Engineering (ENGR)

Courses

ENGR 1A. General Chemistry for Engineers. 4 Units.
Emphasis on solid-state chemistry. Quantum theory, atomic structure, periodic trends, chemical bonding, molecular orbitals, electronic band structure, gases, liquids, intermolecular forces, unit cells, crystal lattices, phase transformations, and electrochemistry.

(Design units: 0)

Prerequisite: A score of 2 or 3 on the AP Chemistry exam, or a score of 550 or higher on the SAT Chemistry Subject exam, or Engineering Chemistry Placement Exam (fee required).

Overlaps with CHEM 1A.

Restriction: School of Engineering majors only.

ENGR 5. Freshman Seminar In Engineering. 1 Unit.
An introduction to the engineering profession. Weekly seminars by both faculty and representatives from industry present an overview of each engineering discipline. Students learn about current trends and issues in engineering, and career and academic options.

Grading Option: Pass/no pass only.

Restriction: Freshmen only.

ENGR 7A. Introduction to Engineering I. 2 Units.
Introduction to engineering disciplines and the design process. Course may be offered online. Materials fee.

(Design units: 1)

Grading Option: In progress only.

ENGR 7B. Introduction to Engineering II. 2 Units.
Introduction to engineering disciplines and the design process. Course may be offered online. Materials fee.

(Design units: 2)

Prerequisite: ENGR 7A.

ENGR 10. Computational Methods in Engineering. 4 Units.
Procedures and procedure followers, algorithms and flow charts, computer languages, subprograms. Computer macro- and microelements, number systems. Methods of differentiation, integration, curve fitting, list processing. Error analysis. Must qualify in BASIC and FORTRAN at end of course through computer use.

(Design units: 0)

Prerequisite: Prerequisite or corequisite: MATH 2A.

Overlaps with ENGRMAE 10, EECS 10, EECS 12.

ENGR 15. Problem Solving in Engineering. 4 Units.
Introduction to scientific computing to solve engineering problems. Problem identification, algorithmic design, and solution using appropriate computational tools. Design and application documentation.

(Design units: 1)

Corequisite: MATH 3D.
Prerequisite: (EECS 10 or EECS 12 or ENGRMAE 10 or CSE 41 or I&C SCI 31) and MATH 3A.

Overlaps with ENGRCEE 20.

Restriction: Biomedical Engineering majors have first consideration for enrollment.
ENGR 30. Statics. 4 Units.
Addition and resolution of forces distributed forces, equivalent system of forces centroids, first moments, moments and products on inertia, equilibrium of rigid bodies, trusses, beams, cables.

(Design units: 0)
Corequisite: MATH 2D.
Prerequisite: MATH 2D and PHYSICS 7C.
Same as ENGRCEE 30, ENGRMAE 30.
Restriction: School of Engineering majors have first consideration for enrollment.

ENGR 54. Principles of Materials Science and Engineering. 4 Units.
Superconductors to biodegradable polymers. Structure and properties of materials, including metal, ceramics, polymers, semiconductors, composites, traditional materials. Atomic structure, bonding, defects, phase equilibria, mechanical properties, electrical, optical and magnetic properties. Introduction to materials processing and synthesis. Materials fee.

(Design units: 0)
Prerequisite: (ENGR 1A or CHEM 1A) and PHYSICS 7C.
Restriction: School of Engineering majors have first consideration for enrollment.

ENGR 69. Energy Facilities Inspection. 1 Workload Unit.
Inspection of power-generating stations of various types, oil and gas processing facilities, and end-use facilities.
Repeatability: May be repeated for credit unlimited times.

ENGR 80. Dynamics. 4 Units.
Introduction to the kinetics and dynamics of particles and rigid bodies. The Newton-Euler, Work/Energy, and Impulse/Momentum methods are explored for ascertaining the dynamics of particles and rigid bodies. An engineering design problem using these fundamental principles is also undertaken. Course may be offered online.

(Design units: 0.5)
Prerequisite: MATH 2D and PHYSICS 7C.
Same as ENGRCEE 80, ENGRMAE 80.
Restriction: School of Engineering majors have first consideration for enrollment.

