

166 Engineering

Definition

Engineering is concerned with the application of scientific and mathematical theories and principles to solve practical technical problems. Under this wide engineering umbrella comes the Engineering Technology program for students desiring to work in engineering related jobs.

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Program Description

The Engineering program at Antelope Valley College has three distinct components: 1) a certificate program in Engineering Technology; 2) associate degree programs in Engineering and Engineering Technology; and 3) Engineering transfer.

Students must receive a minimum grade of "C" or better in all required core courses and the specific courses listed as program electives in order to qualify for the degree or certificate.

Distinctive Features

The Engineering program offers the student challenging and rewarding classes that transfer to four-year universities in California. The Engineering courses listed under the Associate Degree in Engineering should suffice for most engineering majors transferring to a

major university. See a counselor for specific general education requirements.

Career Options

Aerospace Engineering
Agricultural Engineering
Architectural Engineering
Biomedical Engineering
Chemical Engineering
Civil Engineering
Computer Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering
(Most of these careers require education beyond the two-year college level.)

Certificate Program

Engineering Technology

The following courses (32 units minimum) are required for the certificate.

Required Courses:	units
CIS 161, Introduction to C Programming	3
DRFT 125, Mechanical Drafting or DRFT 130, Architectural Draft. I	3
DRFT 150, Interm. 2-D AutoCAD	3
DRFT 240, Electronic Drafting	3
ELTE 125, Direct and Alternating Current Principles	5
ENGR 115, Basic Engineer Drawing	3
ENGR 120, Introduction to 2-D AutoCAD	3
MATH 130, College Algebra	4
Program Electives	5
Total	32

For a recommended plan of study for the certificate, please refer to the Associate Degree plan minus the general education requirements.

Program Electives:	units
DRFT 230, Architectural Drafting II	3
DRFT 250, Intro. to 3-D AutoCAD	2
MATH 150, Calculus and Analytical Geometry	5

(See Drafting/Computer Aided Design for Drafting/CAD program.)

Associate Degrees

Engineering Technology

The requirements for an associate degree in Engineering Technology may be satisfied by completing the certificate program in addition to the associate degree requirements. (See Graduation/Associate Degree Requirements.)

Students who complete the associate degree in Engineering Technology will have drafting and programming skills of value in all fields of engineering and applied technologies including aerospace manufacturing, construction technology, public works, and industrial research and development. They will have entry level skills that would serve as a foundation for advancement in their field of employment. Moreover, the associate degree will also provide students with a broad range of knowledge with which: to evaluate and appreciate the physical environment, the culture, and the society in which they live; the ability to think critically; and the ability to communicate clearly and effectively.

Except in cases of a prerequisite requirement, it is not required to take courses in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Plan of Study

First Semester	units
ENGR 115, Basic Engineer Drawing	3
ENGR 120, Intro. to 2-D AutoCAD	3
MATH 130, College Algebra	4
Course from GE requirement Area B	3
Course from GE requirement Area D1	3
Total	16

Second Semester	units
DRFT 125, Mechanical Drafting or DRFT 130, Architectural Draft. I	3
DRFT 150, Interm. 2-D AutoCAD	3
ELTE 125, Direct and Alternating Current Principles	5
Course from GE requirement Area C	3
Total	14

Third Semester	units
CIS 161, Introduction to C Programming	3
DRFT 240, Electronic Drafting	3

Course from GE requirement Area F	3
Program Electives	<u>5</u>
Total	14

Fourth Semester	units
Course from GE requirement Area E	3
Electives	<u>13</u>
Total	16

Degree Total 60

Program Electives:

Please refer to the Program Electives listed under the certificate program.

NOTE: Semester order for classes and time to complete may vary for night students.

Engineering

The requirements for an associate degree in Engineering may be satisfied by completing the courses listed below in addition to the associate degree requirements. (See Graduation/Associate Degree Requirements.)

