ENGINEERING (ENGR)

ENGR-110 Introduction to Engineering 3 Credits
This course provides a solid foundation in fundamental skills needed for freshmen and transfer students to academically succeed and professionally prepare them for challenges within the disciplines of Engineering and Technology Management. The project-based assignments will provide students with opportunities to apply mathematics to solve engineering problems, acquire team working skills, practice written and verbal communication skills, and enhance problem solving and design skills. Early understanding of these skills will assist students throughout their undergraduate experience.
Prerequisite: MATH-180C
Terms Typically Offered: Spring, odd years.

ENGR-201 Electric Circuts 4 Credits
An introduction to electrical circuit components and laws, including ideal op-amps, DC circuit analysis, AC circuit analysis, transient analysis of RL and RC circuits and computer-aided circuit analysis. This course is 4 units consisting of a 3 hour lecture and 3 hour lab per week.
Prerequisite: PSCI-225 and MATH-181C
Terms Typically Offered: Spring, even years.

ENGR-202 Engineering Dynamics 3 Credits
Topics to be covered include vector dynamics of particles and rigid bodies. The students learn to represent and compute displacement, velocity, and acceleration of particles and rigid bodies in different coordinate systems. Further upon, they learn to relate forces and motions of particles and rigid bodies using Newton's laws and Newton-Euler equations under the conditions where the sum of the forces are not zero. Free, forced, and damped vibrations of particles and rigid bodies are presented in the end. Three hours of lecture per week.
Prerequisite: ENGR-265
Terms Typically Offered: Spring, odd years.

ENGR-203 Digital Logic Systems 3 Credits
This course covers the broad range of foundational skills that apply across all embedded computer system application areas, from thermostats to self-driving vehicles. The emphasis is at the layer where hardware meets software. Topics include microcontroller hardware, assembly language, embedded C programming, analog I/O, timers, code optimization, interrupts, and concurrency. Real world engineering practices, constraints, and example applications are integrated throughout the course. Weekly hands-on hardware and software experiences with an industry-strength automotive embedded controller are coordinated with the lecture content to reinforce core skill.
Prerequisite: ENGR-201
Terms Typically Offered: Fall, odd years.

ENGR-265 Engineering Statics 3 Credits
Topics to be covered include equivalent systems of forces, resultants and distributed forces, equilibrium of rigid bodies, centroids, centers of gravity, moments of inertia, friction and virtual work. Analysis of frames and machines, forces in beams, internal stresses, and stability. Vector algebra will be used throughout. Three hours of lecture per week.
Prerequisite: PSCI-223C and MATH-281
Terms Typically Offered: Fall, even years.

ENGR-301 Embedded Systems 3 Credits
This course covers the broad range of foundational skills that apply across all embedded computer system application areas, from thermostats to self-driving vehicles. The emphasis is at the layer where hardware meets software. Topics include microcontroller hardware, assembly language, embedded C programming, analog I/O, timers, code optimization, interrupts, and concurrency. Real world engineering practices, constraints, and example applications are integrated throughout the course. Weekly hands-on hardware and software experiences with an industry-strength automotive embedded controller are coordinated with the lecture content to reinforce core skills.
Prerequisite: ENGR-201 and ENGR-203
Terms Typically Offered: Spring, even years.

ENGR-307 Computational Problem Solving 4 Credits
While this course is designed for students with majors in the engineering and physical sciences and applied mathematics it is open to all majors. The course will focus on scientific computing and problem-solving using MATLAB and/or similar programing tools. Topics studied include: the design of algorithms, algorithmic problem solving, abstraction, pseudocode, and iteration, important algorithms of computer science, methods used by computer scientists to classify algorithms according to their efficiencies, making predictions of execution times for algorithms, converting algorithms to programming languages such as Visual Basic, C++ and MATLAB. The course will focus on scientific computing and problem-solving using MATLAB and/or similar programing tools).The goal of the course is to design and execute computer programs using practical applications of the following: matrix algebra, and numerical integration of ordinary differential equations (ODEs). The course will also include applying the methodology for solving systems of linear and nonlinear equations and analysis of numerical results. Lab Fee.
Prerequisite: CSCI-110C and MATH-180C

ENGR-310 Electronics I 3 Credits
An introduction to the theory and application of electronic (analog and digital) circuits and devices. The course focuses on the analysis and building of simple electronic circuits. Topics covered include: steady state circuit analysis using complex numbers, simple time-domain analysis and circuit simulation software, semiconductor physics, junctions and transistors, amplifiers, feedback, control circuits, filters, oscillators, optoelectronic devices, electronic noise and signal to noise improvement, field effect transistors, logic gates, digital electronics, signal processing and hybrid analog/digital circuits, and AM/FM and high frequency circuits.
Prerequisite: PSCI-225
Co-Requisite: ENGR-310L
Pre- or Co-Requisite: MATH-310
Terms Typically Offered: Fall, even years.

