

ENGINEERING

Natural and Applied Sciences Division

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www.cabrillo.edu/programs

Engineering

Program Description:

Engineers are the people who design and build the systems, structures and products that make the world run. Engineers are employed in research, development, design, construction, manufacturing and operations of technical projects related to almost all aspects of modern life, including the environment, communications, transportation, food production, medicine and health, space exploration, housing and energy.

Cabrillo College offers a two-year lower division engineering program that prepares students for transfer with full junior standing to colleges and universities in California and across the United States. The first two years of the engineering curriculum at all colleges and universities are similar with specialization commencing in the junior year in branches such as aerospace, civil, chemical, computer, electrical, environmental, industrial, materials and mechanical engineering.

An engineering student at Cabrillo does not need to select a major branch of engineering study until applying for transfer to a college or university; however, some of the course requirements for transfer depend on the student's intended major and the transfer university. Completion of the lower division core courses below is essential in facilitating progress as an upper division engineering transfer student.

It is important that engineering students meet with the engineering transfer counselor or Engineering Department for specific requirements for transfer.

Model Program for Engineering

The Model Program fulfills requirements for the A.S. Degree in Engineering at Cabrillo College. Specific lower division major preparation at four-year public institutions in California can be found at www.assist.org. Please see a counselor for advisement for transfer to any four-year institution.

This program has been adopted by the Engineering Liaison Council of the California Intersegmental Council.

A.S. Degree: Engineering

A.S. General Education

21 Units

Core Courses (39 units)

The following core course is recommended for all potential engineering majors early in their academic career to help determine the field of engineering to pursue. (any of the courses above; at least 12 units of ENGR courses)

ENGR 5 Engineering as a Profession. 2

The following core courses are required for transfer for all engineering majors.

CHEM 1A General Chemistry I 5

ENGR 15 † Circuits 4

ENGR 25 *Graphics and Design 4

ENGR 35 †*Statics 3

ENGR 45 ††*Engineering Materials. 4

MATH 5A Analytic Geometry and Calculus I 5

MATH 5B Analytic Geometry and Calculus II 5

MATH 5C Analytic Geometry and Calculus III 5

MATH 7 Introduction to Differential Equations 3

PHYS 4A Physics for Scientists and Engineers 5

PHYS 4B ††Physics for Scientists and Engineers 5

PHYS 4C †† Physics for Scientists and Engineers 5

The following core courses are required for transfer for most engineering majors and by transfer universities.

CHEM 1B General Chemistry II 5

CS 11 Introduction to Programming Concepts and

Methodology, C++ 4

CS 19 C++ Programming 4

ENGR 1A †† Surveying 4

ENGR 10 †† Engineering Communication 2

ENGR 26 Solid Modeling. 2

MATH 6 † Introduction to Linear Algebra 3

PHYS 4D ††† Modern Physics 3

Total Units **60**

†spring only; ††fall only; †††fall only, even years

**Not required for electrical and computer engineering majors at most transfer universities.*

Engineering Courses

ENGR 1A

Surveying

4 units; 3 hours Lecture, 5 hours Laboratory

Prerequisite: MATH 3 or High School Trigonometry or MATH 4.

Recommended Preparation: ENGR 25 (may be taken concurrently); ENGL 100 or Eligibility for ENGL 1A/1AH/1AMC/1AMCH; READ 100.

Applies theory and principles of plane surveying: office computations and design; operation of surveying field equipment; and production of engineering plans/maps. Topics include distances, angles, and directions; differential leveling; traversing; property/boundary surveys; topographic surveys/mapping; volume/earthwork; horizontal and vertical curves; land description techniques; construction applications; and GPS. Extensive field work using tapes, levels, transits, theodolites, total stations, and GPS. Fall semester only.

Transfer Credit: Transfers to CSU, UC.

ENGR 5

Engineering as a Profession

2 units; 2 hours Lecture

Prerequisite: ENGL 100 or Eligibility for ENGL 1A/1AH/1AMC/1AMCH.

Recommended Preparation: Eligibility for READ 100.

Provides information to evaluate the engineering profession as a personal career choice. Explores the branches of engineering, the functions of an engineer, and the industries in which they work. Presents an introduction to the methods of engineering analysis, design and problem solution emphasizing the interface of the engineer with society and engineering ethics. Explains the engineering education process and explores effective strategies for students to reach their full academic potential.

Transfer Credit: Transfers to CSU, UC.

ENGR 10

Engineering Communication

2 units; 2 hours Lecture, 1 hour Laboratory

Prerequisite: ENGL 1A/1AH/1AMC/1AMCH.

