

Engineering Science and Engineering Technology (ENR)

Courses

ENR-103. Basic Engineering Graphics I. 1 Credit.

LAB 45 hrs

Students learn fundamentals of engineering drawing through freehand sketching. Course includes developing orthographic views including auxiliary views, dimensioning, sectioning, tolerancing, threads, fasteners, springs and assembly drawings. Course includes creation of pictorial drawings.

ENR-117. Computer-Aided Drafting I. 2 Credits.

LECT 15 hrs LAB 60 hrs

This course is an introduction to the concepts and operation of engineering drawing preparation using CAD (computer-aided drafting). The emphasis is on how CAD can reduce drawing time and improve accuracy. Students learn to use the AutoCAD software program to prepare drawings.

Additional Fees: Course fee applies.

ENR-118. Computer-Aided Drafting II. 2 Credits.

LECT 15 hrs LAB 60 hrs

This course is a continuation and enhancement of Computer-Aided Drafting I. Topics include prototype drawings, blocks, attributes, x-reference, grips, paper space and development of 3-dimensional solid modeling.

Prerequisites: ENR-117 or ENR-121

Additional Fees: Course fee applies.

ENR-119. Technical Computer Applications. 1 Credit.

LAB 45 hrs

This course provides an introduction to the various technical tools available to help solve problems in the field of engineering technology. This is a hands-on laboratory course designed to provide students with experience in using scientific calculators, Windows Operating System, Microsoft Office and Internet search tools. Special emphasis is placed on the development of technical reports using Microsoft Office's EXCEL and Word programs.

Prerequisites: MAT-007 or equivalent

Additional Fees: Course fee applies.

ENR-120. Technical Computer Programming. 2 Credits.

LECT 30 hrs LAB 30 hrs

This course is an introduction to computer programming with application to engineering technology. Microcomputers are used to develop application programs in a programming language.

Prerequisites: MAT-007 or equivalent

Additional Fees: Course fee applies.

ENR-121. Engineering Graphics. 2 Credits.

LECT 15 hrs LAB 45 hrs

This course is an introduction to computer aided design software and hardware. Covered are geometric constructions, multiview orthographic projection, dimensioning, sectioning, auxiliary view and axonometric projection and principles of descriptive geometry. A brief introduction to solid modeling is also included. This course is intended for Engineering Science students; Engineering Technology students take ENR-117.

Prerequisites: MAT-123

Additional Fees: Course fee applies.

ENR-123. Introduction to Engineering. 0 Credits.

LECT 15 hrs

This course provides the entering engineering student with an overview of the engineering profession and the design process. Topics discussed include the engineering course of study, academic advisement and transfer processes, types of engineering disciplines, problem-solving techniques, typical software tools, reporting techniques, and study skills.

ENR-124. Instrumentation and Measurements. 2 Credits.

LECT 15 hrs LAB 45 hrs

This course is an introductory study in the concepts involving physical measurements utilizing hands-on electrical and mechanical measurement applications. Use of basic instruments and transducers, accuracy and precision, units and standards of measurements, accounting and presentation of errors in measurements.

Prerequisites: MAT-007 or equivalent

Corequisites: ENR-119

Additional Fees: Course fee applies.

ENR-125. Computer Programming for Engineers. 3 Credits.

LECT 30 hrs LAB 30 hrs

A course in structured and object-oriented programming, emphasizing engineering applications and numerical methods in assignments. Program assignments are coded and are implemented on personal computers.

Prerequisites: MAT-123

Additional Fees: Course fee applies.

ENR-126. Computer Aided Design and Applications. 2 Credits.

LECT 15 hrs LAB 60 hrs

An introductory course in computer aided design using parametric solid modeling software. Creation of solid models of parts, generation of orthographic views, sectional views and auxiliary views are covered. Dimensioning and tolerancing of parts is emphasized along with development of appropriate files to make the parts for product development using rapid prototyping (3-D printing) and to manufacture parts using computerized numerical control machines.

Prerequisites: ENR-117

Additional Fees: Course fee applies.

ENR-130. Introduction to Engineering. 1 Credit.

LECT 15 hrs

This course provides the entering engineering student with an overview of the engineering profession and the design process. In addition this course is designed to assist the first year engineering science student in their adjustment and success with the college experience. Topics discussed include the engineering course of study, academic advisement and transfer process, types of engineering disciplines, solving techniques, academic expectations, time management and study skills.

