take EGR-209

EGR-310 MACHINE DESIGN I LAB (1 Credit)

Introduction to finite element analysis for planar loading, strain gauges and rosettes, and experimental determination of state of stress in a body. Lab fee applied.

Prerequisite: Take EGR-209 (C or higher), Take EGR-309 concurrently

EGR-312 DYNAMICS (3 Credits)

Study of motion and the relationship between force, mass, and acceleration for particles and rigid bodies. Work-energy and impulse-momentum concepts.

Prerequisite: EGR-209 (C or higher), MAT-235 (C or higher)

EGR-330 PRODUCT DVLPT/PROJECT MGMT (4 Credits)

This course will examine the tactics and strategies needed to successfully complete engineering projects. Students will exercise their project management skills while engaging in a semester-long product development scenario utilizing the engineering design process. Design topics will include: gathering customer requirements, establishing specifications, generating alternative concepts, estimating feasibility, concept selection, embodiment design, design refinement, prototyping, testing and service model definition.

Prerequisite: None

EGR-345 DYNAMIC SYSTEM MODELING & CONTROL (4 Credits)

An introduction to mathematical modeling of mechanical, thermal, fluid, and electrical systems. Topics include equation formulation, Laplace transform methods, transfer functions, system response and stability, Fourier methods, frequency response, feedback control, control actions, block diagrams, state variable formulation, and computer simulation. Emphasis on mechanical systems.

Prerequisite: EGR-214, MAT-235

EGR-350 VIBRATION (3 Credits)

Study of mechanical vibration of structures and engineering components. Free and forced vibration of single, two, and multi-degree of freedom systems. Modal analysis and mode summation. Elements of analytical dynamics. Approximate numerical methods. Random vibration. Vibration measurement, isolation, and control.

Prerequisite: Take MAT-235 (C or higher), PHY-222 (C or higher)

EGR-360 THERMODYNAMICS (3 Credits)

Lecture only. Basic concepts of thermodynamics and an introduction to heat transfer. Properties of pure substances, equation of state, work, heat, first and second laws of thermodynamics, closed systems and control volume analysis, irreversibility and availability, refrigeration and power cycles, thermodynamic relations, introduction to conduction, convection, radiation, heat transfer, and heat exchange design.

Prerequisite: PHY-222 (C or higher), MAT-235 (C or higher)

EGR-365 FLUIDS (3 Credits)

This course provides students with a foundation in fluids, specifically, fluid statics, control volume analysis, continuity, momentum, energy, Bernoulli equation, dimensional analysis and similitude, laminar and turbulent flows, boundary layers, differential analysis, external flow, lift and drag, internal flow, pump selection, introduction to turbomachinery, and open channel flow.

Prerequisite: EGR-360

EGR-367 MANUFACTURING PROCESSES (3 Credits)

The fundamentals of manufacturing processes and the machinery of production. The forming of metals, plastics, ceramics, and composites with an emphasis on the economics of engineering designs and designs that can be practically manufactured. Computer aided manufacturing and quality control processes.

Prerequisite: EGR-250

EGR-368 MANUFACTURING PROCESSES LAB (1 Credit)

The laboratory experiments and exercises will involve careful investigation of the effects of the interactions between design, processing conditions, and materials on the quality and performance of fabricated products. Application of the scientific method in investigations, the principles of design of experiments (DOE), and statistics are reinforced. Lab fee applied.

Prerequisite: Take EGR-367 concurrently

EGR-380 INTERNSHIP (3 Credits)

This course provides an opportunity to work in a supervised engineering setting. The experience must include opportunities to apply the theories and concepts learned in the discipline of engineering.

Prerequisite: Take EGR-100, Junior or Senior status required

EGR-409 MACHINE DESIGN 2 (3 Credits)

The study of mechanical design. Topics include design of screws, clutches, brakes, belts, gears, journal bearings, roller bearings, and planetary gear trains.

Prerequisite: EGR-309

EGR-437 ENVIRONMENTAL ENGINEERING (4 Credits)

An analysis of the impact of human development (industrial, commercial and residential) on air, land, and water resources. Special emphasis is placed on environmental engineering practices related to environmental laws and regulations. Additional topics include the development of environmental engineering plans and designs. Lab fees applied.

Prerequisite: ECO-241, EGR-360

EGR-440 PRODUCTION MODELS (3 Credits)

An introduction to analytic and simulation models, as well as their application to current production strategies, particularly lean manufacturing. Emphasis on workstations, inventories, flow lines, Kanban and CONWIP, and cellular manufacturing. Computer-based solution techniques, case studies, and case problems are employed.

Prerequisite: EGR-113 (C or higher)

EGR-468 HEAT TRANSFER (3 Credits)

This course provides students with an in-depth study of heat transfer. The mechanisms by which heat is transferred in different media: conduction, convection, and radiation. One - and two-dimensional steady state conduction, transient conduction, finite differences, methods in conduction, forced and free convections, heat exchangers, radiation processing and properties, radiation exchange between surfaces.

Prerequisite: EGR-360 (previously or concurrently)

EGR-485 CAPSTONE PROJ & ETHICS I (3 Credits)

An independent investigation of theoretical or experimental design problems in engineering. The nature and scope of the project are determined by the student in consultation with the instructor and depend upon the facilities available. Normally this project is carried out during the entire senior year, with one-hour of credit during the first semester and two hours of credit during the second semester. A written technical report is required. All seniors meet together each week to discuss their projects with each other and their supervisor. Laboratory. Lab fee applied.

Prerequisite: Senior status required

EGR-486 CAPSTONE PROJ & ETHICS II (3 Credits)

Continuation of student's work in EGR 485. Both an oral report and a final written technical report are required. Lab fee applied.

Prerequisite: EGR-485, Senior status required

EGR-490 INDEPENDENT STUDY (1-3 Credits)

Prerequisite: None