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 students only.

(II)

**ENGR 7A. Introduction to Engineering I. 2 Units.**  
Introduction to engineering disciplines and the design process. Materials fee.

(Design units: 1)

Grading Option: In Progress (Letter Grade with P/NP).

Restriction: Lower-division students 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

Restriction: Lower-division students only.

**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. Course may be offered online.

(Design units: 0)

Corequisite: MATH 2D  
Prerequisite: MATH 2D and PHYSICS 7C

Same as ENGRCEE 30, ENGRMAE 30.

Restriction: School of Engineering students 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. Course may be offered online. Materials fee.

(Design units: 0)

Prerequisite: (ENGR 1A or CHEM 1A) and PHYSICS 7C

Restriction: School of Engineering students have first consideration for enrollment.
ENGR 80. Dynamics. 4 Units.
Introduction to the kinematics 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.

(Design units: 0.5)
Prerequisite: MATH 2D and PHYSICS 7C
Same as ENGRCEE 80, ENGRMAE 80.
Restriction: Mechanical Engineering Majors have first consideration for enrollment. Aerospace Engineering Majors have first consideration for enrollment. Civil Engineering Majors have first consideration for enrollment. Materials Science Engineering Majors have first consideration for enrollment. Environmental 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: Workload Credit P/NP 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.

(Design units: 0)
Grading Option: Workload Credit P/NP 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)
Grading Option: Workload Credit Letter Grade with P/NP.
Repeatability: Unlimited as topics vary.
Restriction: School of Engineering students 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 Majors have first consideration for enrollment. Biomedical Engineering Majors have first consideration for enrollment. Materials Science Engineering Majors have first consideration for enrollment. 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. Materials fee.

(Design units: 2)
Restriction: Seniors only. School of Engineering students 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 students 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.
Upper-division technical writing course including the development of presentation skills. Effective communication with a range of audiences. Recognition of ethical and professional responsibilities for engineers.

(Design units: 0)
Prerequisite: Satisfactory completion of the Lower-Division Writing requirement.
Restriction: School of Engineering students only.

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 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).

(Design units: 0)
Prerequisite: Completion of at least 4 units of Individual Research in Engineering. Satisfactory completion of the Lower-Division Writing requirement.
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.

(1b)

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.

Restriction: Pass/not-pass option only

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 students 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 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. Materials fee.

Restriction: Graduate students only. School of Engineering 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.

Restriction: School of Engineering students have first consideration for enrollment. Graduate students only.

Concurrent with ENGR 180.

ENGR 295. Special Topics in Engineering. 1-4 Units.
Studies 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.