ENR-132. Introduction to Experimentation and Design. 3 Credits.

LECT 30 hrs LAB 30 hrs

A required course in the Engineering Technology programs that introduces students to the field of engineering. Students will be introduced to experimental techniques, data collection and representation, as well as the proper method for documenting experimental results. The course will also cover topics that will help students succeed in their field of study and in their college experience.

Corequisites: MAT-016 or placement into MAT 110, or beyond

Additional Fees: Course fee applies.

ENR-134. Robotics and Automation I. 3 Credits.

LECT 30 hrs LAB 30 hrs

This course provides an overview of control concepts, automation systems, and the application of robotic systems in modern industrial applications. Students explore coordinate systems, PLCs, types of automation, safety, equipment components, and various programming methods. Students are exposed to robotics-related applications and career options in the manufacturing, service, and medical industries.

Prerequisites: MAT-016 or placement into MAT 110, or beyond

Additional Fees: Course fee applies.

ENR-135. Robotics and Automation II. 3 Credits.

LECT 30 hrs LAB 30 hrs

This course is a continuation of Robotics and Automation I and provides a more in-depth exploration of automation systems, PLC programming using I/O devices, system design, and integration. An in-depth study of applications programming will be covered during the semester. Programming will include different methods of error handling and operator interfacing used in robotic applications.

Prerequisites: ENR-134 and (CMP-128 or CMP-131).

ENR-220. Hydraulics and Fluid Power. 3 Credits.

LECT 30 hrs LAB 30 hrs

This course is an exploration into the relationship between pressure, density and temperature as they relate to hydraulic and pneumatic systems. Topics include hydraulic pumps, motors and air compressors. The course emphasizes use of engineering standards and specifications for circuit design and component selection. Electrical controls and application to systems are covered. Lab sessions further expand upon lectures by providing students with physical evidence to support theories and ideas acquired in class.

Prerequisites: MAT-110

Additional Fees: Course fee applies.

ENR-222. Mechanics of Solids. 3 Credits.

LECT 45 hrs

Principles of strength of materials are derived for uniaxial stresses and strains, direct shear, torsion bending and combined stresses and column buckling. Also covered are axial force, shear moment and torque in structural members and in statically indeterminate systems. Elementary failure theory of structures and mechanical components is discussed.

Prerequisites: ENR-223.

ENR-223. Engineering Mechanics I (Statics). 3 Credits.

LECT 45 hrs

This course is a vector approach to statics in a plane and in three dimensions, equilibrium of particles and rigid bodies. Equivalent force systems, structural analysis, centroids and moments of inertia. Virtual work and applied engineering problems are incorporated.

Prerequisites: MAT-131 and PHY-130.

ENR-224. Engineering Mechanics II (Dynamics). 3 Credits.

LECT 45 hrs

This course is a calculus-based course in dynamics. Kinematics and kinetics of particles and rigid bodies, Newton's laws, work, energy, impulse and momentum are covered. Practical engineering problems are incorporated.

Prerequisites: ENR-223.

ENR-230. Engineering Strength of Materials. 4 Credits.

LECT 45 hrs LAB 45 hrs

Principles of strength of materials are derived for uniaxial stresses and strains, direct shear, torsion bending, and combined stresses and column buckling. Elementary failure theory of structures and mechanical components is discussed. Laboratory covers a variety of tensile stress-strain, impact and hardness tests, as well as shear stress-strain and the techniques of report writing.

Prerequisites: ENR-223

Additional Fees: Course fee applies.

ENR-232. Materials Science. 3 Credits.

LECT 45 hrs

This course covers the properties and structure of materials: atomic bonding, molecular, crystalline, noncrystalline structures and crystalline imperfections. It also covers metallic phases, equilibrium and nonequilibrium reactions, processing and properties of ferrous and non-ferrous metals, polymers, ceramics and composites. In addition, corrosion phenomenon is discussed.

Prerequisites: CHM-125 and CHM-126 and PHY-130.

ENR-234. Independent Study in Technology. 3 Credits.

LECT 45 hrs

This course is for students in Engineering Technologies. The student selects an area of interest and proposes a plan of study to a sponsoring faculty member who supervises and evaluates the student's progress.