Required Courses:	units
ENGR 110, Engineering Orientation and Basic Skills	3
ENGR 120, Introduction to 2-D AutoCAD	3
ENGR 130, Materials Science	3
ENGR 210, Statics	3
ENGR 210PS, Statics Problem Solving Session	1
ENGR 220, Strength of Materials	3
ENGR 220PS, Strength of Materials Problem Solving Session	1
ENGR 220L, Strength of Materials Lab	1
ENGR 230, Circuit Analysis	4

Transfer

A student planning to pursue a bachelor's degree in Engineering should consult with the Transfer Center for specific program information.

Engineering Major—CSU and UC

The following foundation courses are common to many programs.

CHEM 110, General Chemistry	5
ENGR 110, Engineering Orientation and Basic Skills	3
ENGR 120, Introduction to 2-D AutoCAD	3

ENGR 130, Materials Science	3
ENGR 210, Statics	3
ENGR 220, 220L, 220 PS, Strength of Materials/Lab/Problem Solving Session	5
ENGR 230, Circuit Analysis	4
MATH 150, 160, 250, Calculus and Analytic Geometry	15
MATH 230, Intro. to Ordinary Differential Equations	3
PHYS 110, 120, 211, General Physics/Lab	15

NOTE: No grade lower than "C" will be accepted for transfer from AVC in major courses. Always check the appropriate transfer institution catalog and consult with a counselor.

Prerequisite Completion

If a course is listed as a prerequisite for another course, that prerequisite course must be completed with a satisfactory grade in order to enroll in the next course. According to Title 5, Section 55200(d), a satisfactory grade is a grade of "A," "B," "C" or "P". Classes in which the Pass/No Pass option is available are indicated with an asterisk (*) before the course title. See "Pass/No Pass Option" in the catalog for full explanation.

Engineering Courses

ENGR 110 *ENGINEERING ORIENTATION AND BASIC SKILLS

3 units

3 hours weekly

Advisory: Eligibility for MATH 102.

The purpose of this course is to provide an introduction to the profession of engineering and its connection with society today and in the future. The development of basic engineering skills for future success in the field will be emphasized. Engineering disciplines, functions, and employment opportunities will be considered. Application of the engineering problem solving method, teamwork, and the design process are practiced. Typical engineering problems

will be solved aided by use of computer software. College courses required for individual engineering majors will be illustrated. (CSU, UC, AVC)

ENGR 115 *BASIC ENGINEERING DRAWING

3 units

6 hours weekly

Advisory: Eligibility for MATH 070.

Introductory engineering drawing covers lettering, use of instruments and rulers, applied geometry, sketching, sectional views, orthographic projection and auxiliary views. Computerized software will be introduced. This course is intended for vocational training leading to a certificate and a basic drawing background for engineers transferring to a university. (CSU, AVC)

ENGR 120 *INTRODUCTION TO 2-D AUTOCAD

3 units

6 hours weekly

Prerequisite: Completion of or concurrent enrollment in ENGR 115.

Advisory: Eligibility for READ 099.

Introduction to the study of 2-dimensional (2D) computer aided design/drafting (CADD). The student will learn to perform on the computer all the skills learned in ENGR 115. Includes lectures, demonstrations and laboratory practice. Student will gain experience in the preparation of industry quality drawings as a result of the training. Previous skills in computer operation are not required. Work to be performed in AutoCAD. (CSU, AVC) (R2)

ENGR 130 MATERIALS SCIENCE

3 units

3 hours weekly

Prerequisite: Completion of CHEM 110 and PHYS 110.

Corequisite: Concurrent enrollment in ENGR 130L.

A study of production, composition, test methods and properties of important engineering materials. Emphasizes relation of the atomic structure of engineering materials to their physical properties. (CSU, UC, AVC)

ENGR 130L MATERIALS SCIENCE LAB

1 unit

3 hours weekly

Corequisite: Concurrent enrollment in ENGR 130.

