

# ENGINEERING (ENGR)

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## ENGR Courses

### ENGR 101. Engineering Student Success. 1 unit

Term Typically Offered: TBD

CR/NC

Strategies for success as an engineering student, including development of intrinsic motivation, time management, self-advocacy, campus resources, and career preparation. Engineering design process, teamwork, and communication skills. Credit/No Credit grading only. 1 activity.

### ENGR 110. Introduction to Engineering. 2 units

Term Typically Offered: F

Introduction to engineering and the computing disciplines with emphasis on the design process, professionalism, communication, teamwork, diversity and skills for academic success in engineering. 2 lectures.

### ENGR 234. Introduction to Design Thinking. 4 units

Term Typically Offered: F

Prerequisite: Entrepreneurship minors only.

Introduction to the process of design thinking and human centered design, including design process, methodology, and implementation. Empathy, creativity, iterative prototyping, and contextual design of products and services. 4 lectures. Crosslisted as BUS/ENGR 234.

### ENGR 270. Selected Topics. 1-4 units

Term Typically Offered: TBD

Prerequisite: Open to undergraduate students and consent of instructor.

Directed group study of selected topics. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

### ENGR 301. Engineering Professional Success. 1 unit

Term Typically Offered: F

CR/NC

Prerequisite: Consent of instructor. Recommended: ENGR 101.

Strategies for success as an engineering professional. Preparation for job searches, including networking and building a professional identity. Exploration of engineering within context of society and community. Intended for First Generation and new transfer students. Credit/ No Credit grading only. 1 activity.

### ENGR 310. Introduction to Entrepreneurship. 4 units

Term Typically Offered: TBD

Prerequisite: Completion of GE Area A with grades of C- or better.

Role and impact of entrepreneurship and technology startups; characteristics and traits of entrepreneurs; opportunity identification and assessment; frameworks for building startups; the founding team; organizational and legal issues; business and value proposition models; acquiring resources; entrepreneurial risk; realizing and harvesting value. Course may be offered in classroom-based or online format. 4 lectures. Crosslisted as BUS/ENGR 310.

### ENGR 322. The Learn By Doing Lab Teaching Practicum. 2 units

Term Typically Offered: W, SP

CR/NC

Prerequisite: Completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Early teaching experience in an informal science, technology, engineering, and mathematics (STEM) teaching and learning environment. Principles of inquiry-driven STEM education, lesson design, implementation and assessment. Intended for undergraduates exploring STEM teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory. Crosslisted as ENGR 322/SCM 302/HNRS 302.

### ENGR 334. Needfinding in New Product Design. 4 units

Term Typically Offered: TBD

Prerequisite: BMED 212, ENGR 234, IME 144, or ME 234.

Identification and characterization of human needs for future products, systems, services, and environments. Observation and interview techniques based on ethnographic approaches and building design empathy. Emphasis on development of broad and flexible thinking skills for designers to address the needs of a changing society. Field trips required. 4 lectures.

### ENGR 350. The Global Environment. 4 units

Term Typically Offered: TBD

2020-21 or later: Upper-Div GE Area B

2019-20 or earlier catalog: GE Area B5, B6, or B7

Sustainability Focused

Prerequisite: Junior standing; completion of GE Area A with grades of C- or better; and completion of GE Areas B1 through B4, with a grade of C- or better in one course in GE Area B4 (GE Area B1 for students on the 2019-20 or earlier catalogs).

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/ historical/political perspectives. Use of remote sensing maps. Sustainable solutions. Course may be offered in classroom-based, online, or hybrid format. 4 lectures. Crosslisted as AG/EDES/ENGR/GEOG/ISLA/SCM/UNIV 350. Fulfills GE Area Upper-Division B (GE Areas B5, B6, or B7 for students on the 2019-20 catalog).

### ENGR 400. Special Problems for Advanced Undergraduates. 2-4 units

Term Typically Offered: F,W,SP,SU

Prerequisite: ME 212 or consent of department head.

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units.

### ENGR 440. Engineering as a Profession. 3 units

Term Typically Offered: TBD

Prerequisite: Senior standing.

Preparation for the transition from academia to industry. Working knowledge of key topics such as leadership, organizational structure, intellectual property, business models, and product development cycles, along with an appreciation of impact of technology on society. 3 lectures.

