

Definition

Engineering is concerned with the application of scientific and mathematical theories and principles to solve practical technical problems.

Staff

To access faculty and staff, dial (661) 722-6300, then the 4-digit extension.

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Program Description

The Engineering program at Antelope Valley College has three distinct pathways: 1) Mechanical/Aerospace Engineering, 2) Electrical Engineering, and 3) Computer Engineering that prepare students for transfer. AVC has an agreement with the CSU Long Beach Antelope Valley Engineering Program, Engineering Transfer Agreement Pathway (ETAP), that offers priority acceptance for students satisfying the ETAP.

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 Degrees in each engineering area should suffice for those specific engineering majors, and possibly those beyond transferring to a major university. See a counselor for specific details and general education requirements.

Career Options

Mechanical Engineering

Electrical Engineering

Computer Engineering

Biomedical Engineering

Aerospace Engineering

Civil Engineering

and many more sub areas of engineering (see a counselor for

details)

(Most of these careers require education beyond the two-year college level.)

Program Learning Outcomes

Computer Engineering

1. Apply knowledge of math, science, and engineering to identify, define, and solve computer engineering related problems.
2. Design and perform tests/experiments, analyze and interpret data, and prepare technical reports as a member of a group.
3. Effectively employ techniques, skills, and computational tools necessary for computer engineering.

Electrical Engineering

1. Apply knowledge of math, science, and engineering to identify, define, and solve electrical engineering related problems.
2. Design and perform tests/experiments, analyze and interpret data, and prepare technical reports as a member of a group.
3. Effectively employ techniques, skills, and computational tools necessary for electrical engineering.

Mechanical Engineering

1. Apply knowledge of math, science, and engineering to identify, define, and solve engineering problems.
2. Communicate effectively and work efficiently in a team environment.
3. Design and perform tests/experiments, analyze and interpret data, and prepare technical reports.
4. Effectively employ techniques, skills, and computational tools necessary for engineering.

Associate Degrees

Computer Engineering

The Associate in Sciences in Computer Engineering will provide students with a fundamental knowledge of Computer Engineering, to enhance their computational and problem solving skills, sharpen their critical thinking, and to ensure proper preparation for junior level Computer Engineering coursework at a university. Students completing this degree should realize that there are many sub disciplines in Computer Engineering and most require a similar core education, but not all. The requirements for an associate degree in Computer 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
MATH 150, Calculus and Analytiv Gemetry	5
MATH 160, Calculus and Analytic Geometry	4
MATH 250, Calculus and Analytic Geometry	4
MATH 230, Introduction to Ordinary Differential Equations	4
PHYS 110, General Physics	4
PHYS 120, General Physics	4
ENGR 110, Engineering Orientation and Basic Skills,	3
CIS 121, Computer Mathematics	4
ENGR 230, Circuit Analysis	4

MATH 220, Linear Algebra 4

Program Electives:

Students will need to complete three of the following courses based on their selected transfer institution's requirements.

CIS 250 Introduction to Python Programming	4
CIS 111, Introduction to Programming and Algorithms	3
CIS 113, Data Structures	3
CIS 123, Assembly Language and Computer Architecture	3
CIS 161, Introduction to C Programming	3
CIS 173, Introduction to C++ Programming	3
CIS 175, Java Programming	3

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.

First Semester

	units
ENGR 110, Engineering Orientation and Basic Skills	3
MATH 150, Calculus and Analytic Geometry	5
General Ed, Area B - Social & Behavioral Sciences	3
General Ed, Area D1 - English Composition	3
Total:	14

Second Semester

	units
Program Electives	6
MATH 160, Calculus and Analytic Geometry	4
PHYS 110, General Physics	4
Total:	14

Third Semester

	units
MATH 250, Calculus and Analytic Geometry	4
MATH 250, Calculus and Analytic Geometry	4
PHYS 120, General Physics	4
CIS 121, Computer Mathematics	4
General Ed, Area C - Humanities	3
Program Elective	3
Total	21

Fourth Semester

	units
MATH 220, Linear Algebra	4
MATH 230, Introduction to Ordinary Differential Equations	4
ENGR 230, Circuit Analysis	4
General Ed, Area F - Diversity Studies	3
Total	15

