

ENGINEERING (ENGR)**Engineering 012****AEC Print Reading**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Reading and interpreting blueprints for Architecture, Civil Engineering, Construction (AEC). Information in This course provides preparation for more advanced AEC coursework. Recommended for students with no prior course(s) in blueprint reading.

Engineering 051**Basic Technical Drawing**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Principles of mechanical drawing including projections, views, dimensions, and conventions, utilizing sketches and computer drafting program. Designed for students with no prior mechanical drawing experience.

Engineering 100A (C-ID ENGR 110)**Introduction to Engineering**

Unit(s): 2.0 Class Hours: 36 Lecture total.

Introduction to major fields of engineering (including mechanical, electrical, industrial, biomedical, aerospace, and others), 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. CSU/UC

Engineering 100B**Introduction to Architecture/Civil Engineering /Construction (AEC)**

Unit(s): 2.0 Class Hours: 36 Lecture total.

Introduction to the Architectural, Civil Engineering, Construction (AEC) fields. Includes an overview of academic programs, career information and preparation requirements, virtual or in person field trips, and guest speakers. CSU

Engineering 103**Solidworks Basic Solid Modeling**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Introductory course in parametric solid modeling. This course will include a solid modeling overview, solid model construction techniques (extrude, revolve, fillet, chamfer, etc.), including the preparation of individual solid components and basic solid model assemblies. (Same as Manufacturing Technology 103). CSU

Engineering 104**Solidworks Intermediate Solid Modeling**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Engineering 103 or Manufacturing 103 with a minimum grade of C.

Intermediate course for solid modeling, includes a review of the introductory class and changes to the Solidworks interface. Instruction in the use of intermediate Solidworks part modeling skills such as assembly modeling and sub-assemblies is included. (Same as Manufacturing Technology 104). CSU

Engineering 105**Solidworks Advanced Solid Modeling**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Engineering 104 or Manufacturing Technology 104 with a minimum grade of C.

Advanced course for solid modeling includes a review of the intermediate class and changes to the Solidworks interface. Instruction in the use of Solidworks part modeling, assembly modeling, sub-assemblies, advanced photoworks and advanced animator emphasized. (Same as Manufacturing Technology 105). CSU

Engineering 110**Advanced CAD Applications**

Unit(s): 0.5 - 4.0 Class Hours: 24–192 Laboratory total.

Individual skill development for advanced students desiring to learn special applications using college licensed computer drafting and design software. Each 0.5 unit of credit requires 24 laboratory hours. Suggested preparation: Engineering 184. Grade: Pass/No Pass Only. Open Entry/Open Exit. CSU

Engineering 111**Basic Mechanical Blueprint Reading**

Unit(s): 2.0 Class Hours: 36 Lecture total.

Reading and interpreting blueprints for manufacturing technologies. (Same as Manufacturing Technology 111). CSU

Engineering 112**Society and the Built Environment**

Unit(s): 3.0 Class Hours: 54 Lecture total.

An introductory course that explores the far-reaching impacts of society on the built environment. A multidisciplinary examination of western and non-western society's ethics, economics, culture, ecology, processes, technology and tools on trends and developments of the built environment. CSU

Engineering 114**Geometric Dimensioning and Tolerancing**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Engineering 104 or Manufacturing 111 or Engineering 122 or Engineering 125 with a minimum grade of C.

Drawing interpretation utilizing geometric dimensioning and tolerancing (ANSI Y14.5) as applied in engineering, manufacturing, and inspection. (Same as Manufacturing Technology 114). CSU

Engineering 115**Cooperative Work Experience Education-Occupational**

Unit(s): 1.0 - 4.0 Class Hours: 60–300 Lecture total.

This work experience course of supervised employment is designed to assist students to acquire desirable work habits, attitudes and skills in a field related to the students' major so as to enable them to become productive employees. This course also provides students with career awareness for jobs. 75 hours of paid work or 60 hours of un-paid work equals one unit of course credit. Student repetition is allowed per Title 5, Section 55253. Grade: Pass/No Pass Only. CSU

Engineering 118 (C-ID ENGR 180)**Surveying**

Formerly: Engineering 118, Plane Surveying

Unit(s): 4.0 Class Hours: 54 Lecture, 54 Laboratory total.

Prerequisite: Mathematics 160 or Mathematics 170 with a minimum grade of C or Prerequisite may be satisfied by High School or College Trigonometry (C-ID MATH 851) or Precalculus (C-ID MATH 155) or High School transcribed Trigonometry or Precalculus with a minimum grade of C.

