

# ENGINEERING (ENGR)

**\*UC credit limit: all CADD courses, ENGR 119, ENGR 129, OH 200, OH 201 combined: maximum credit, one course**

## 100 INTRODUCTION TO ENGINEERING AND DESIGN 4 UNITS

3 hours lecture, 3 hours laboratory  
Introduction to engineering as a way of perceiving the world. Overview of design and analytical techniques, problem solving and strategic thinking, disciplines, and ethics. Fundamentals of engineering graphics as a universal language and application to the visualization, representation, and documentation of designed artifacts, including orthographic projections, pictorial, section, and detail views; creation of basic to intermediate solid parts and assemblies; dimensioning and tolerancing practices; thread notation per ASME Y14.5M-1994. This course covers the principles of engineering drawings in visually communicating engineering designs, and an introduction to solid modeling and computer-aided design (CAD). Assignments develop technical sketching and 2D and 3D CAD skills. The use of solid modeling CAD software (SolidWorks and Creo Parametric) is an integral part of the course, as is the production of physical prototypes using 3D printing and other techniques. This course focuses on the design process and on spatial reasoning and visualization.

AA/AS GE, CSU, UC

## 119 BASIC ENGINEERING CAD 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in CADD 115 or ENGR 100 or equivalent  
Recommended Preparation: Working knowledge of basic computer operations and file administration  
2 hours lecture, 4 hours laboratory  
CAD (Computer-Aided Drafting) fundamentals for engineers. Basic drawing techniques and commands in AutoCAD. Includes geometric construction, multiview and singleview projections, section views, dimensions, and text. *Not open to students with credit in CADD 120, 120ABCD.*

CSU, \*UC credit limit

## 120 ENGINEERING COMPUTER APPLICATIONS 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in MATH 180 or equivalent or concurrent enrollment  
2 hours lecture, 3 hours laboratory  
Use of computerized mathematical analysis, computer programming, and computer graphics as tools for solving engineering problems.

CSU, UC

## 125 3D SOLID MODELING 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in CADD 115 or ENGR 100 or equivalent  
Recommended preparation: Working knowledge of basic computer operations and file administration  
2 hours lecture, 4 hours laboratory  
Advanced graphic communication using solid modeling techniques and software (SolidWorks). Techniques include feature based part construction using extrudes, cuts and revolves; advanced surface shaping using lofts and sweeps; and assembly construction and constraining in an engineering design environment. Students will continue to develop 2D drafting skills including proper organization and layout of component drawing views, dimensioning and tolerancing in accordance with ANSI standard, sectioning and detailing, detail descriptive geometry, and introduction to manufacturing processes of mechanical parts such as sheet metal process and molding,

introduction to 3D printing technology. *Also listed as CADD 125. Not open to students with credit in CADD 125.*

CSU, UC, UC credit limit

## 129 ENGINEERING SOLID MODELING 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in CADD 115 or ENGR 100 or equivalent  
2 hours lecture, 4 hours laboratory  
Advanced 3D computer-aided mechanical design and drafting. This parametric modeling course provides skills and knowledge of appropriate software (Creo Parametric) and feature based part construction using extrudes, cuts, revolves, lofts and sweeps. Students will enhance their skills in model assembly and assembly drawings including proper organization and layout of component drawing views, dimensioning and tolerancing, sectioning and detailing. 3D printing technology (additive manufacturing) is integrated to this course. *Also listed as CADD 129. Not open to students with credit in CADD 129.*

CSU, \*UC credit limit

## 175 MECHATRONICS: INTRODUCTION TO MICROCONTROLLERS AND ROBOTICS 3 UNITS

2 hours lecture, 3 hours laboratory  
Mechatronics is the combination of mechanical, electronic, and computer engineering to create automatic "intelligent" devices. Microcontrollers offer an easy and flexible way to do this. This course introduces the use of microcontrollers to operate motors, lights, and other electromechanical devices in response to inputs from sensors. Application of these ideas through the development of an autonomous robot. *Also listed as CS 175. Not open to students with credit in CS 175.*

CSU, UC

## 176 MECHATRONICS: PROTOTYPE DESIGN 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in CS 175 or ENGR 175 or equivalent  
2 hours lecture, 3 hours laboratory  
This course focuses on electromechanical product development. Control of single chip microcontrollers including memory-mapped I/O (Input/Output), direct access to registers, and fine control of timing. Development of custom circuits including manufacture of printed circuits. Control of DC and AC motors and stepper motors. Development of mechanisms and transmissions. Introduction to manufacturing techniques. This course includes a capstone design project. *Also listed as CS 176. Not open to students with credit in CS 176.*