Degree Total 6

Electrical Engineering

The Associate in Sciences in Electrical Engineering will provide students with a fundamental knowledge of Electrical Engineering, to enhance their computational and problem solving skills, sharpen their critical thinking, and to ensure proper preparation for junior level Electrical Engineering coursework at a university. Students completing this degree should realize that there are many sub disciplines in Electrical Engineering and most require a similar core education, but not all. The requirements for an associate degree in Electrical 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
CIS 161, Introduction to C Programming	3
ENGR 110, Engineering Orientation and Basic Skills	3
ENGR 125, Programming and Problem Solving in MATLAB	4
ENGR 185, Digital Logic and Design	4
ENGR 230, Circuit Analysis	4
MATH 150, Calculus and Analytic Geometry	5
MATH 160, Calculus and Analytic Geometry	4
MATH 230, Introduction to Ordinary Differential Equations	4
MATH 250, Calculus and Analytic Geometry	4
PHYS 110, General Physics	4
PHYS 120, General Physics	4
PHYS 211, General Physics	5
Total	48

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

	units
First Semester	
ENGR 110, Engineering Orientation and Basic Skills	3
MATH 150, Calculus and Analytic Geometry (AVC GE D2)	5
Course from GE requirement Area B	3
Course from GE requirement Area D1	3
Total	14

	units
Second Semester	
CIS 161, Introduction to C Programming (AVC GE E)	3
ENGR 125, Programming and Problem Solving in MATLAB	4
MATH 160, Calculus and Analytic Geometry	4
PHYS 110, General Physics (AVC GE A)	4
Total	15

	units
Third Semester	
ENGR 185, Digital Logic and Design	4
MATH 250, Calculus and Analytic Geometry	4
PHYS 120, General Physics	4
Course from GE requirement Area C	3
Total	15

	units
Fourth Semester	
ENGR 230, Circuit Analysis	4
MATH 230, Introduction to Ordinary Differential Equations	4
PHYS 211, General Physics	5
Course from GE requirement Area F	3
Total	16
Degree Total	60

Mechanical Engineering

The Associate in Sciences in Mechanical Engineering will

provide students with a fundamental knowledge of Mechanical Engineering, to enhance their computational and problem solving skills, sharpen their critical thinking, and to ensure proper preparation for junior level Mechanical Engineering coursework at a university. Students completing this degree should realize that there are many sub disciplines in Mechanical Engineering and most require a similar core education, but not all. The requirements for an associate degree in Mechanical 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
CHEM 110, General Chemistry	5
ENGR 110, Engineering Orientation and Basic Skills	3
ENGR 125, Programming and Problem Solving in MATLAB	4
ENGR 130, Materials Science	3
ENGR 130L, Materials Science Lab	1
ENGR 140, Engineering 3D Graphics	3
ENGR 210, Statics	4
MATH 150, Calculus and Analytic Geometry	5
MATH 160, Calculus and Analytic Geometry	4
MATH 230, Introduction to Ordinary Differential Equations	4
MATH 250, Calculus and Analytic Geometry	4
PHYS 110, General Physics	4
PHYS 120, General Physics	4
Total	48

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
CHEM 110, General Chemistry (AVC GE A)	5
ENGR 110, Engineering Orientation and Basic Skills	3
MATH 150, Calculus and Analytic Geometry (AVC GE D2)	5
Total	13

Second Semester	units
ENGR 125, Programming and Problem Solving in MATLAB	4
MATH 160, Calculus and Analytic Geometry	4
PHYS 110, General Physics (AVC GE E)	4
Course from GE requirement Area D1	3
Total	15

Summer	units
ENGR 130, Materials Science	3
ENGR 130L, Materials Science Lab	1
Total	4

Third Semester	units
ENGR 140, Engineering 3D Graphics	3
MATH 230, Introduction to Ordinary Differential Equations	4
PHYS 120, General Physics	4
Course from GE requirement Area C	3
Total	14

Fourth Semester	units
ENGR 210, Statics	4

MATH 250, Calculus and Analytic Geometry	4
Course from GE requirement Area B	3
Course from GE requirement Area F	3
Total	14
Degree Total	60

Transfer

Students planning to continue studies at a four-year college or university after AVC should visit the Transfer Resource Center and consult with a counselor as soon as possible. Additional information on official transfer articulation agreements from AVC to many CSU/UC campuses can be found at the following Web site: www.assist.org

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

Prerequisite: Completion of MATH 135.