The course applies theory and principles of plane surveying: office computations and design; operation of surveying field equipment; and production of engineering plans/maps. Topics include distances, angles, and directions; differential leveling; traversing; property/boundary surveys; topographic surveys/mapping; volume/earthwork; horizontal and vertical curves; land description techniques; and GPS. Extensive field work using tapes, levels, transits, theodolites, total stations, and GPS. Assists in passing the land surveyor-in-training exam. Completion of Math 160 recommended. CSU

Engineering 119**Advanced Plane Surveying**

Unit(s): 4.0 Class Hours: 54 Lecture, 54 Laboratory total.

Prerequisite: Engineering 118 with a minimum grade of C; Instructor may waive if student can show proof of industry experience in surveying equal to or greater than Engineering 118.

Course emphasis is on: coordinate geometry calculations; route surveying with horizontal and vertical curves; topographic surveying and mapping; construction surveying; introduction to geospatial technologies, boundary surveying and surveys of public lands; and field surveying projects. Assists student in passing the state LSIT exam. CSU

Engineering 122**Engineering Drawing**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Principles of engineering drawing: projections, views, sections, dimensions, tolerancing, assemblies, manufacturing processes, engineering drafting practices. Utilizing sketches and computer drafting program. CSU/UC

Engineering 124**Advanced Drawing**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Recommended Preparation: Engineering 122 or Engineering 125 with a minimum grade of C.

Advanced topics in engineering drawing and design - working drawings, fasteners, cams, gears, auxiliary views, advanced sectioning, dimensioning, tolerancing. Utilizing sketches and computer drafting program. CSU/UC

Engineering 125**Engineering Graphics**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Prerequisite: Mathematics 160 with a minimum grade of C. May be satisfied by equivalent High School trigonometry class with minimum grade of C.

Includes principles of engineering drawings in visually communicating engineering designs in sketches, and an introduction to computer-aided design (CAD). Includes orthographic projections, dimensioning, tolerancing, section, design and graphical mathematics, utilizing sketches, introduction to 2D and 3D computer drafting program and the engineering design process. Assignments develop sketching and 2-D and 3-D CAD skill. The use of CAD software is an integral part of the course. Suggested preparation: Engineering 051 and 183 (may be taken concurrently). CSU/UC

Engineering 130A**CATIA Beginning Solid Modeling**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Introductory course in parametric solid modeling CAD using CATIA software. Topics include: CAD overview, sketching, basic solid model creation (base features, pads, pockets, grooves, shafts, etc.) sketch constraints, reference elements, hole features, feature editing, assembly and drawing creation. (Same as Manufacturing Technology 130A). CSU

Engineering 130B**CATIA Intermediate Solid Modeling**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Recommended Preparation: Engineering 130A or Manufacturing 130A with a minimum grade of C.

Intermediate course in parametric solid modeling CAD using CATIA software. Topics: intermediate/ advanced level sketching & modeling (sweeps, ribs, slots), feature editing & transformation, assemblies, drafting workbench, surface modeling, and other CATIA modules. (Same as Manufacturing Technology 130B) CSU

Engineering 131**Engineering Mechatronics Technology Survey**

Unit(s): 0.5 Class Hours: 9 Lecture total.

Course provides hands-on exposure to modern techniques in rapid prototyping, including: 3D printing, laser cutting, 3D scanning, and other processes used in mechatronics and engineering. Course provides a good introduction to the Engineering Mechatronics Technology program. CSU

Engineering 132**Introduction to Robotics**

Unit(s): 2.5 Class Hours: 36 Lecture, 27 Laboratory total.

Introductory course in robotics. Topics include history of robotics, role of robotics in modern engineering, industrial automation, emerging technologies, basic design, sensors, circuitry, actuators, mechanics, programming, and a hands-on robot design and construction project. CSU

Engineering 133**Basic Mechatronics Engineering Technology****Formerly: Introductory Electromechanical Engineering Technology**

Unit(s): 3.0 Class Hours: 45 Lecture, 27 Laboratory total.

Recommended Preparation: Engineering 103 and Mathematics 084 with a minimum grade of C.

Introductory course in mechatronics engineering technology with an emphasis on hands-on fabrication and testing. Topics include: basic design using CAD software and mechanics principles; introductory fabrication and testing of mechanical systems (mechanical elements, materials, fabrication processes, frames, fasteners, fluid systems, 3D printing, laser cutting, rapid prototyping, and other processes), and electronics systems (basic circuit analysis, construction, and measurement). CSU

Engineering 134**Intermediate Mechatronics Engineering Technology****Formerly: Intermediate Electromechanical Engineering Technology**

Unit(s): 3.0 Class Hours: 45 Lecture, 27 Laboratory total.