Recommended Preparation: Eligibility for READ 100.

Develops written, computer and oral communication skills in analyzing and presenting data in solving engineering problems. Builds analysis, computation, teamwork and presentation skills; teaches writing and organizing principles for effective technical writing; and utilizes computer applications to create and present engineering projects. Fall semester only.

Transfer Credit: Transfers to CSU; UC, with conditions: In order for transfer credit to be granted for 10, ENGR 5 must also be taken.

ENGR 15

Circuits

4 units; 3 hours Lecture, 4 hours Laboratory

Prerequisite: PHYS 4B.

Hybrid Requisite: Completion of or concurrent enrollment in MATH 7.

Recommended Preparation: ENGL 100 or Eligibility for ENGL 1A/1AH/1AMC/1AMCH; Eligibility for READ 100.

Analyzes the behavior of currents and voltages in electrical circuits containing resistive, capacitive, inductive passive elements, along with op-amps interconnected to voltage and current sources. Basic circuit laws, network theorems and computer analysis are used to solve DC steady state circuits, RC, RL, and RLC DC circuit transients and sinusoidal AC steady state circuits. Power and energy analysis is performed throughout the course. Students enrolled in the Honors Transfer Program may count this course towards the "Honors Scholar" designation. Spring semester only.

Transfer Credit: Transfers to CSU, UC.

ENGR 25

Graphics and Design

4 units; 3 hours Lecture, 5 hours Laboratory

Prerequisite: MATH 153 or MATH 2 or MATH 4 or High School Geometry.

Recommended Preparation: ENGL 100 or Eligibility for ENGL 1A/1AH/1AMC/1AMCH; Eligibility for READ 100.

Applies principles of engineering drawing in visually communicating engineering designs using freehand sketching, instrument drawing, and computer-aided drafting/design using AutoCAD. Topics include orthographic and pictorial drawings; descriptive geometry; detail and assembly drawings; dimensioning and tolerancing; and scales. Acquire an in-depth understanding of the engineering design process and improve creativity in solving engineering problems.

Transfer Credit: Transfers to CSU, UC.

ENGR 26

Solid Modeling

2 units; 1 hour Lecture, 4 hours Laboratory

Prerequisite: ENGR 25.

Recommended Preparation: ENGL 100 or Eligibility for ENGL 1A/1AH/1AMC/1AMCH; Eligibility for READ 100.

Applies principles of solid modeling using Pro/Engineer in engineering design and the production of engineering drawings. Construct parts, solid models, and assemblies. Plot three-dimensional drawings and dimensioned orthographic drawings. Produce engineering documentation packages. Spring semester only.

Transfer Credit: Transfers to CSU, UC.

ENGR 35

Statics

3 units; 3 hours Lecture, 1 hour Laboratory

Prerequisite: PHYS 4A.

Hybrid Requisite: Completion of or concurrent enrollment in MATH 5C.

Recommended Preparation: ENGR 25 and ENGL 100 or Eligibility for ENGL 1A/1AH/1AMC/1AMCH; Eligibility for READ 100.

Analyzes two- and three-dimensional force systems on rigid bodies in static equilibrium. Vector and scalar analysis methods address forces acting on rigid bodies, trusses, frames, machines, and beams. Topics include distributed force systems, friction, shear and bending moment diagrams; centroids/center of mass, moment of inertia. Additional topics include Mohr's circle and virtual work. Students enrolled in the Honors Transfer Program may count this course towards the "Honors Scholar" designation. Spring semester only.

Transfer Credit: Transfers to CSU, UC.

ENGR 45

Engineering Materials

4 units; 3 hours Lecture, 4 hours Laboratory

Prerequisite: PHYS 4A and CHEM 1A and ENGL 1A/1AH/1AMC/1AMCH.

Recommended Preparation: ENGR 10 and CHEM 1B and Eligibility for READ 100.

Presents the properties and performance of engineering materials and their relationship to the internal structure of materials. Applies the concepts of material science and engineering in testing materials using laboratory testing equipment. Utilizes analysis techniques in selecting the appropriate materials to meet engineering design criteria. Engineering materials include metals, polymers, ceramics, composites, and semiconductors. Fall semester only.

Transfer Credit: Transfers to CSU, UC.

ENGR 99A-Z

Special Topics in Engineering

0.5 - 5 units; 0.5 hour Lecture

Repeatability: May be taken a total of 4 times.

Selected topics in Engineering not covered by regular *Catalog* offerings. Each special topic course will be announced, described, and given its own title and letter designation in the *Schedule of Classes*. The structure and format of the classes will vary depending on the subject matter.

Transfer Credit: Transfers to CSU.