The course explores the branches of engineering, the functions of an engineer, and the industries in which engineers work. Explains the engineering education pathways and explores effective strategies for students to reach their full academic potential. Presents an introduction to the methods and tools of engineering problem solving and design including the interface of the engineer with society and engineering ethics. Develops communication skills pertinent to the engineering profession. (C-ID: ENGR 110) (CSU, AVC)

ENGR 125 PROGRAMMING AND PROBLEM-SOLVING IN MATLAB

4 units

6 hours weekly

(3 hours lecture, 3 hours lab)

Prerequisite: Completion of MATH 150.

This course utilizes the MATLAB environment to provide students with a working knowledge of computer-based problem-solving methods relevant to science and engineering. It introduces the fundamentals of procedural and object-oriented programming, numerical analysis, and data structures. Examples and assignments in the course are drawn from practical applications in engineering, physics, and mathematics. (C-ID: ENGR 220) (CSU, UC, AVC)

ENGR 130 MATERIALS SCIENCE

4 units

6 hours weekly

Prerequisite: Completion of CHEM 110 and PHYS 110.

This course presents the internal structures and resulting behaviors of materials used in engineering applications, including metals, ceramics, polymers, composites, and semiconductors. The emphasis is upon developing the ability both to select appropriate materials to meet engineering design criteria and to understand the effects of heat, stress, imperfections, and chemical environments upon material properties and performance. (C-ID: ENGR 140 and ENGR 140L) (CSU, UC, AVC)

ENGR 140 ENGINEERING 3D GRAPHICS

3 unit

6 hours weekly

Prerequisite: Completion of MATH 135 (AVC placement through multiple measures).

This course covers the principles of engineering drawings in visually communicating engineering designs and an introduction to computer-aided design (CAD). Topics include the development of visualization skills; orthographic projections; mechanical dimensioning and tolerancing practices; and the engineering design process. Assignments develop sketching and 2-D and 3-D CAD skills. The use of CAD software is an integral part of the course. (C-ID: ENGR 150) (CSU, UC, AVC)

ENGR 185 *DIGITAL LOGIC AND DESIGN

4 units

6 hours weekly

(3 hours lecture, 3 hours lab)

Prerequisite: Completion of MATH 135.**Advisory:** Completion of ENGL 101.

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 student's 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

4 units

4 hours weekly

Prerequisite: Completion of MATH 160 and PHYS 110.

A first course in engineering mechanics: properties of forces, moments, couples and resultants; two- and three-dimensional force systems acting on engineering structures in equilibrium; analysis of trusses, and beams; distributed forces, shear and bending moment diagrams, center of gravity, centroids, friction, and area and mass moments of inertia. Optional additional topics include fluid statics, cables, Mohr's circle and virtual work. (C-ID: ENGR 130) (CSU, UC, 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.

This course is a study of stresses, strains and deformations associated with axial, torsional and flexural loading of bars, shafts and beams, as well as pressure loading of thin-walled pressure vessels. The course also covers stress and strain transformation, Mohr's Circle, ductile and brittle failure theories, and the buckling of columns. Statically indeterminate systems are also studied. (C-ID ENGR 240) (CSU, UC, AVC)

ENGR 230 CIRCUIT ANALYSIS

4 units

6 hours weekly

(3 hours lecture, 3 hours lab)

Prerequisite: *Completion of PHYS 120.*

Corequisite: *Completion of or concurrent enrollment in MATH 230.*

An introduction to the analysis of electrical circuits. Use of analytical techniques based on the application of circuit laws and network theorems. Analysis of DC and AC circuits containing resistors, capacitors, inductors, dependent sources, operational amplifiers, and/or switches. Natural and forced responses of first and second order RLC circuits; the use of phasors; AC power calculations; power transfer; and energy concepts. (C-ID ENGR 260L) (CSU, UC, AVC)