

# ENGINEERING

## Associate Degrees

- Engineering - Associate in Arts
- Engineering - Associate in Science

### ENGR 001 Technology and Society 3 Units

This course will explore the interrelationships between technology and the social sciences. Specifically, the course will investigate the societal factors which impact technology (historical, political, economic, ethical, and environmental) and the ways in which technology affects society (language, art, music, psychology, and sociology). This course is appropriate for students in both technical and non-technical majors.

Lecture Hours: 3 Lab Hours: None Repeatable: No Grading: L  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: D IGETC: 4 District GE: D

### ENGR 010 Engineering Processes and Tools 3 Units

This course introduces students to the engineering profession and devices, processes, and techniques utilized in solving engineering problems. Engineering designs and their impact on society, environment, and economics are emphasized. Design principles and methodology are a major focus of the course. The use of spreadsheets and mathematical software in engineering problem solving and data presentation are explored. Engineering design process, report writing and technical presentations are practiced through term projects.

Lecture Hours: 2 Lab Hours: 3 Repeatable: No Grading: L  
 Prerequisite: MATH 021 or MATH 025, both with C or better  
 Recommended: The student should be able to use computers, word-processing software, and the Internet.  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

### ENGR 018 Engineering Design and Graphics 3 Units

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)

Lecture Hours: 2 Lab Hours: 3 Repeatable: No Grading: L  
 Prerequisite: MATH 022 with C or better or placement by multiple measures  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

### ENGR 050 Introduction to Computing 4 Units

Students learn the fundamentals of computer-assisted problem solving, as it applies to the solution of engineering problems. The four major themes of this course are algorithm development, efficient programming/modeling, PC device interfacing, and practical and user-friendly pre/post-processing techniques. The C++ programming language is used to obtain solutions to various engineering problems. Object-oriented programming using subjects such as classes, pointers, inheritances, dynamic allocation of memory space, and standard template libraries are emphasized.

Lecture Hours: 3 Lab Hours: 3 Repeatable: No Grading: L  
 Prerequisite: MATH 066 or MATH 071 with C or better  
 Recommended: Ability to use word processing and spreadsheet software; completion of ENGR 010  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

### ENGR 060 Surveying 3 Units

Students learn the basic theory and practice of surveying or geomatics as related to engineering practices. Basic concepts, standards, errors, and statistical handling are presented. Linear and angular measurements, profile leveling, and traversing are discussed. The concepts of bearings and azimuths as well as related computations are explained. Theory, use, and care of surveying instruments in establishing horizontal and vertical control are studied. In addition, students will gain practical experience through laboratory and fieldwork.

Lecture Hours: 2 Lab Hours: 3 Repeatable: No Grading: L  
 Prerequisite: MATH 021 or SG 100 both with C or better or placement by multiple measures  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

### ENGR 061 Plane Surveying 3 Units

Students learn various plane surveys and associated computations. The types of surveys covered include topographical, control, boundary, construction, and public land surveys. The types of calculations include coordinate geometry computations, area, and volume calculations from survey data. Horizontal and vertical curve computations and layout are also discussed. Least-squares adjustments, GPS, and GIS are introduced.

Lecture Hours: 2 Lab Hours: 3 Repeatable: No Grading: L  
 Recommended: Students are highly recommended to be familiar with the material covered in the Surveying class, ENGR 060  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

**ENGR 063 GIS for Civil Engineering and Surveying 3 Units**

Students learn the fundamentals of Geographical Information System (GIS) as related to civil engineering and surveying and how the Multipurpose Cadastre (MPC), Land Information System (LIS), and GIS fit together. Geodetic reference frames, base maps, cadastral overlays, and linkage mechanisms are also discussed. Data quality and accuracy, privacy, ethics, and institutional, governmental, and technological issues associated with GIS are explored. The ArcGIS software is taught and used in the course. GIS applications and existing case studies are presented. Federal Geographical Data Committee (FGDC) standards and future trends of GIS are addressed.

