Endocrinology and Metabolism

See Internal Medicine (IMD), on page 437.

Engineering

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Pre-Fall 2011 General Education (GE): ArtHum = Arts and Humanities; ACH = American Cultures; DD = Domestic Diversity; DL = Oral Skills; DL = Quantitative; LL = Scientific; VL = Visual; WC = World Cultures; WE = Writing Experience


Undergraduate Study

The college has eight departments:

- Biological and Agricultural Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science Engineering
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering

Graduate Study

Graduate degrees (M.S and Ph.D.) are offered in the following engineering disciplines:

- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil and Environmental Engineering
- Computer Science
- Electrical and Computer Engineering
- Materials Science and Engineering
- Mechanical and Aerospace Engineering
- Transportation Technology and Policy

The Major Programs

Eleven majors, leading to the B.S. degree, are open to students.

- Aerospace Science & Engineering
- Biochemical Engineering
- Biological Systems Engineering
- Biomedical Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science and Engineering
- Electrical Engineering
- Materials Science and Engineering
- Mechanical Engineering

Minor Programs

The College of Engineering offers nine undergraduate minors:

- Biomedical Engineering (Department of Biomedical Engineering)
- Computational Biology (Department of Computer Science)
- Construction Engineering and Management (Department of Civil and Environmental Engineering)
- Electrical Engineering (Department of Electrical and Computer Engineering)
- Energy Science and Technology (Department of Biological and Agricultural Engineering)
- Energy Policy (Department of Biological and Agricultural Engineering)
- Energy Efficiency (Department of Biological and Agricultural Engineering)
- Materials Science (Department of Materials Science and Engineering)
- Sustainability in the Built Environment (Department of Civil and Environmental Engineering)

Courses in Engineering (ENG)

Students are encouraged to carefully adhere to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Lower Division

1. Introduction to Engineering (1)
   - Lecture—1 hour. Open to first year students only. Introduction to the role of engineers in acquisition and development of engineering knowledge, the differences and similarities among engineering fields, and the work ethic and skills required for engineering. (P/NP grading only.) GE credit: SE—F. (J. F. Schroeder)

2. Creativity and Entrepreneurship for Engineers (3)
   - Discussion—3 hours. Introduction to entrepreneurial thinking from an engineer's perspective. Focus on identifying entrepreneurial opportunities, developing prototypes, and generating business models. Emphasis on developing a creative and entrepreneurial mindset. GE credit: SciEng or SocSci.

3. Engineering Graphics in Design (3)
   - Lecture—2 hours; laboratory—3 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems. GE credit: SciEng or SocSci.

4. Engineering Graphics in Design (3)
   - Lecture—2 hours; laboratory—3 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems. GE credit: SciEng or SocSci.

5. Technology and Culture of the Internet (4)
   - Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A, 17A or 21A, C or above; Mathematics 168, 176 or 21B, C or above (may be taken concurrently); Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications. GE credit: SciEng or SocSci.

6. Technology and Culture of the Internet (4)
   - Lecture—3 hours; discussion—1 hour. Prerequisite: basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. Offered irregularly. GE credit: SciEng or SE.

7. The Science Behind the Technology in Our Lives (4)
   - Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Understanding of how the technology in our lives works using only basic concepts and rudimentary mathematics. GE credit: SciEng or SocSci. (2017-2018 offering in parentheses)

8. Issues in Engineering (1)
   - Lecture—1 hour. Prerequisite: Participation in the MESA Engineering Program or consent of instructor. Designed to broaden student's understanding of the engineering profession, its methods, principles, design and development process, career opportunities, and professional resources. Offered irregularly.

