ENGINEERING (ENGR)

Courses

ENGR 121 - Introduction to Engineering   **Credit 1**
A presentation of the opportunities of the many engineering specialties, historical and current trends, ethical and societal factors in engineering projects and examples of engineering design problems from professionals and through field trips. **Grade Mode:** A.
Restriction(s): Must be Undergraduate Level.

ENGR 122 - Introduction to Engineering Lab   **Credit 1**
The applications of topics related to engineering design including engineering analysis and presentation, written reports, team-based problem-solving skills, and more. **Lecture/Lab Hours:** Three hours laboratory weekly. **Grade Mode:** A.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 124 - Data Analysis and Presentation   **Credit 1**
This course is intended for Chemistry, Physics and Engineering Department majors or anyone else interested in learning to develop their intuition for problem-solving using formal and informal techniques. Involves the use of MATLAB, Excel and other computer tools for data analysis. **Grade Mode:** A.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 212 - Engineering Economics   **Credits 3**
This course introduces engineering concepts of benefit-cost evaluation, rate of return, time value of money, cash flow analysis, expected value and risk, and choosing the best alternative. Students will also learn the impact of these accounting and finance principles on engineering and manufacturing activities. **Grade Mode:** A.
Restriction(s): Must be Undergraduate Level.

ENGR 311 - Computer Techniques in Science and Engineering   **Credits 3**
Students will learn computational techniques commonly used by both practitioners and academics in the fields of engineering, physics, and chemistry. These techniques include methods for (a) finding roots of equations, (b) solving simultaneous equations using matrix operations, (c) optimization, (d) curve fitting, and (e) numerical integration and differentiation. MATLAB and Excel will be used to implement the above-mentioned algorithms and methods. **Grade Mode:** A.
Prerequisite(s): ENGR 124 or PHSC 124; PHSC 233, PHSC 237; MATH 250 and MATH 334 recommended.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 313 - Statics   **Credits 3**
Statics of particles, rigid bodies in two and three dimensions, centroids and centers of gravity, structures, friction, and inertia. **Lecture/Lab Hours:** Three hours lecture weekly. **Note(s):** Primarily for Engineering majors. **Grade Mode:** A.
Prerequisite(s): PHSC 132, PHSC 134.
Restriction(s): Must be Undergraduate Level.

ENGR 314 - Mechanics of Materials   **Credits 3**
Analysis of stress, strain and deflection of mechanical elements due to tension. Shear, bending or torsion, combined stresses, elastic stability and energy methods. **Note(s):** Primarily for Engineering majors. **Grade Mode:** A.
Prerequisite(s): ENGR 313 or PHSC 313.
Restriction(s): Must be Undergraduate Level.

ENGR 316 - Dynamics   **Credits 3**
The concepts of force, mass, and acceleration, of work and energy, and of impulse and momentum as applied to problems involving the motion of particles and rigid bodies in two and three dimensions. **Note(s):** Primarily for Engineering majors. **Grade Mode:** A.
Prerequisite(s): ENGR 313 or PHSC 313.
Restriction(s): Must be Undergraduate Level.

ENGR 321 - Circuits and Instrumentation I   **Credits 5**
Introduction to circuit elements, network theorems, response, semiconductor devices, integrated circuits, and the operation and design of analog DC/AC circuits. Also introduces the fundamentals of Boolean logic and digital design. Laboratory work involves extensive construction and analysis of circuits, as well as introduction of soldering and assembly techniques. **Lecture/Lab Hours:** Three hours lecture; six hours laboratory, weekly. **Grade Mode:** A.
Prerequisite(s): PHSC 233, PHSC 237.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 322 - Circuits and Instrumentation II   **Credits 3**
This course is an introduction to the fundamental concepts of microcontrollers and embedded systems. Concepts include information representations, embedded C language constructs, and fundamental circuit analysis. Specific embedded topics will include digital I/O, serial I/O protocols, analog-to-digital conversion, sensor and actuator interfacing, and interrupt mechanisms. A lecture/lab course format will be employed to provide hands-on experience and active learning techniques. **Lecture/Lab Hours:** Two hours lecture; three hours laboratory, weekly. **Grade Mode:** A.
Prerequisite(s): CSCI 105, PHSC 233, PHSC 237; PHSC 321 or ENGR 321 recommended.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 331 - Thermodynamics   **Credits 3**
Introduction to energy, heat, work, entropy, temperature and states of matter. The first, second and third laws of thermodynamics with an emphasis on applications. **Grade Mode:** A.
Prerequisite(s): PHSC 132, PHSC 134.
Restriction(s): Must be Undergraduate Level.