Recommended Preparation: Engineering 133 and Engineering 103 and Engineering 158

Intermediate course in mechatronics engineering technology with an emphasis on hands-on fabrication and testing. Topics include: design using CAD software and mechanics principles; intermediate level fabrication and testing of mechanical systems (machine elements, fabrication processes, rapid prototyping, assembly, measurement and inspection, and other processes), and electronics systems (circuit analysis, op amps, AC circuits, LEDs, soldering, circuit construction, use of DMM and oscilloscope). CSU

Engineering 135**Advanced Mechatronics Engineering Technology****Formerly: Advanced Electromechanical Engineering Technology**

Unit(s): 3.0 Class Hours: 45 Lecture, 27 Laboratory total.

Recommended Preparation: Engineering 134 and Engineering 103 and Engineering 158

Advanced course in mechatronics engineering technology with an emphasis on hands-on fabrication and testing. Topics include: design using CAD software and mechanics principles; advanced level fabrication and testing of mechanical systems (drive systems, gears, linear motion elements, rapid prototyping systems, motor control, actuation, and other processes), and electrical systems (solid state devices, op amps, AC circuits, transducers, micro-controllers, circuit measurement devices). CSU

Engineering 142**Architecture/Civil Engineering/Construction (AEC) Drawing**

Unit(s): 4.0 Class Hours: 54 Lecture, 72 Laboratory total.

Recommended Preparation: Engineering 012 and Engineering 183

An introduction to conventional and computer aided drafting techniques in the relation of drawings for construction. Interpretation of details in construction drawings/blueprints and reference materials. Laboratory: Drafting plans for a residential building using the techniques introduced in the course. Includes ecological terms and concepts, BIM basics, and abbreviations. CSU

Engineering 143**Fundamentals of Construction Engineering/Construction (AEC) Drafting Standards**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Overview of residential, commercial, institutional, industrial, and heavy civil construction and associated codes, standards, and ethical boundaries. Areas of focus to include type of foundations, materials, contract documents, working drawings and vocabulary. Includes an introduction to LEED/Green Construction. CSU

Engineering 154**AEC BIM with Revit /Construction (AEC) Parametric and BIM Applications****Formerly: Architecture/Civil Engineering/Construction (AEC)**

Unit(s): 5.0 Class Hours: 54 Lecture, 108 Laboratory total.

Recommended Preparation: Engineering 142 and Engineering 186 with a minimum grade of C. Prior knowledge of 3D CAD and prior knowledge of AEC basics is recommended. Students who do not have that prior experience will need to plan to work longer hours and use optional course materials to ensure success. ENGR 142 and ENGR 186 or equivalent are recommended. Familiarity with 3D CAD environments is recommended. Students without that foundation knowledge will need to plan to plan to work longer hours to ensure success. ENGR 142 and ENGR 186 or equivalent industry experience are recommended.

This course covers AEC 3D Parametric applications for architectural, civil engineering, and construction drawings/documents. Includes BIM concepts, sustainable design, organization of projects, visualization and printing. Suggested preparation: Engineering 142 and 186. CSU

Engineering 158**Basic Machining Concepts and Operations**

Unit(s): 3.0 Class Hours: 18 Lecture, 126 Laboratory total.

Fundamental operations on lathes, milling machines, grinders, and drill presses, including precision measurements and layout. Equips students with skills and theory necessary to enter or upgrade within the machinist trade. (Same as Manufacturing Technology 158). CSU

Engineering 165**Introduction to Energy**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Students will gain a broad understanding of energy concepts, efficiencies, conservation, distribution, careers and cost-benefit analysis of energy resource use. The study of both renewable and non-renewable energy will be included. CSU/UC

Engineering 175**Introduction to Energy Analysis**

Unit(s): 3.0 Class Hours: 54 Lecture total.

This course is focused on energy analysis with respect to energy conservation, energy auditing, and CA Title 24 requirements. Calculations will be performed manually and with the assistance of software applications. Career tracks in energy analysis will be explored. Energy concepts, heat loss calculations, basic solar concepts, site selection, design improvements, appliances, and utility systems will be covered within this course. CSU

Engineering 177**Green HVAC**

Unit(s): 3.0 Class Hours: 54 Lecture total.