Lecture Hours: 2 Lab Hours: 3 Repeatable: No Grading: L  
 Recommended: ENGR 018 and ENGR 060  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

**ENGR 066 Properties of Materials 3 Units**

Mechanical, thermal, electrical, magnetic and chemical properties of materials are studied. The effect of atomic and crystal structure and various bonding mechanisms on the above properties are discussed. Diffusion and phase analysis in various materials, defects, and failure in materials including the effect of heat treatment on the strength of materials are also investigated. Various laboratory experiments such as impact, tensile and compression, torsion, fatigue, corrosion, thermal conduction and expansion, electrical conduction, magnetic strength, composite structure, rubber and polymer resilience, and photomicrograph are conducted to provide enhanced knowledge of material properties.

Lecture Hours: 2 Lab Hours: 3 Repeatable: No Grading: L  
 Prerequisite: CHEM 001A and PHYS 004A or PHYS 007A, all with C or better  
 Recommended: ENGR 010 and ability to use word processing and spreadsheet software  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

**ENGR 069 Statics 3 Units**

This course covers the equilibrium characteristics of various structures that are subject to external forces. The effects of various types of forces on the equilibrium of objects are discussed through the application of vector mechanics and the laws of Newton. Topics studied include two and three-dimensional rigid structures, free-body diagrams, the concept of centroids, distributed load analysis, moment of inertia analysis, friction, and virtual work. The structures considered are primarily trusses, machines, and frames.

Lecture Hours: 3 Lab Hours: None Repeatable: No Grading: L  
 Prerequisite: PHYS 004A or PHYS 007A with C or better  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

**ENGR 071 Introduction to Circuit Analysis 4 Units**

Analyses of DC and AC circuits are performed using Kirchhoff's voltage and current laws. Emphasis is given to resistive, capacitive, inductive, and amplifier circuits powered by independent and dependent sources. The transient nature of first-order and second-order circuits containing capacitors and inductors is studied. Thevenin's and Norton's theorems are applied to DC and AC circuits and properties of these circuits for maximum power transfer are determined. The concept of impedance is used to analyze AC circuits in the frequency domain as well as to perform power analysis. An introduction to the construction of electrical circuits, basic use of electrical test and measurement instruments including multimeters, oscilloscopes, power supplies, and function generators are given. Interpretation of measured and simulated data based on principles of circuit analysis for DC, transient, and sinusoidal steady-state (AC) conditions is discussed. Elementary circuit design incorporating operational amplifiers and practical considerations such as component value tolerance and non-ideal aspects of laboratory instruments is emphasized. Introduction to simulation software such as PSpice and MultiSim is given.

Lecture Hours: 3 Lab Hours: 3 Repeatable: No Grading: L  
 Prerequisite: MATH 078 and (PHYS 004B or PHYS 007B), all with C or better  
 Corequisite: MATH 078  
 Advisory Level: Read: 3 Write: 3 Math: None  
 Transfer Status: CSU/UC Degree Applicable: AA/AS  
 CSU GE: None IGETC: None District GE: None

**ENGR 500 Introduction to Engineering 0 Units**

This course consists of a survey of the field of engineering including all aspects of activities and responsibilities of a practicing engineer. Various disciplines are introduced and preparation and skills needed to successfully complete an engineering education and compete in the profession are detailed. Some historical perspective is included in order to provide a comprehensive view of the field. Topics such as engineering successes, failures, current/future challenges, and the impact of engineering and technology on society are also included. This course is intended to provide a general overview of the engineering field to those who are planning on pursuing a technical career.

Lecture Hours: 1.5 Lab Hours: None Repeatable: Yes Grading: N  
 Recommended: Students are expected to be able to use the Internet  
 Advisory Level: Read: 2 Write: 2 Math: None  
 Transfer Status: None Degree Applicable: NC  
 CSU GE: None IGETC: None District GE: None