ENGINEERING (ENGR)

ENGR 1 Introduction to Engineering
2 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 110)
Lecture: 18 Lab: 54

Engineering professions including academic requirements, licensure, articulation agreements with four-year institutions, transfer, engineering study as a preparation for other careers, and academic and employment strategies. Engineering design, creativity, and problem solving processes including working as a team member on an engineering design project. Field trips are required.

ENGR 1C Engineering Critical Thinking
3 Units (Degree Applicable, CSU, UC)
Lecture: 36 Lab: 54
Prerequisite: *ENGL 1A or ENGL 1AH or ENGL 1AM or AMLA 1A*

A critical thinking course for science and engineering students. Analyze, criticize, and reason inductively and deductively and reach well-supported factual or judgmental conclusions. Main topics include: identifying topics for investigation, developing planning strategies, locating pertinent information, critically analyzing sources of information, testing hypotheses, synthesizing and organizing results for effective written and verbal communication. Students will complete a hands-on experience with a client-centered engineering design project to develop critical thinking skills.

ENGR 6 Introduction to Engineering Programming Concepts and Methodologies
4 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 120)
Lecture: 54 Lab: 54
Prerequisite: *MATH 160*

Fundamental concepts of procedure-oriented programming, associated abstraction mechanisms and design processes, interface of software with the physical world, use of sensors, and application of numerical techniques.

ENGR 7 Programming Applications for Engineers
4 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 220)
Lecture: 54 Lab: 54
Prerequisite: *MATH 180*

Engineering computation using MATLAB and Simulink. Topics include matrix computation, statistical analysis, graphics, and numerical methods. Common examples and applications of physics and engineering are used throughout the course.

ENGR 8 Properties of Materials
4 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 140)
Lecture: 54 Lab: 54
Prerequisite: *CHEM 50 or CHEM 55 and (PHYS 4A or PHYS 2AG)*

Mechanical, electrical, magnetic, optical, and thermal properties of engineering materials and their relation to the materials' internal structure. Atomic structure and bonding, crystalline structures, phase and phase diagrams, metals, polymers, ceramics, composites, mechanical deformation and fracture, structural control and influence of properties, materials naming and designating systems, corrosion process, lasers, semiconductors, and electronic packaging materials.

ENGR 16 Introduction to Digital Electronics with FPGA Programming
4 Units (Degree Applicable, CSU, UC)
Lecture: 54 Lab: 54
Prerequisite: *MATH 160*
Advisory: *ENGR 6 or CSCI 140*

A core course in electrical and computer engineering which introduces Digital Electronics and Field Programmable Gate Array programming. Digital circuit implementation using Field Programmable Gate Arrays (FPGAs). Analysis, design, building, and testing of combinational and sequential digital logic circuits. Analysis and design of finite state machines with state diagrams and ASM charts. Design of finite state machines with HDL and implementation of finite state machines with FPGAs.

ENGR 18 Introduction to Engineering Graphics
3 Units (Degree Applicable, CSU)
(May be taken for option of letter grade or Pass/No Pass)
Lecture: 36 Lab: 54

Engineering graphics and problem solving techniques using orthographic, auxiliary, isometric, and oblique view drawings. Skills in freehand and instrument drawing are developed and applied to the solution of engineering problems.

ENGR 24 Engineering Graphics
4 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 150)
Lecture: 36 Lab: 108
Prerequisite: *MATH 150 or (Eligibility for MATH 160 or Eligibility for MATH 180) and (ENGR 18 or instructor approval)*

Project-based learning activities and hands-on design related to 2D and 3D Computer-Aided Design (CAD) for engineering students. The principles of engineering drawing and sketching for civil and mechanical design, the use of computer graphics and solid modeling in design representation of 3D objects, assembly, and simulation as well as American Society of Mechanical Engineers (ASME) standards on geometric dimensioning and tolerances.

ENGR 40 Statics
3 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 130)
Lecture: 54
Prerequisite: *MATH 181 and PHYS 4A*

Vector approach to static equilibrium of rigid bodies, forces, and couples in two- and three-dimensional space. Application of equilibrium principles to trusses, frames, and machines. Calculation of center of mass and centroid. Friction, moment of inertia, and distributed and concentrated loads. Forces in cables and beams. Fluid statics. Introduction to virtual work.

