



# Engineering

## Degrees

Engineering, Associate of Science

Engineering Technology, Associate of Science

# Engineering

## Associate of Science Degree

The Associate of Science in Engineering program provides the necessary foundation for a career in the various fields of engineering. People working in the field of engineering and related technical fields “bridge the gap” between scientific principles and the application of these principles to the needs of society. The field is quite diversified with exciting job opportunities for people with varied mathematic, scientific, and technical skills.

An engineer uses experience and judgment, as well as advanced training in engineering, science, and mathematics to formulate ideas and designs, and to determine standards, specifications, work orders and schedules so that projects can be economically beneficial to mankind. A Bachelor of Science Degree in Engineering is required for this field, although students with the Associate of Science in Engineering degree can obtain employment as Engineering Technicians.

### Program Learning Outcomes

Upon successful completion of the Associate of Science in Engineering degree, the student will:

- Demonstrate proficiency in technical skills and safety principles required for employment as an engineering technician.
- Apply problem solving skills used in engineering design and product development.
- Demonstrate a deep understanding of the core material required for transfer to a four year university degree program in engineering.

### Career Opportunities:

Engineering Technician (with AS degree), Engineer (with BS degree)

### To Achieve the Associate of Science Degree

Upon completion of graduation requirements and the required degree courses with at least a ‘C’ grade in each course, the student will be awarded an Engineering Associate of Science Degree.

### Total Units: 44

#### Required Courses

Course #	Name	Units
ENGR B47	Introduction to Engineering and Design	2.0
MATH B6A	Analytic Geometry/Calculus I	4.0
MATH B6B	Analytic Geometry/Calculus II	4.0
MATH B6C	Calculus III	4.0
MATH B6D	Ordinary Differential Equations	3.0
PHYS B4A	Mechanics and Wave Motion	4.0
PHYS B4B	Heat, Electricity, Magnetism	4.0
CHEM B1A	General Chemistry I	5.0
ENGR B17	Introduction to Electric Circuits	3.0
ENGR B20	Programming and Problem-Solving in MATLAB	4.0
	<i>or</i>	
ENGR B19C	Introduction to Programming Concepts and Methodologies for Engineers	4.0

Electives: Select at least seven units from:

Course #	Name	Units
ENGR B17L	Electrical Circuit Lab	1.0
ENGR B24	Engineering Graphics and Descriptive Geometry	3.0
ENGR B36	Engineering Mechanics – Statics	3.0
ENGR B37	Engineering Mechanics – Dynamics	3.0
ENGR B40	Surveying	3.0
ENGR B45	Properties of Materials	4.0
COMP B12	Programming Concepts and Methodology II	3.0
COMP B14	Discrete Structures	3.0
MATH B6E	Elementary Linear Algebra	3.0
PHYS B4C	Optics and Modern Physics	4.0
CHEM B1B	General Chemistry and Chemical Analysis	5.0
GEOL B10	Introduction to Geology	3.0

#### Recommended Sequence

##### Semester 1 (17 units — suggested GE listed)

Course #	Name	Units
ENGR B47	Introduction to Engineering and Design	2.0
MATH B6A	Analytic Geometry/Calculus I	4.0
CHEM B1A	General Chemistry I	5.0
POLS B1	American Government: National, State and Local	3.0
HLED B1	Principles of Health Education	3.0

##### Semester 2 (15 units— suggested GE listed)

Course #	Name	Units
MATH B6B	Analytic Geometry/Calculus II	4.0
PHYS B4A	Mechanics and Wave Motion	4.0
ENGL B1A	Expository Composition	3.0
Art B4	Two-Dimensional Design	3.0
PHED course	Physical Education	1.0

##### Semester 3 (15 units— suggested GE listed)

Course #	Name	Units
MATH B6C	Calculus III	4.0
PHYS B4B	Heat, Electricity, Magnetism	4.0
ENGR B20	Programming and Problem-Solving in MATLAB	4.0
	<i>or</i>	
ENGR B19C	Introduction to Programming Concepts and Methodologies for Engineers	4.0
HIST B17A	History of the United States	3.0

##### Semester 4 (16 units— it may be a range)

Course #	Name	Units
MATH B6D	Ordinary Differential Equations	3.0
ENGR B17	Introduction to Electric Circuits	3.0
COMM B8	Small Group Communication	3.0
	Elective (7 units)	4.0

## Engineering Technology Associate of Science

The Engineering Technology program at Bakersfield College is designed for those who want a hands-on engineering career with a focus on technology in an applied setting. The program provides students with foundational knowledge in mathematics, critical thinking, problem solving, and engineering design, as well as strong technical skills so that students can adapt to the ever-changing modern industrial workplace. Upon completion of the required core classes engineering technology students select elective classes from an engineering discipline (or combination of disciplines) of interest – architectural, civil, industrial drawing, mechanical, electrical/electronics, or occupational safety.