**ENGR 459. Interdisciplinary Senior Design Project I. 2 units**

Term Typically Offered: F

Prerequisite: Senior standing.

First of three courses taken sequentially in a team based interdisciplinary senior design project. Development of sponsor's needs and generation of design solutions. Project management, cost analysis, intellectual property, test plans, impact analysis on society, and ethical considerations. Communication of results to project sponsor. 2 laboratories.

**ENGR 460. Interdisciplinary Senior Design Project II. 2 units**

Term Typically Offered: W

Prerequisite: ENGR 459.

Continuation of ENGR 459 and senior project. Activities focus on detail design, analysis and material procurement. 2 laboratories.

**ENGR 461. Interdisciplinary Senior Design Project III. 2 units**

Term Typically Offered: SP

Prerequisite: ENGR 460.

Continuation of ENGR 460 and completion of senior project. Design verified through prototyping and testing. 2 laboratories.

**ENGR 462. Senior Project. 4 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: ME 212, junior standing, and consent of instructor.

Selection and completion of project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. Minimum commitment of 150 hours.

**ENGR 463. Interdisciplinary Entrepreneurial Senior Design Project I. 2 units**

Term Typically Offered: F

Prerequisite: Senior standing.

First of three courses taken sequentially in a team based interdisciplinary senior design project with engineering and business students. Entrepreneurial process through design of a product or service, using customer development and agile engineering. 2 laboratories.

**ENGR 464. Interdisciplinary Entrepreneurial Senior Design Project II. 2 units**

Term Typically Offered: W

Prerequisite: ENGR 463.

Continuation of ENGR 463 and a team based interdisciplinary senior design project with engineering and business students. 2 laboratories.

**ENGR 465. Interdisciplinary Entrepreneurial Senior Design Project III. 2 units**

Term Typically Offered: SP

Prerequisite: ENGR 464.

Continuation of ENGR 464 and a team based interdisciplinary senior design project with engineering and business students. 2 laboratories.

**ENGR 470. Selected Advanced Topics. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

**ENGR 471. Selected Advanced Laboratory. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

**ENGR 493. Cooperative Education Experience. 2 units**

Term Typically Offered: TBD

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units.

**ENGR 494. Cooperative Education Experience. 6 units**

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units.

**ENGR 495. Cooperative Education Experience. 12 units**

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Sophomore standing and consent of instructor.

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units.

**ENGR 500. Individual Study. 2-4 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing and consent of Program Director.

Advanced study planned and completed under the direction of faculty. Open to graduate students who have demonstrated the ability to do independent work. Total credit limited to 8 units.

**ENGR 570. Selected Advanced Topics. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 lectures.

**ENGR 571. Selected Advanced Laboratory. 1-4 units**

Term Typically Offered: TBD

Prerequisite: Graduate standing or consent of instructor.

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Class Schedule will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories.

**ENGR 581. Biochemical Engineering. 4 units**

Term Typically Offered: TBD

Prerequisite: CHEM 312 and MCRO 221.

Types of microorganisms and microbially-mediated biochemical reactions for biotechnology applications. Stoichiometric and thermodynamic principles for microbial growth and metabolism. Material and energy balances for aerobic and anaerobic growth and bioreactor design. Kinetics of enzyme catalyzed reactions. Field trips required. 3 seminars, 1 laboratory. Crosslisted as ENGR/ENVE 581.

**ENGR 593. Cooperative Education Experience. 2 units**

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

**ENGR 594. Cooperative Education Experience. 6 units**

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only.

**ENGR 595. Cooperative Education Experience. 12 units**

Term Typically Offered: F,W,SP,SU

CR/NC

Prerequisite: Graduate standing and consent of instructor.

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only.

**ENGR 596. Industry Sponsored Project Experience. 1-9 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Designed for MS students who are performing a work-for-others research project that requires a Non-disclosure Agreement. Students who qualify will be required file a detailed, supervised report and undergo an examination on the work performed. Total credit limited to 9 units. 1 to 9 supervision.

**ENGR 599. Design Project (Thesis). 1-9 units**

Term Typically Offered: F,W,SP,SU

Prerequisite: Graduate standing.

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted.