

Engineering General (ENGR)

ENGR 111. Introduction to Engineering. 1 Credit.

Designed to provide general engineering students with an opportunity to review, study, discuss, and evaluate various engineering professions as career choices. F, S.

ENGR 120. Introduction to Engineering. 3 Credits.

Introduction to Engineering is a foundation course for the Project Lead the Way Engineering curriculum. Students will be exposed to the design process, collaboration, research and analysis, communication, technical documentation and engineering standards.

ENGR 121. Principles of Engineering. 3 Credits.

This course is the second foundation course in the Project Lead the Way sequence. This course prepares students for colleges' majors in engineering or engineering technology fields. Course encompasses energy, power, materials and structures, control systems, statistics and kinematics. Prereq: ENGR 120.

ENGR 122. Digital Electronics. 3 Credits.

This course provides a foundation for students who are interested in electrical engineering, electronic, or circuit design in the Project Lead The Way program. Students study topics like combinatorial and sequential logic and are exposed to circuit design tools used in industry. Prereq: ENGR 120.

ENGR 123. Civil Engineering and Architecture. 3 Credits.

This course is intended to serve as a specialization course in the Engineering sequence for Project Lead the Way. Students will use rivet and auto desk to solve and make problems in the course. This includes a long term project that involves the development of a local property site. Prereq: ENGR 120.

ENGR 124. Biotechnical Engineering or Environmental Sustainability. 3 Credits.

Students will investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply issues, and renewable energy. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 125. Computer Integrated Manufacturing. 3 Credits.

This course teaches the fundamentals of computerized manufacturing technology. It builds on the solid modeling skills developed in Introduction to Engineering. Students will be able to describe and design a manufacturing process. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 126. Aerospace Engineering. 3 Credits.

The major focus of this course is to expose students to the world of aeronautics, flight, and engineering through the fields of aerospace engineering and related areas of study. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 127. Engineering Design and Development. 3 Credits.

Engineering Design and Development is the capstone course in the Project Lead the Way high school engineering program. It is an engineering research course in which students work in teams to design and develop an original solution to a valid open ended problem. Prereq: ENGR 120 and ENGR 121.

ENGR 128. Computer Science and Software Engineering. 3 Credits.

This course covers the computer science principles framework. This course teaches multiple programming languages and aims to develop computational thinking. This will help generate excitement in the field of computer and software engineering. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 191. Seminar. 1-5 Credits.**ENGR 194. Individual Study. 1-3 Credits.****ENGR 196. Field Experience. 1-15 Credits.****ENGR 199. Special Topics. 1-5 Credits.****ENGR 291. Seminar. 1-3 Credits.****ENGR 292. Study Abroad. 1-15 Credits.****ENGR 294. Individual Study. 1-5 Credits.****ENGR 299. Special Topics. 1-5 Credits.****ENGR 310. Entrepreneurship for Engineers and Scientists. 3 Credits.**

How to turn a great idea into a business by starting a company and/or profiting from a new invention. Developing a product, conducting patent searches, securing intellectual property rights, writing a business plan, obtaining financing, etc. are covered. F.

ENGR 311. History of Technology in America. 3 Credits.

Development of tools, technology, and whole systems, especially the U.S. experience since 1700. Contributions of Jefferson, Richards, Edison and others as models of creativity as a foundation for the emergence of modern conceptions of progress.

ENGR 312. Impact of Technology on Society. 3 Credits.

Study of the impact of technology on the natural environment; discussion of values, ethics, citizenship, social responsibilities, and the relationship of humans to the environment.

ENGR 379. Study Tour Abroad. 1-6 Credits.

ENGR 391. Seminar. 1-3 Credits.

ENGR 392. Study Abroad. 1-15 Credits.

ENGR 394. Individual Study. 1-3 Credits.

ENGR 399. Special Topics. 1-5 Credits.

ENGR 402. Engineering Ethics and Social Responsibility. 1 Credit.

Philosophical basis for ethical decisions, guidance for ethical decision making in engineering practice, ethics of social responsibility, professionalism, case studies, and codes of conduct for engineers. F, S.

ENGR 489. Collaborative Engineering Capstone. 3 Credits.

Integration of engineering and architecture topics and job functions projects. Students will plan, design, develop, verify, produce/construct/service facilities and systems created to fulfill industrial, agricultural, urban, and business needs. Prereq: Senior standing and major departmental approval. F, S.

ENGR 491. Seminar. 1-5 Credits.

ENGR 492. Study Abroad. 1-15 Credits.

ENGR 493. Undergraduate Research. 1-5 Credits.

ENGR 494. Individual Study. 1-5 Credits.

ENGR 496. Field Experience. 1-15 Credits.

ENGR 499. Special Topics. 1-5 Credits.

ENGR 690. Graduate Seminar. 1-5 Credits.

ENGR 696. Special Topics. 1-5 Credits.

ENGR 715. Engineering Systems. 3 Credits.

Interdisciplinary systems analysis approach to engineering problems. Mathematical and physical stochastic process and control systems.

ENGR 722. Academic Writing in the Engineering Disciplines. 2 Credits.

Students will learn to effectively use structural elements of academic writing by analyzing published papers. They will also work on sentence-level clarity and draft their own papers for publication.

ENGR 741. Systems-Linear and Nonlinear Concepts. 3 Credits.

Nonlinear and linear programming methods for engineering design optimization. Formulation and optimization of design problems from all areas of engineering.

ENGR 762. Heat and Mass Transfer. 3 Credits.

Theory and application of transport of heat and mass. Heat diffusion equation in several coordinate systems. Fourier series and transforms and Laplace transform techniques. Mass transfer examples. Introduction to simulations.

ENGR 770. Quantitative Modeling. 3 Credits.

Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with IME 770.

ENGR 771. Probabilistic and Deterministic Methods. 3 Credits.

Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with IME 771.

ENGR 780. Electromagnetic Theory. 3 Credits.

Physical concepts and mathematical solutions of Maxwell equations; boundary conditions, force, and energy equations; potential equations; Green's functions; wave equations, radiation, and propagation of electromagnetic waves. F/2.

ENGR 789. Advanced Research Methods in Engineering. 3 Credits.

Advanced study of the philosophy, reasoning, design, methods, and procedures employed in conducting and disseminating scientific research. Includes a survey of current and original research with interpretation and assessment.

ENGR 790. Seminar. 1-5 Credits.

ENGR 791. Temporary/Trial Topics. 1-5 Credits.

ENGR 793. Individual Study/Tutorial. 1-5 Credits.

ENGR 899. Doctoral Dissertation. 1-15 Credits.