Graduates of associate degree programs seek employment as engineering technicians. Graduates of bachelor degree programs are referred to as technologists and can earn a Professional Engineers license in the state of California. Engineering technicians and technologists serve as members of the engineering team and engage in the management, design, production, assembly, quality control and sales activities in their respective fields.

Cal Poly Pomona, CSU Long Beach, and the California Maritime Academy each have bachelor's degree programs in engineering technology. Students interested in transferring should meet with a Bakersfield College counselor and plan the courses required for transfer to a four-year college or university to pursue a bachelor's degree in Engineering Technology.

### Total Units: 38-40

#### Required Courses (24-26 units)

Course #	Name	Units
CHEM B2A	Introductory General Chemistry	4.0
	<i>or</i>	
CHEM B1A	General Chemistry I	5.0
ENGR B19C	Introduction to Programming Concepts and Methodologies for Engineers	4.0
	<i>or</i>	
ENGR B20	Programming & Problem Solving in MATLAB	3.0
ENGR B24	Engineering Graphics	3.0
ENGR B47	Introduction to Engineering	2.0
MATH B6A	Descriptive Geometry / Calculus I	4.0
PHYS B2A	General Physics - Mechanics and Heat	4.0
	<i>or</i>	
PHYS B4A	Mechanics and Wave Motion	4.0
PHYS B2B	General Physics - Sound, Light, Electricity, Magnetism, Modern Physics	4.0
	<i>or</i>	
PHYS B4B	Heat, Electricity, Magnetism	4.0

### Program Learning Outcomes

Upon successful completion, the student will be able to:

- Solve technical engineering problems by applying design and engineering process methodologies.
- Demonstrate an ability to apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require limited application of principles but extensive practical knowledge.
- Communicate engineering design solutions effectively through individual and cooperative group efforts including speaking, writing, presentation, and the use of various design graphics and technical software.
- Demonstrate an ability to function effectively as a member of a technical team.

### To Achieve the Associate of Science Degree

Upon completion of graduation requirements and the required degree courses with a minimum grade point average of 2.0 with a 'C' grade or higher in each course required, the student will be awarded an Engineering Technology Associate of Science Degree. A "P" (Pass) grade is not an acceptable grade for courses in the major.

#### Electives (14 units)

Choose a combination to total at least 14 units.

#### Architectural Electives

Course #	Name	Units
ARCH B30	Residential Building Information Modeling	4.0
ARCH B33	Architectural Computer Practice	3.0
ARCH B55	Residential Building Codes	3.0
ARCH B56	Commercial Codes	3.0
ARCH B6	Materials of Construction	3.0

#### Civil Electives

Course #	Name	Units
CNST B2	Estimating and Scheduling	3.0
ENGR B40	Surveying	3.0
INDR B20A	Computer Aided Drafting and Design	3.0
INDR B20B	Computer Aided Drafting and Design	3.0
INDR B52	Civil Drafting and Geographic Information Systems	3.0

## Engineering Technology

### Associate of Science *(Continued)*

#### *Electronics/Electrical Electives*

Course #	Name	Units
ELET B1A	Basic Electronics (DC)	3.0
ELET B1B	Electronic Circuits (AC and Analog)	3.0
ELET B3	Programmable Logic Controllers	3.0
ELET B56	Instrumentation and Process Control	3.0
INDR B51	Electrical Design	3.0

#### *Industrial Drawing Electives*

Course #	Name	Units
INDR B12	Introduction to Drafting and CAD	3.0
INDR B20A	Computer Aided Drafting and Design	3.0
INDR B20B	Computer Aided Drafting and Design	3.0
INDR B40	Parametric Modelling Fundamentals	3.0
INDR B42	Introduction to Solidworks	2.0
INDR B50	Process Piping	3.0

#### *Mechanical Electives*

Course #	Name	Units
ELET B70	Mechanical Systems	4.0
MFGT B1AB	Machine Tool Processes	3.0
WELD B1A	Introduction to Oxygen Acetylene Welding and Cutting	2.0
WELD B1B	Introduction to the Welding Processes	2.0
WELD B54A	Blueprint Reading for Welders and Machinists	3.0

#### *Occupational Safety and Risk Management Electives*

Course #	Name	Units
OSRM B10	Occupational Safety	3.0
OSRM B12	Occupational Health	3.0
OSRM B16	Managing Employee Safety and Health	3.0
OSRM B18	Occupational Regulations and Regulators	3.0
OSRM B20	Environmental Health and Hazardous Materials	3.0