A laboratory course designed to accompany ENGR 130, Materials Science. (CSU, AVC)

ENGR 185 *DIGITAL LOGIC AND DESIGN

5 units

6 hours weekly

(3 hours lecture, 3 hours lab)

Prerequisite: Completion of MATH 102.

Advisory: Eligibility for ENGL 101 and READ 099.

This course covers discrete mathematics, logic Boolean algebra, binary arithmetic, logic gates, combinatorial logic, and minimization techniques. Includes an introduction to sequential circuits, state machines and synchronous state machine design. Students will design combinatorial circuits, flipflops, multivibrators, registers and counters. (CSU, UC, AVC)

ENGR 199 *OCCUPATIONAL WORK EXPERIENCE

1–8 units

hours vary

Prerequisite: To participate in work experience, students must have a job or internship which is either paid or voluntary and have the approval of the supervisor and instructor supervising work experience in the specific subject area. PRIOR TO ENROLLING, students must attend a scheduled orientation or meet individually with the supervising instructor for an individual orientation.

Occupational Work Experience Education is supervised employment designed to provide students a realistic learning experience through work. The ultimate goal is to teach students those skills and attitudes that will equip them to function and adapt as an employee in a variety of situations and jobs. Occupational Work Experience Education is supervised employment extending classroom-based occupational learning at an on-the-job learning station related to the students' educational major or occupational goal.

Credit may be accrued at the rate of one to eight units per semester. For the satisfactory completion of all types of Cooperative Work Experience Education (WE 197 and WE 199), students may earn up to a total of sixteen semester credit hours. (CSU, AVC) (R3)

ENGR 210 STATICS

3 units

3 hours weekly

Prerequisite: Completion of MATH 150 and PHYS 110.

Corequisite: Concurrent enrollment in ENGR 210PS.

Analytical and graphical study of force systems, concurrent and non-concurrent, coplanar and non-coplanar. Centroids, principal moment of inertia, trusses, frames, friction, virtual work, potential energy will be studied; vector methods and calculus will be used as appropriate.

NOTE: Offered fall semester only. (CSU, UC, AVC)

ENGR 210PS *STATICS PROBLEM SOLVING SESSION

1 unit

1 hour weekly

Corequisite: Concurrent enrollment in ENGR 210.

Problem solving session for ENGR 210, Statics, which augments the theoretical lecture session with necessary "hands-on" experience. (CSU, AVC)

ENGR 220 *STRENGTH OF MATERIALS

3 units

3 hours weekly

Prerequisite: Completion of ENGR 210.

Corequisite: Concurrent enrollment in ENGR 220L.

Advisory: Concurrent enrollment in ENGR 220PS.

Stresses and strains under axial, shearing, and torsional forces; flexural stresses and deflections of simple beams; columns and combined stresses. Failure theories, statically indeterminate problems, and energy methods will be considered. (CSU, UC, AVC)

ENGR 220PS *STRENGTH OF MATERIALS PROBLEM SOLVING SESSION

1 unit

1 hour weekly

Corequisite: Concurrent enrollment in ENGR 220.

Problem solving session for the ENGR 220 class, which augments the theoretical lecture session with necessary "hands-on" experience. (CSU, AVC)

ENGR 220L *STRENGTH OF MATERIALS LAB

1 unit

3 hours weekly

Corequisite: Concurrent enrollment in ENGR 220.

A laboratory course designed to accompany ENGR 220 lecture. (CSU, AVC)

ENGR 230 CIRCUIT ANALYSIS

4 units

6 hours weekly

Prerequisite: Completion of MATH 160 and PHYS 120.

Ohm's and Kirchoff's Law, Mesh and Nodal analysis, basic network theorems, RL and RC transients, phasors and steady-state sinusoidal analysis, first and second order circuits, current, voltage and power relationships. (CSU, UC, AVC)