In this course students learn the basic principles of heating, ventilation, and air conditioning (HVAC) systems in commercial buildings, with an emphasis on energy efficiency and renewable energy. Topics include heat loss calculations, fuels and combustion, waste heat recovery, and maintenance considerations for these systems. CSU

Engineering 183**CAD I - Computer Aided Drafting**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

A first course in computer drafting focused on AutoDesk software, with AutoCAD as a base. Topics include display and file management, units, entities, object selection, advanced editing, layers, dimensions, text, graphic exchange, and phone apps. CSU/UC

Engineering 184**CAD II - Computer Aided Drafting**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Recommended Preparation: Engineering 183 or industry CAD experience

Intermediate course focused on Autodesk software, especially AutoCAD. Topics include including a variety of intermediate apps, blocks, hatches, attributes, inquiry, and 3-D introduction, plus smart phone use. CSU

Engineering 186**AutoCAD 3-Dimensional Drawing**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Use of AutoCAD's 3-dimensional software. Includes 3-D models, extruding to 3-D, coordinate space, filter, and dynamic viewing. Recommended Preparation: Engineering 184. CSU

Engineering 187**3D CAD With Civil 3D****Formerly: Advanced 3-D CivilCAD**

Unit(s): 3.5 Class Hours: 36 Lecture, 81 Laboratory total.

Recommended Preparation: Engineering 186

Advanced use of 3-Dimensional software for Civil Engineering applications. Includes: merging of models, advanced modeling, calculations, 3-dimensional rendering and presentation. CSU

Engineering 195**Renewable Energy**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Students will be able to cite sustainable methods for improving the operational performance of offices, schools, hospitals, and other residential and commercial buildings. In this course, students learn the principles, methods, and equipment associated with renewable energy systems. Topics include solar, wind, biomass and biofuels, fuel cells, hydropower, oceanic energy, geothermal, and energy storage. Nonrenewable energy sources, climate change, and the economics and politics of energy are also discussed. CSU/UC

Engineering 201**Residential and Light Commercial Construction Practices and Estimating**

Unit(s): 4.0 Class Hours: 54 Lecture, 72 Laboratory total.

Recommended Preparation: Engineering 100B, Engineering 112, and Engineering 142.

Course provides practical knowledge, ecological terms and concepts, for planning, design, and construction of residential and light commercial buildings including materials, equipment, construction/assembly methods, quantity take-off, and building codes/standards. CSU

Engineering 203**Sustainable Construction and Facilities Management**

Unit(s): 3.0 Class Hours: 54 Lecture total.

This course provides students the means to apply core sustainable principles to each step within the facilities planning, design, and management process. It examines best practices for site and building: energy, conservation, reclamation, recycle-ability, air, water, waste, sound, ecological literacy, and management tools. CSU

Engineering 204**Building Automation & Controls**

Unit(s): 3.0 Class Hours: 54 Lecture total.

In this course, students learn the basic principles of building automation and controls for energy management. Topics include control devices, signals, logic, and applications for various systems, such as electrical, lighting, HVAC, plumbing, fire protection, security, access control, voice-data-video, and elevator systems. CSU

Engineering 205**Engineering Programming and Problem- Solving**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Prerequisite: Engineering 183 with a minimum grade of C.

This course includes fundamental studies of data handling and processing in engineering. It 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. CSU

Engineering 228**Descriptive Geometry**

Unit(s): 3.0 Class Hours: 36 Lecture, 72 Laboratory total.

Application of the concepts of orthographic projection to the solution of three-dimensional problems arising in the various branches of engineering. Introductory computer aided drafting/design concepts or applications. Suggested preparation: Engineering 122 or 125. CSU/UC

Engineering 235**Statics**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Physics 217 and Mathematic 185 with a minimum grade of C (Both classes can be taken concurrently).

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. Utilizes SI metrics. CSU/UC

Engineering 240 (C-ID ENGR 230)**Dynamics**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Engineering 235 with a minimum grade of C.

Fundamentals of kinematics and kinetics of particles and rigid bodies. Topics include kinematics of particle motion; Newton's second law, work-energy and momentum methods; kinematics of planar motions of rigid bodies; work-energy and momentum principles for rigid body motion; Introduction to mechanical vibrations. CSU/UC

Engineering 250**Electric Circuits**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Mathematics 280 and Physics 227 with a minimum grade of C (Both may be taken concurrently).

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. CSU/UC

Engineering 250L**Electric Circuits Laboratory**

Unit(s): 1.0 Class Hours: 54 Laboratory total.

Corequisite: Engineering 250 with a minimum grade of C.

An introduction to the construction and measurement of electrical circuits, including resistive, RL, RC, RLC, and operational amplifier circuits. Basic use of electrical test and measurement instruments including multimeters, oscilloscopes, power supplies, and function generators. Interpretation of measured data under DC, transient, and sinusoidal steady-state (AC) conditions. CSU/UC

Engineering 281**Properties of Engineering Materials**

Unit(s): 3.0 Class Hours: 54 Lecture total.

Prerequisite: Chemistry 209 and Physics 217 with a minimum grade of C.

Study of atomic, microscopic, and macroscopic structure of metals; properties' enhancement by alloying and heat treatment; effects of temperature and corrosion on metals; fatigue; and other materials (wood, plastic, and concrete). CSU/UC