9. Circuits I (4)
   - Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A (C or better required); Mathematics 22B (C or better required) may be taken concurrently; Physics 9C or 9HD (C or better required). Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE credit: SciEng or SocSci. (2017-2018 offering in parentheses)

20. Introduction to Space Exploration: Understanding the Technological and Environmental Challenges to Our Exploration of the Solar System (4)
   - Lecture—3 hours; discussion—1 hour. Prerequisite: high school level Algebra, Geometry, General Science (Physics and Chemistry). Introductory overview of the space environment. Discussion of space exploration technology including propulsion, orbital mechanics, and spacecraft engineering. Offered irregularly. GE credit: SciEng or QL, SE, SL.
35. Statics (4) Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9A C- or better and Mathematics 21D C- or better or consent of instructor. Analysis of statically determinate and indeterminate systems and equilibrium conditions with emphasis on engineering problems. GE credit: SciEng|SE.—F, W, S; (F, W, S.)

45. Properties of Materials (4) Lecture—3 hours; laboratory—3 hours. Prerequisite: C- or better in Mathematics 16C or 21C, Chemistry 2A, and Physics 9A. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. GE credit. SciEng|WrW; (Q, SL, SE, WL)—F, W, S; (F, W, S, Su.)

45H. Honors Properties of Materials (1) Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in course 45 required. Examination of special materials science and engineering topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors program.—W. (W.)

45Y. Properties of Materials (4) Web virtual lecture; laboratory. Prerequisite: C- or better in Mathematics 16C or 21C; Chemistry 2A and Physics 9A. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. Not open for credit to students who have taken course 45. GE credit. SciEng|QI, QL, SE, SL.—F, W, S; (F, W, S.)

98. Directed Group Study (1-4) Restricted to College of Engineering students only. (P/ NP grading only) May be repeated for credit up to three times when content differs.

Upper Division

100. Electronic Circuits and Systems (3) Laboratory—3 hours; lecture—2 hours. Prerequisite: course 17 C- or better is recommended. Introduction to analog and digital circuit and system design through hands on laboratory design projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit. GE credit: SciEng|QI, QL, SE, SL.—F, W, S; (F, W, S.)

102. Dynamics (4) Lecture—4 hours. Prerequisite: grade of C- or better in Engineering 35; grade of C- or better in Mathematics 22B. Open to College of Engineering students only. Kinetics of particles, systems of particles, and of rigid bodies; application of these topics are applied to engineering problems. Only two units of credit allowed to students who have previously taken course 36. GE credit: SciEng|QI, QL, SE, SL.—F, W, S; (F, W, S.) Cheng, Eke, Hess, Joshi

103. Fluid Mechanics (4) Lecture—4 hours. Prerequisite: C- or better in each of the following: Mathematics 23A and 23B and Mathematics 22B and Physics 9B. Open to students in the College of Engineering and Hydrology majors. Fluid properties, fluid statics, continuity and linear momentum equations. General concepts of potential flow, viscous flow, and boundary layers. Application of fluid mechanics principles and techniques to practical engineering problems. GE credit: SciEng|SE.—F, W, S; (F, W, S.)


104L. Mechanics of Materials Laboratory (1) Laboratory—3 hours. Prerequisite: course 104. Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental analysis. GE credit: SciEng|SE.—F, W, S; (F, W, S.)

105. Thermodynamics (4) Lecture—4 hours. Prerequisite: grade of C- or better in Mathematics 22B and Physics 9B. Open to College of Engineering students only. Fundamentals of thermodynamics, heat energy and work, properties of pure substances, First and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales. Applications of thermodynamics to engineering systems. GE credit: SciEng|QI, QL, SE, VL.—F, W, S; (F, W, S.) Aldredge, D’Souza, Erickson

106. Engineering Economics (3) Lecture—3 hours. Prerequisite: upper division standing in Engineering 100. The analysis of problems in engineering economy, the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life and risk and uncertainty are applied to methods of selecting most economic alternatives. GE credit: SciEng|QI, QL, SE, SI, SS, VL.—F, W, S; (F, W, S.) Aldredge, D’Souza, Erickson

111. Electric Power Equipment (3) Lecture—2 hours; laboratory—3 hours. Prerequisite: grade of C- or better in course 17. Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment and component based on their various construction features and performance characteristics. Offered irregularly. GE credit: SciEng|QI, QL, SE, VL, WE.—Delwiche, Hartsough.

