

ENGINEERING (ENGR)

ENGR 101 | INTRODUCTION TO ENGINEERING

Units: 3-4 Repeatability: No

Core Attributes: Science/Tech Inquiry area

Prerequisites: MATH 150 (Can be taken Concurrently)

Introduction to the field of engineering. Students work in small teams to solve open-ended interdisciplinary design problems, including concept generation, analysis, computer aided design (CAD) modeling, construction, testing, development, and documentation. The project work is enhanced with lectures, activities, and reading on design, manufacturing, and engineering tools. Intended for majors in engineering or those exploring careers in engineering. Four hours lecture-laboratory weekly.

ENGR 102 | INTRODUCTION TO ELECTROMECHANICAL SYSTEM DESIGN

Units: 3 Repeatability: No

Prerequisites: ENGR 101 and MATH 151 (Can be taken Concurrently) and (ENGR 121 or COMP 110 or COMP 150) and PHYS 270 (Can be taken Concurrently)

Introduction to the use of sensors, actuators, controllers, and computer interfaces for the use with electro-mechanical systems. Application of the engineering design process culminating in a team-based design project.

ENGR 103 | USER-CENTERED DESIGN

Units: 3 Repeatability: No

Core Attributes: Domestic Diversity level 1

Prerequisites: ENGR 101 and MATH 151 (Can be taken Concurrently)

Introduction to strategies for developing designs that emphasize how users will interact with the final product. Iterative design methods to elicit user requirements, generate alternative designs, develop low-fidelity prototypes, and evaluate designs from the user's perspective. Individual and collaborative strategies for design thinking, concept development, and functional evaluation.

ENGR 110 | THE DESIGN OF COFFEE

Units: 3 Repeatability: No

Core Attributes: Science/Tech Inquiry area

Non-Core Attributes: Lab

This course serves as an introduction to how engineers approach and solve problems, demonstrated by the process of roasting and brewing coffee. Students will be introduced to basic principles of engineering analysis and design, and guided through a series of laboratory experiments testing the effect of design choices on the sensory quality of coffee. Both qualitative and quantitative concepts will be included in the course, along with discussion on the implications of coffee production and harvesting on land use, agriculture industry, labor force, economies, and societies. This course fulfills a Scientific and Technological Inquiry core curriculum requirement for non-majors. Concurrent registration in MATH 115 or higher recommended.

ENGR 121 | ENGINEERING PROGRAMMING

Units: 3 Repeatability: No

Prerequisites: MATH 150 (Can be taken Concurrently)

Fundamentals of computer usage and programming in a structured, high-level language as commonly used in engineering systems development and applications; modular programming principles; use of the operating system and language constructs for program input/output; object-oriented programming. Three hours lecture weekly.

ENGR 241 | ACOUSTICS OF MUSICAL INSTRUMENTS

Units: 3 Repeatability: No

Core Attributes: Science/Tech Inquiry area

An exploration of the acoustical properties of musical instruments that combines the concepts of musical acoustics with the design and construction of musical instruments. Analysis of musical tones using instrumentation. Analysis of vibrating structures using SolidWorks. The course will culminate in student innovative design projects. Not intended for engineering majors.

ENGR 294 | SPECIAL TOPICS IN ENGINEERING

Units: 1-4 Repeatability: Yes (Can be repeated for Credit)

Special topics in various areas of engineering theory and practice. May be repeated for credit with a different topic.

ENGR 296 | UNDERGRADUATE RESEARCH

Units: 1-3 Repeatability: Yes (Can be repeated for Credit)

Faculty-directed undergraduate research in engineering. Problem selected after consultation with faculty. Written report required. Prior approval by department chair or dean is required.

ENGR 298 | INTERNSHIP/CO-OP EXPERIENCE

Units: 1-3

Directed lower division internship or co-operative experience in an engineering or related activity. Usually involves a three-month summer work assignment with industrial firms or government agencies. Written report required. Credit not applicable to minimum engineering program graduation requirements. May be repeated for credit.

ENGR 299 | INDEPENDENT STUDY

Units: 1-3 Repeatability: Yes (Can be repeated for Credit)

Individual project in creative design and synthesis under the general supervision of a participating professor. Project proposal must be submitted and approved prior to enrollment. May be repeated for credit.

ENGR 311 | ENGINEERING MATERIALS SCIENCE

Units: 3 Repeatability: No

Prerequisites: (CHEM 151 and CHEM 151L) and MATH 151 and PHYS 271

Basic concepts of material structure and its relation to properties; atomic structure; mechanical, electrical, and magnetic properties; engineering applications; introduction to semiconductor physics. Three hours lecture weekly. Fall semester.

ENGR 315 | COFFEE: ENGINEERING, THE GLOBAL INDUSTRY AND SOCIAL JUSTICE

Units: 3 Repeatability: No

Core Attributes: Global Diversity level 2

Non-Core Attributes: Lab

Prerequisites: ISYE 330

This course introduces students to the engineering, science and economic aspects of the coffee growing, harvesting, production, distribution, roasting, grinding and brewing processes. Students will apply fundamental principles of engineering analysis and design, and be guided through a series of laboratory experiments testing the effect of design choices on the sensory quality and measured properties of brewed coffee. This course examines both historical and contemporary systems of the coffee industry and the constructs that have dominated its social, economic and political aspects. Students will also critically examine and recognize how different cultures and social statuses may lead to disparities in coffee experiences, and explore the social, economic and environmental impacts of the coffee industry around the world. Students may not receive credit for both ENGR 110 and ENGR 315.

ENGR 351 | COMMUNITY-BASED PARTICIPATORY ENGINEERING APPRENTICESHIP**Units: 3 Repeatability: No****Core Attributes: Domestic Diversity level 2**

Prerequisites: ENGR 103

Interdisciplinary apprenticeship course to support engineers' ability to work with community groups around socio-technical problems. Explorations of the historical and contemporary contexts and impacts of designs, systems, processes and products surrounding and involving engineering and engineers will be applied to a community context. Collaborations with communities to share knowledge and understanding and to co-create project briefs related to engineering in support of social justice.

ENGR 465 | FORENSIC ENGINEERING**Units: 3 Repeatability: No**

This course deals with the interaction between the engineering and legal communities. Through case studies, students will learn about the legalities associated with being an engineer. The analysis stage of the engineering design process will be dissected and viewed as it is interpreted by the courts. Standard of care and legal standards for review of engineering design will be discussed. Duties of the engineer, the manufacturer, and the end user will be compared and contrasted. Students will perform forensic analyses of product failure cases. Legal concepts will be conveyed via case studies and Law Review articles.

ENGR 494 | SPECIAL TOPICS IN ENGINEERING**Units: 1-4 Repeatability: Yes (Can be repeated for Credit)**

Special topics course in areas of special interest to engineering. May be repeated for credit with a different topic.

ENGR 496 | UNDERGRADUATE RESEARCH**Units: 0.5-3 Repeatability: Yes (Can be repeated for Credit)**

Faculty-directed undergraduate research in engineering. Problem proposal must be submitted and approved prior to enrollment. Written report required. Upper division standing in engineering. Prior approval by department chair or dean is required. May be repeated for credit.

ENGR 499 | INDEPENDENT STUDY**Units: 1-3 Repeatability: Yes (Can be repeated for Credit)**

Prerequisites: (MATH 130 or MATH 150)

Individual project in creative design and synthesis under the general supervision of a participating professor. Project proposal must be submitted and approved prior to enrollment. May be repeated for credit.