ENGR 332 - Fluid Mechanics   **Credits 3**
Introduction to fluid properties: density, viscosity, surface tension; fluid statics: manometry, buoyancy, forces of submerged surfaces; elementary fluid dynamics: the Bernoulli equation; control volume analysis: mass, momentum, and energy conservation; differential fluid flow analysis: mass conservation and Navier-Stokes equation, Laminar and turbulent flow in pipes, dimensional analysis, and similitude. **Grade Mode:** A.
Prerequisite(s): ENGR 313 or PHSC 313; MATH 250.
Restriction(s): Must be Undergraduate Level.

ENGR 360 - Mechatronics   **Credits 3**
Project and laboratory-based introduction to designing mechatronic systems. It integrates the mechanical and electrical engineering disciplines. Topics covered in the course include electric motor types and other actuators, linkages and mechanisms, low-level interfacing of software with hardware, real-time computation tasks, analog interfacing and power amplifiers, measurement and sensing, sensors and transducers, and control of mechatronic systems. **Lecture/Lab Hours:** Two hours lecture; three hours laboratory, weekly. **Grade Mode:** A.
Prerequisite(s): PHSC 233, PHSC 237.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 370 - Computer Aided Engineering Design   **Credits 3**
This course prepares engineering students with practical skills in using industrial standard Mechanical CAD (MCAD) and Electrical CAD (ECAD) software tools. Students will learn to use SolidWorks for 3D mechanical modeling and design, and use Altium Designer to create schematic and Printed Circuit Board (PCB) layout. **Lecture/Lab Hours:** Two hours lecture, three hours laboratory. **Grade Mode:** A.
Prerequisite(s): ENGR 360.
Restriction(s): Must be Undergraduate Level.
Course Fee: $130.

ENGR 465 - Special Topics in Engineering   **Credits 1-4**
Various special topics related to interdisciplinary engineering design, research, and development. **Note(s):** May be taken multiple times for credit with different content; course may have a lecture and lab component (for example, 2 credit lecture; 1 credit lab). **Grade Mode:** A.
Restriction(s): Must be Junior Class or Senior Class; and Undergraduate Level.
Repeat Limit (after first attempt): 10.
Additional Fee(s): May involve lab fees of up to $185.

ENGR 470 - Senior Design Capstone   **Credits 3**
Preparation course of a senior-level capstone project. Application of design principles to a project that involves designing, building, and testing. Projects are team-based and require a significant amount of documentation, oral, and written communication. Projects can be applied research, industry-sponsored, innovation challenges, or service projects with non-profit organizations. Includes weekly seminar topics surrounding professional topics. Both lecture and laboratory sessions will be integrated into the class meeting times as required. **Lecture/Lab Hours:** Two hours lecture; three hours laboratory, weekly. **Grade Mode:** A.
Restriction(s): Must be Senior Class; and Undergraduate Level.
Course Fee: $130.

ENGR 471 - Engineering Capstone   **Credits 3**
Engineering senior-level capstone project. Final designs and projects are expected to be implemented and presented to respective audiences. Projects are team-based and require a significant amount of documentation, oral, and written communication. Projects can be applied research, industry-sponsored, innovation challenges, or service projects with non-profit organizations. Weekly seminar topics surrounding professional topics may be required. Both lecture and laboratory/project sessions will be integrated into the class meeting times as required. **Lecture/Lab Hours:** One hour lecture; six hours laboratory, weekly. **Grade Mode:** A.
Prerequisite(s): ENGR 470.
Restriction(s): Must be Senior Class; and Undergraduate Level.
Course Fee: $130.

ENGR 480 - Internship in Engineering   **Credits 1-3**
Professionally supervised participation in pre-approved research or a project at an off-campus site. Documentation of the time spent and the activities performed as well as a written paper or presentation explaining the experience are required. **Note(s):** Special approval required; each credit of Internship requires 45 hours of internship activity; may involve lab fees of up to $115. **Grade Mode:** A.
Restriction(s): Must be Undergraduate Level.
Repeat Limit (after first attempt): 4.

ENGR 490 - Directed Research in Engineering   **Credits 1-3**
Research activity under the supervision of the primary researcher or self-directed research under the supervision of the instructor of record. **Note(s):** Special approval required; each credit of Directed Research requires a minimum of 3 hours of research activity per week. **Grade Mode:** A.
Restriction(s): Must be Undergraduate Level.
Repeat Limit (total number of credits): 8.
Course Fee: $130.