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## 182 WORK EXPERIENCE IN ENGINEERING TECHNOLOGY 1-3 UNITS

Prerequisite: Completion of a minimum of 10 units in an engineering technology program (e.g., CADD Technology, Mechatronics) and recommendation from engineering or CADD instructor. Must meet state guidelines for work experience.  
75 hours paid or 60 hours unpaid work experience per unit

Students who are employed in the engineering technology industry full-time or part-time (paid or unpaid) and able to work the minimum required hours during the semester are eligible to enroll in this course. Assessment of student will be performed by instructor in discussion with appropriate supervisor at place of employment. Students will further develop skills attained in the classroom setting. *Preregistration counseling with the instructor is required. Occupational cooperative work experience may accrue at the rate of 1-8 units*

*per semester for a total of 16 units. Students must work 75 paid hours or 60 unpaid hours per unit earned.*

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## 199 SPECIAL STUDIES OR PROJECTS IN ENGINEERING 1-3 UNITS

Prerequisite: None  
48-54 hours (1 unit), 96-108 hours (2 units), 144-162 hours (3 units)  
Individual study, research or projects under instructor guidance. Written reports and periodic conferences required. Content and unit credit to be determined by student/instructor conferences and the Office of Instruction. *May be repeated with different content for a maximum of 9 units.*  
(see catalog page 40, 199 Courses-Special Studies)

## 200 ENGINEERING MECHANICS-STATICS 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in PHYC 190 or equivalent  
Corequisite: MATH 280 or previous enrollment  
3 hours lecture  
Engineering applications of the principles of: static equilibrium of force systems acting on particles and rigid bodies; structural analysis of trusses, frames, and machines; forces in beams; dry friction; centroids and moments of inertia.

CSU, UC

## 210 ELECTRIC CIRCUITS 4 UNITS

Prerequisite: "C" grade or higher or "Pass" in MATH 280, PHYC 200 or equivalent  
3 hours lecture, 3 hours laboratory  
Fundamentals of electrical circuits for engineers. Includes both DC and AC analysis. Concepts include Kirchhoff's laws, nodal and mesh analysis, linearity and superposition, Thevenin's theorem, ideal and real operational amplifiers, step response of first and second order RLC circuits, complex impedance, steady-state sinusoidal AC circuits, and AC power. Laboratory work supports the theory and introduces basic lab practices and tools (e.g., oscilloscopes and signal generators).

CSU, UC

## 218 PLANE SURVEYING 4 UNITS

Prerequisite: "C" grade or higher or "Pass" in MATH 170 or equivalent or concurrent enrollment  
2 hours lecture, 6 hours laboratory  
Use, care and adjustment of surveying instruments. Fundamental surveying methods, traverse measurements, and area computations. Introduction to horizontal and vertical curves, stadia, and construction layout. Introduction to topographic mapping. Earth work computations. *Also listed as SURV 218. Not open to students with credit in SURV 218.*

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## 220 ENGINEERING MECHANICS-DYNAMICS 3 UNITS

**C-ID ENGR 230**  
Prerequisite: "C" grade or higher or "Pass" in ENGR 200 or equivalent  
3 hours lecture  
Motion of particles, particle systems and rigid bodies, and the effects thereon of applied forces and moments. Newtonian laws of motion, work and energy; linear and angular momentum. Application to engineering problems.

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## 260 ENGINEERING MATERIALS 3 UNITS

Prerequisite: "C" grade or higher or "Pass" in PHYC 190 or equivalent  
Corequisite: CHEM 141 or previous enrollment  
3 hours lecture  
Atomic and molecular structure of materials used in engineering. Analysis of the relationships

between structure of materials and their mechanical, thermal, electrical, corrosion and radiation properties, together with examples of specific application to engineering problems.

*CSU, UC*

**270 DIGITAL DESIGN** **4 UNITS**

Prerequisite: "C" grade or higher or "Pass" in MATH 175 or 176 or equivalent

3 hours lecture, 3 hours laboratory

Modeling, analysis, simulation, design and construction of combinational and sequential digital logic systems and networks.

*CSU, UC*