Prerequisites: Permission of department chair.

ENR-235. Engineering Circuit Analysis I. 3 Credits.

LECT 45 hrs

This first course in engineering circuit analysis covers DC circuit analysis including source transformations, mesh, nodal, superposition, Thevenin and Norton theorems, and the maximum power transfer theorem. Dependent as well as independent sources are included. Transient response of RC, RL and RLC circuits is introduced. Steady-state analysis of single and three phase AC systems is studied using phasor diagrams and the network theorems mentioned above. Real, reactive, apparent power and power factors are included. Use of the computer as a problem-solving tool is included in the course.

Prerequisites: MAT-132.**ENR-236. Engineering Circuit Analysis Laboratory I. 1 Credit.**

LAB 45 hrs

This laboratory course includes experiments in DC, AC and transients to accompany the course work in Engineering Circuit Analysis I.

Corequisites: ENR-235**Additional Fees:** Course fee applies.**ENR-237. Engineering Circuit Analysis II. 3 Credits.**

LECT 45 hrs

This is a second course in engineering circuit analysis. Natural and step response of RL, RC and RLC circuits, mutual inductance, ideal transformers, series and parallel resonance are studied. Laplace transform theory is covered and includes step and impulse response in the S-domain. Bode diagrams of simple and quadratic factors are plotted and the computer is used for actual frequency and phase plots. Fourier Series are studied using both trigonometric and exponential forms.

Prerequisites: ENR-235**Corequisites:** MAT-232.**ENR-238. Engineering Circuit Analysis Laboratory II. 1 Credit.**

LAB 45 hrs

This laboratory course includes experiments on transformers, series and parallel resonance, filters and frequency/phase response plots, and two-port hybrid models to accompany the course work in Engineering Circuit Analysis II.

Prerequisites: ENR-236**Corequisites:** ENR-237**Additional Fees:** Course fee applies.**ENR-240. Engineering Technology Project. 3 Credits.**

LECT 30 hrs LAB 45 hrs

This course covers the design of products and processes considering functional requirements, manufacturing feasibility and economy, and the use of technical literature and catalogs. Includes design layout and working drawings and group and individual projects.

Prerequisites: ENR-117 and MEC-110 and MEC-141**Additional Fees:** Course fee applies.**ENR-241. Instrumentation and Control. 3 Credits.**

LECT 30 hrs LAB 45 hrs

This course is an introduction to the study of measuring systems and components, digital and analog signals and their characteristics. Mechanical and electromechanical transducer elements are used to measure pressure, temperature, displacement, velocity and acceleration. Static and dynamic performance of instruments, statistical analysis of experimental data are explored. A brief study of process controllers, programmable logic controllers and final control elements are also explored.

Prerequisites: ELT-201**Additional Fees:** Course fee applies.**ENR-264. Machine Learning. 3 Credits.**

LECT 15 hrs LAB 60 hrs

This course provides a practical understanding and foundational principles of Machine Learning techniques. It offers the concepts, the intuitions, and the tools the students need to implement programs capable of learning from data. A large number of techniques are covered, from supervised learning algorithms, unsupervised learning algorithms to Deep Learning techniques and applications. The main goal of this course is to equip students with the skills to tackle real Machine Learning problems encountered in real life and business and establish a project portfolio.

Prerequisites: MAT-114 AND CMP-131, OR Equivalent AND Department Permission**Additional Fees:** Course fee applies.**ENR-290. Special Topics in Technology. 1 Credit.**

LECT 15 hrs

This course is for students in Engineering Technologies. The student selects an area of interest and proposes a plan of study to a sponsoring faculty member who supervises and evaluates the student's progress when used for independent study. The course is also used to cover either current or future topics of interest in technology. Topics discussed will have relevance to either electronics technology, mechanical technology or both, and may vary each semester.

Prerequisites: Permission of department chair.**ENR-291. Special Topics in Engineering. 3 Credits.**

LECT 45 hrs

This course is an examination of selected topics or issues in engineering. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: Permission of department chair.**ENR-292. Special Topics in Engineering. 3 Credits.**

LECT 45 hrs

This course is an examination of selected topics or issues in engineering. Topics may differ each time the course is offered. Students should consult the department chair for further information.

Prerequisites: Permission of department chair.