ENGR 92. Engineering and Computer Educational Laboratory. 1-4 Workload Units.
Comprehensive academic support designed primarily for underrepresented or underprepared students in Engineering, ICS, or selected areas of the physical sciences. Typical program activities: tutoring, study skills, career planning, self-esteem enhancement, library research techniques.

(Design units: 0)
Grading Option: Pass/no pass only.
Repeatability: May be taken for credit for 12 units.

ENGR 93. Public and Professional Service in Engineering. 1-2 Workload Units.
Student participation in public and professional service activities related to engineering.
Grading Option: Pass/no pass only.
Repeatability: May be repeated for credit unlimited times.

ENGR 98. Group Study . 1-4 Units.
Group study of selected topics in engineering.

(Design units: 1-4)
Repeatability: Unlimited as topics vary.
ENGR 100. Special Topics in Fabrication Safety. 1 Workload Unit.
Hands on training in the safe use of item fabrication: metalworking, woodworking, electronics fabrication, composites, welding, adhesives, water disposal, and others. Safety certification will be granted from this course and is required for access to Engineering School fabrication facilities.

(Design units: 0)

Repeatability: Unlimited as topics vary.

Restriction: School of Engineering majors have first consideration for enrollment.

ENGR 150. Mechanics of Structures. 4 Units.

(Design units: 2)

Prerequisite: (ENGRCEE 30 or ENGR 30 or ENGRMAE 30) and MATH 3A.

Same as ENGRMAE 150.

Overlaps with ENGRCEE 150.

Restriction: Aerospace Engineering, Chemical Engineering, Materials Science Engineering, and Mechanical Engineering majors have first consideration for enrollment.

ENGR 165. Advanced Manufacturing. 4 Units.
Principles in manufacturing processes. All machining requires energy: mechanical (cutting and shaping), heat energy (laser cutting), photochemical (photolithography), chemical energy (electro chemical machining and chemical vapor deposition). These methods and their fundamentals are examined.

(Design units: 2)

Restriction: School of Engineering majors only. Seniors only.

Concurrent with ENGR 265.

ENGR 180. Entrepreneurship for Scientists and Engineers. 4 Units.
Real-world introduction to the theory and practice of entrepreneurship. Explore organizational, strategic, and financial challenges; start-up strategies; business idea evaluation; and business plan writing. Presentations by prestigious entrepreneurs and industry leaders.

(Design units: 0)

Restriction: Upper-division students only. School of Engineering majors have first consideration for enrollment.

Concurrent with ENGR 280.

ENGR 189. Senior Project - Topics Vary. 1-4 Units.
Multidisciplinary group senior project of theoretical or applied nature involving design.

(Design units: 1-4)

Repeatability: May be taken for credit for 12 units as topics vary.

Restriction: Seniors only.

ENGR 190W. Communications in the Professional World. 4 Units.

(Design units: 0)

Prerequisite: Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Environmental Engineering, Materials Science Engineering and Mechanical Engineering majors have first consideration for enrollment.

(Ib)
ENGR 195. Special Topics in Engineering. 1-4 Units.
Studies in selected areas of Engineering. Topics addressed vary each quarter.

(Design units: 1-4)
Prerequisite: Prerequisites vary.
Repeatability: Unlimited as topics vary.

ENGR 196. Engineering Thesis. 4 Units.
Preparation of final presentation and paper describing individual research in Engineering completed in one or more quarters of individual study (i.e., ENGR 199).

Prerequisite: Completion of at least 4 units of Individual Research in Engineering.

ENGR 196W. Engineering Thesis. 4 Units.
Preparation of final presentation and paper describing individual research in Engineering completed in one or more quarters of individual study (i.e., ENGR 199).

Prerequisite: Completion of at least 4 units of Individual Research in Engineering. Satisfactory completion of the Lower-Division Writing requirement.

(Ib)

ENGR H196. Honors Thesis. 4 Units.
Preparation of final presentation and paper describing individual research in Engineering. For participants in the Campuswide Honors Program.

(Design units: 1-4)
Prerequisite: ENGR H199.
Restriction: Campuswide Honors Program students only.

ENGR H196W. Honors Thesis. 4 Units.
Preparation of final presentation and paper describing individual research in Engineering. For participants in the Campuswide Honors Program.

