

**CUYAMACA COLLEGE**  
**COURSE OUTLINE OF RECORD**

**ENGINEERING 125 – SOLID MODELING DESIGN**

2 hours lecture, 4 hours laboratory, 3 units

**Catalog Description**

This is advanced graphic communication course using solid modeling techniques. This course covers feature based solid part construction including extrudes, cuts and revolves; advanced surface shaping using lofts and sweeps. This also covers assembly construction and constraining in an engineering design environment. Students learn how to produce technical/engineering drawing including proper layout of component drawing views, sectioning and detailing. Threads and fasteners are also included in this course. Dimensioning and tolerancing will be taught in accordance with ANSI standard. Introduction to 3D printing technology (aka Additive Manufacturing) is part of this course. SolidWorks software is used throughout the course. *Also listed as CADD 125. Not open to students with credit in CADD 125.*

**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

**Entrance Skills**

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Complete - orthographic drawings.
- 2) Solve basic geometric construction with accuracy and detail.
- 3) Create sectional, auxiliary, and detail views.

**Course Content**

- 1) Design process and engineering drawing
- 2) Basic part modeling technique
- 3) Advanced concepts in part modeling
- 4) Creation of assembly models
- 5) Advanced assembly operations
- 6) Parts and assembly drawings and bill of materials
- 7) Additive manufacturing (aka: 3D printing) Technology

**Course Objectives**

Students will be able to:

- 1) Execute a modern approach to the engineering design process.
- 2) Create part model sketches to construct 3D models.
- 3) Apply pattern features to create multiple identical objects.
- 4) Use solid modeling software techniques to demonstrate the manufacturing of components for assembly.
- 5) Produce working drawing of parts and assemblies, including auxiliary, sectional, and detail drawings.
- 6) Create dimensions and tolerances in accordance with ANSI standard.

- 7) Refine presentation of parts and assembly and generating multiple sheet-drawings.
- 8) Create parts using additive manufacturing technology.

### **Method of Evaluation**

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Student portfolio of drawing exercises and final project that demonstrate students' skill and competency in using and applying SolidWorks for 3D solid modeling in engineering applications.
- 2) Midterm exam that measures students' ability to apply 3D solid modeling software in simple engineering design, using SolidWorks as a tool to the subject matter.
- 3) Final exam that measures students' capabilities in advanced and complex engineering design and assembly of parts.
- 4) In-class activities (written/oral) that measure students' ability to articulate fundamental 3D solid modeling skills required in the field of engineering graphics.

### **Special Materials Required of Student**

USB flash drive (1GB or larger)

### **Minimum Instructional Facilities**

CAD computer lab

### **Method of Instruction**

- 1) Lecture and lab demonstration
- 2) Lab assignments
- 3) Hand-out materials, projects

### **Out-of-Class Assignments**

- 1) Weekly homework
- 2) Group project
- 3) Final project
- 4) Drawing portfolio

### **Texts and References**

- 1) Required (representative example): Howard, William and Joseph Musto. *Introduction to Solid Modeling Using SolidWorks 2020*. McGraw Hill, 2020.
- 2) Supplemental: None

### **Exit Skills**

Students having successfully completed this course exit with the following skills, competencies, and/or knowledge:

- 1) Apply the fundamental skills in 3D model design and produce engineering drawing/documentation.
- 2) Create part model sketches to construct advanced and complex 3D models.
- 3) Use solid modeling software techniques to demonstrate the manufacturing of parts and assemblies.
- 4) Refine presentations of parts and assemblies and generate multiple sheet-drawings.
- 5) Produce working drawing of parts and assemblies, including auxiliary, sectional, and detail drawings
- 6) Create dimensions and tolerances in accordance with ASNI standard
- 7) Create parts using additive manufacturing technology

### **Student Learning Outcomes**

Upon successful completion of this course, students will be able to:

- 1) Develop 3D part modeling (simple/complex) from a 2D sketch.

- 2) Create working drawings of complex designed parts including, Orthographic views, Section views, Auxiliary views and Detail views.
- 3) Provide documentation including exploded pictorial view, label all assembly components along with BoM, scale of drawing and relevant information in title block.
- 4) Create dimensions and tolerances in accordance with ANSI standard.
- 5) Create parts using additive manufacturing technology.