121. Fluid Power Actuators and Systems (4) Lecture—3 hours; laboratory—3 hours. Prerequisite: grade of C- or better in Engineering 100 and Engineering 102. Hydraulic and pneumatic systems with emphasis on analysis and control of actuators. Design of hydraulic and pneumatic systems, specification and sizing of components, and selection of electro-hydraulics/electro-pneumatics, servo valves, and closed loop systems to solve basic control problems. Offered in alternate years. GE credit: SciEng|QI, QL, SE, SL, VL, WE.—(S.) Rosa

122. Introduction to Mechanical Vibrations (4) Lecture—4 hours. Prerequisite: C- or better in Engineering 102; C- or better in Engineering 6 or course 5 or Computer Science Engineering 30: ability to program in MATLAB. Free and forced vibrations in lumped parameter systems and with and without damping: vibrations in ideal systems, electromechanical analogy; use of energy conservation principles. GE credit: SciEng|QI, QL, SE.—F. (F)

160. Environmental Physics and Society (3) Lecture—3 hours. Prerequisite: Physics 9D, SC, or 10 or 1B and Math 18B or equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the related policy implications will be considered. In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement. (Same course as Physics 160B.) GE credit: SciEng|QI, SE, SL.—S. (S.) Craig, Jungmner

180. Engineering Analysis (4) Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better in Mathematics 21D and 22B, or C- or better in Engineering Science and Computer Science Engineering 30. Solutions of systems of linear and nonlinear algebraic equations; approximation methods; solutions of ordinary differential equations; initial and boundary value problems; solutions of partial differential equations of elliptic, parabolic, and hyperbolic types; Eigen value problems. GE credit: SciEng|SE.—F. (F) Halez

188. Science and Technology of Sustainable Power Generation (4) Lecture—3 hours; discussion—1 hour. Prerequisite: upper-level standing in Physics 7C or 9C. Focus on scientific understanding and development of power generation that is the basis of modern society. Concentration on power generation systems that are sustainable, in particular, discussion of the most recent innovations. GE credit: SocSci|SS.—S. (S.) Hwang

190. Professional Responsibilities of Engineers (3) Lecture—3 hours. Restricted to upper division students in the College of Engineering. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional ethics, societal, and political issues related to engineering. GE credit: SocSci|SS.—W. (W, S.) Tseregounis

198. Directed Group Study (1-5) May be repeated for credit up to 3 times. (P/ NP grading only) GE credit: SE.

Graduate


Engineering: Applied Science

(The Graduate Program in Applied Science)

The Department of Applied Science is not accepting new graduate students.

Courses in Engineering: Applied Science—Davis (EAD) Graduate

213A. Computer Graphics (3) Lecture—3 hours. Prerequisite: consent of instructor. Development of algorithms for perspective line drawings of three-dimensional objects, as defined by polygons or bicuspid patches.—W. (W.)

225. Biophotonics in Medicine and the Life Sciences (3) Lecture/discussion—3 hours. Prerequisite: Physics 108 and Biology 101-105; course 202 highly recommended; graduate standing. Introduction to the science and technology of biomedical optics and photonics, with an overview of applications in medicine and the life sciences. Emphasis on research supported by the NSF Center for Biophotonics at UC Davis Medical Center. (Same course as Biomedical Science 225 and Biophysics 255.)—W. (W.) Chuang, Matthews

230. Topics in Computational Fluid Dynamics (3) Lecture—3 hours. Prerequisite: course 210A, 210B or consent of instructor. A hands-on approach to numerical methods for compressible fluid flow. Readings and discussions of solution strategies complemented with programming exercises and projects to give first hand experience with performance and accuracy of several computational methods; from upwind differencing to Godunov methods.—S. (S.)

285D. Physics and Technology of Microwave Vacuum Electron Beam Devices (4) Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.—S. (S.) Luhmann