ENGR 40T Applied Statics
3 Units (Degree Applicable, CSU, UC)
Lecture: 54
Prerequisite: *MATH 160 and PHYS 2AG*

Vector approach to static equilibrium of rigid bodies, forces, and couples in two- and three-dimensional space. Application of equilibrium principles to trusses, frames, and machines. Calculation of center of mass and centroid. Friction, moment of inertia, and distributed and concentrated loads. Forces in cables and beams. Fluid statics. Introduction to virtual work. This course is for applied Engineering students. This course may not be accepted in general engineering transfer programs.

ENGR 41 Dynamics
3 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 230)
Lecture: 54
Prerequisite: *ENGR 40*

Vector approach to classical mechanics including absolute and relative motion of particles and rigid bodies in translational and rotational motion. Instantaneous center of rotation. Application of Newton's Second Law, work-energy and impulse-momentum methods, and introduction to mechanical vibrations.

ENGR 42 Mechanics of Materials
4 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 240)
Lecture: 54 Lab: 54
Prerequisite: *ENGR 40*

Mechanics of deformable bodies subjected to axial, torsional, shearing, and bending loads. Includes combined stresses, statically indeterminate structures, deflection and stress analysis of beams, stability of columns, strain energy methods, and design of pressure vessels and structures. Applied concepts through a laboratory experience linking mechanics of materials to properties of materials.

ENGR 44 Electrical Engineering
4 Units (Degree Applicable, CSU, UC, C-ID #: ENGR 260)
Lecture: 54 Lab: 54
Prerequisite: *PHYS 4B*
Corequisite: *ENGR 285 or MATH 290 (may have been taken previously)*

Electrical circuit analysis including applications of Kirchoff's Laws and Thevenin's Theorems to direct current (DC) and alternating current (AC) circuits. Fundamental principles, including steady state and transient circuit response, complex impedance and admittance, Fourier and Laplace transforms, and three-phase circuits. Application of fundamental circuit principles to operational amplifier and transistor circuits.

ENGR 50A Robotics Team Project Development
2 Units (Degree Applicable, CSU)
(May be taken four times for credit)
Lab: 108
Prerequisite: *Instructor approval required for robotics competition team members*

This course is for members of the Robotics Team. Introduces the knowledge, skills and activities needed to organize, promote and manage the design phase of a robotics competition team. Includes a survey of problem analysis, programming, mechanical design, and project management. Intended for students with an interest in robotics who need to gain experience as members of an engineering design team. Instructor approval required. Off-campus competition required.

ENGR 50B Intermediate Robotics Team Project Development
2 Units (Not Degree Applicable)
(May be taken four times for credit)
Lab: 108
Prerequisite: *Instructor approval required for robotics competition team members*

For members of the robotics team who compete in one or more intercollegiate competitions. Designing a solution to a complex problem by applying strategic design, mechanical design, computer-aided design, numerical modeling, computer programming, prototyping, fabrication, and project management. Instructor approval required. Off-campus activities required.

ENGR 99 Special Projects in Engineering
1-2 Units (Not Degree Applicable)
Lab: 54-108
Corequisite: *PHYS 1 or PHYS 2AG or PHYS 4A (May have been taken previously)*

In order to offer selected students recognition for their academic interests and ability and the opportunity to explore their disciplines to greater depth, the various departments from time to time offer special projects courses. The content of each course and the methods of study vary from semester to semester and depend on the particular project under consideration. Student must have instructor's authorization before enrolling in this class. Students who repeat this course will meet with the instructor and make individual contracts of a more advanced nature to ensure that proficiencies are enhanced.

ENGR 285 Differential Equations and Linear Algebra for Engineers
4 Units (Degree Applicable, CSU, UC)
Lecture: 54 Lab: 54
Prerequisite: *MATH 181*

Linear algebra, ordinary and partial differential equations, systems of differential equations, Fourier series, and Laplace and Fourier transforms and their applications in engineering. Applications include mechanics, vibration, circuits, and computer vision.