ENGR-310L Electronics I Lab 1 Credit
This course supports the ENGR-310 lecture.
Prerequisite: PSCI-225L
Co-Requisite: ENGR-310
Terms Typically Offered: Fall, even years.

ENGR-320 Optics 4 Credits
This is an introductory Optics course with emphasis on applying lectured, theoretical principles in a hands-on setting. This course will cover the fundamental properties of light propagation and interaction with amtter under the approximations of geometrical optics and scalar wave optics. In particular, topics in geometrical optics will include: ray-tracing, aberrations, lens design, apertures and stops, radiometry and photometry. Topics covered in wave optics include: basic electrodynamics, polarization, interference, wave-guiding, Fresnel and Fraunhofer diffraction, image formation, resolution.
Prerequisite: PSCI-225
Co-Requisite: ENGR-320L
Terms Typically Offered: Fall, odd years.

ENGR-320L Optics Labratory 1 Credit
This course supports the ENGR-320 lecture.
Prerequisite: PSCI-225L
Co-Requisite: ENGR-320
Terms Typically Offered: Fall, odd years.

ENGR-400 Introduction to Materials Science Engr. 3 Credits
Topics include: 1. Atomic structure, chemical bonding, crystal structure, defects, diffusion, phase diagrams, mechanical and magnetic properties, thermal, electrical and optical behavior; 2. Correlation of the mechanical, electrical and optical properties of different material systems such as metals and alloys, ceramics, polymers to the microstructure of the material; 3. How material properties are influenced by thermal and mechanical treatments; 4. Strengthening mechanisms in materials; 5. The effects of the environment on materials and the possible failure modes of structures; 6. Application of material systems in photonics, microelectronics, and other technology fields; 7. Design limitation for metal alloys, ceramics, semiconductors and polymers; 8. Application of materials design concepts to selecting the material most suitable for a given application.
Prerequisite: PSCI-223C/PSCI-223CL, PSCI-225/PSCI-225L, CHEM-120/CHEM-120L
Co-Requisite: ENGR-400L
Terms Typically Offered: Spring, odd years.

ENGR-400L Intro/Materials Science Laboratory 1 Credit
This laboratory course supports the ENGR-400 lecture. Lab Fee.
Prerequisite: CHEM-121L, PSCI-225L, PSCI-227L
Co-Requisite: ENGR-400
Terms Typically Offered: Spring, odd years.

ENGR-450 Research Internship Program 1-4 Credits
This course may be taken for a maximum of 4 units in one semester. A maximum of 6 combined units credit for ENGR-450 or ENGR-485 apply to graduation. This course is designed with the purpose of providing students the opportunity to conduct research off-campus at universities or STEM companies in the community. This course promotes early entry into the workplace for the student through part-time employment. This course requires actual work experience be sought in an engineering or STEM-focused business firm providing an opportunity to integrate classroom teaching in practical application under the direct supervision of the assigned instructor. Students are responsible for completing a project report and presenting their research results in ENGR-499C
Prerequisite: PSCI-225
Terms Typically Offered: On Demand.

ENGR-485 Undergraduate Research 1-4 Credits
Problems in advanced laboratory research with emphasis on research techniques. Research is carried out under the supervision of the instructor with weekly conferences to discuss results and direction. Emphasis will be placed on project management, safety, instrumentation, solution preparation, and research documentation skills. A written proposal and report emphasizing the literature background of the problem and the experimental results are required. The results of the research project will also be presented in an oral format in ENGR-499C. This course is a variable credit course. At least two units of ENGR-450 or ENGR-485 are required for all engineering physics majors. A minimum of 50 hours of laboratory work is required per unit. May be repeated. Lab fee.
Prerequisite: PSCI-225
Terms Typically Offered: Summer.

ENGR-499C Engineering Physics Capstone Seminar 2 Credits
This course analysis and evaluation of current research in engineering and physics and the integration of faith and the physical sciences. An oral presentation of the research accomplished in ENGR 450 or ENGR 485 in a classroom setting is required. In-class presentations by faculty and guests are part of the course. This course fulfills the Core Curriculum Capstone requirement for Engineering Physics majors.
Prerequisite: ENGR-450, ENGR-485
Terms Typically Offered: Spring.