(Design units: 1-4)
Prerequisite: ENGR H199. Satisfactory completion of the Lower-Division Writing requirement.
Restriction: Campuswide Honors Program students only.

(Ib)

ENGR 197A. Educational Strategies for Tutoring and Teacher Aiding . 4 Units.
Placement in a public elementary or secondary school to gain experience as a tutor or teacher aide. Emphasis on cognitive learning and the development of instructional strategies and resources which can be used in effective cross-age and cross-cultural experiences.

Grading Option: Pass/no pass only.
Repeatability: May be taken for credit 3 times.
Same as EDUC 100.

ENGR 199. Individual Study. 1-4 Units.
Supervised independent reading, research, or design for undergraduate Engineering majors. Students taking individual study for design credit are to submit a written paper to the instructor and to the Undergraduate Student Affairs Office in the School of Engineering.

(Design units: 1-4)
Repeatability: May be taken for credit for 8 units.
Restriction: School of Engineering majors only.
ENGR 199P. Individual Study. 1-4 Units.  
Supervised independent reading, research, or design for undergraduate Engineering majors. Students taking individual study for design credit are to submit a written paper to the instructor and to the Undergraduate Student Affairs Office in the School of Engineering.  
(Design units: 1-4)  
Grading Option: Pass/no pass only.  
Repeatability: May be repeated for credit unlimited times.

ENGR H199. Individual Study for Honors Students. 1-5 Units.  
Supervised research in Engineering for participants in the Campuswide Honors Program. Students taking individual study for design credit are to submit a written paper to the instructor and to the Undergraduate Student Affairs Office in the School of Engineering.  
(Design units: 1-5)  
Repeatability: May be repeated for credit unlimited times.  
Restriction: Campuswide Honors Program students only.

ENGR 260A. Technology for Life. 4 Units.  
Engineering techniques including physics, chemistry, biology, and micro/nano technology for enabling life sciences research in the areas of genomics/proteomics, cells, tissues/organs, and biomolecules.  
Prerequisite: PHYSICS 106 or CHEM 128L or BIO SCI M118L.

ENGR 260B. Technology of Life. 4 Units.  
Engineering perspectives of evolution in life sciences including the physics, chemistry, and mechanics of various life systems such as DNA, RNA, biomolecules, cells, organs.  
Prerequisite: PHYSICS 146A or CHEM 128 or BIO SCI D114 or BME 50A or BME 50B.

ENGR 265. Advanced Manufacturing. 4 Units.  
Principles in manufacturing processes. All machining requires energy: mechanical (cutting and shaping), heat energy (laser cutting), photochemical (photolithography), chemical energy (electro chemical machining and chemical vapor deposition). These methods and their fundamentals are examined.  
Restriction: School of Engineering graduate students only.  
Concurrent with ENGR 165.

ENGR 280. Entrepreneurship for Scientists and Engineers. 4 Units.  
Real-world introduction to the theory and practice of entrepreneurship. Explore organizational, strategic, and financial challenges; start-up strategies; business idea evaluation; and business plan writing. Presentations by prestigious entrepreneurs and industry leaders.  
(Design units: 0)  
Restriction: Graduate students only. School of Engineering majors have first consideration for enrollment.  
Concurrent with ENGR 180.

ENGR 295. Special Topics in Engineering. 1-4 Units.  
Studied in selected areas of Engineering. Topics addressed vary each quarter.  
Prerequisite: Prerequisites vary.  
Repeatability: Unlimited as topics vary.  
Restriction: Graduate students only.

ENGR 296. Master of Science Thesis Research. 1-16 Units.  
Individual research or investigation conducted in the pursuit of preparing and completing the thesis required for the M.S. in Engineering.  
Repeatability: May be repeated for credit unlimited times.

ENGR 297. Doctor of Philosophy Dissertation Research. 1-16 Units.  
Individual research or investigation conducted in the pursuit of preparing and completing the dissertation required for the Ph.D. in Engineering.  
Repeatability: May be repeated for credit unlimited times.
ENGR 299. Individual Research. 1-16 Units.
Individual research or investigation under the direction of an individual faculty.

Repeatability: May be repeated for credit unlimited times.

ENGR 399. University Teaching. 4 Units.
University teaching with Engineering faculty.

Grading Option: Satisfactory/unsatisfactory only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Teaching assistants only.