

Lecture Contact Hours: 32-36; Homework Hours: 64-72;
Laboratory Contact Hours: 48-54; Homework Hours: 0;
Total Student Learning Hours: 144-162

CUYAMACA COLLEGE

COURSE OUTLINE OF RECORD

Engineering 129 – Engineering Solid Modeling

2 hours lecture, 2 units
3 hours laboratory, 1 unit
Total units: 3 units

Catalog Description

Advanced 3D computer-aided mechanical design and drafting. This parametric modeling course provides skills and knowledge of appropriate software, such as Fusion, and associated commands and features using extrudes, cuts, revolves, lofts and sweeps. Students will enhance their skills in sheet metal design as well as 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.*

Prerequisite

“C” grade or higher or “Pass” or concurrent enrollment in CADD 115 or ENGR 100 or equivalent

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) Basic part modeling technique
- 2) Parametric modeling fundamentals
- 3) Constructive Solid Geometry (CSG)
- 4) Parametric and constraints fundamentals
- 5) Symmetrical features in designs
- 6) Geometric construction tools
- 7) Advanced 3D modeling tools
- 8) Sheet metal design
- 9) Assembly modeling
- 10) Assembly drawings and bill of materials
- 11) From 3D-Model to 3D-Printed Part (Introduction to 3D-Printing Technology)

Course Objectives

Students will be able to:

- 1) Create part model sketches to construct 3D models.
- 2) Develop part model sketched features into 3D objects – introduction to advanced level.
- 3) Use several model features to create complex features.
- 4) Use engineering software to develop sheet metal parts.
- 5) Generate assembly working-drawings in multiple sheets.
- 6) Prototype 3D objects, using “Additive Manufacturing” (3D printing machines).

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) Midterm exam that measures students' ability to apply 3D solid modeling software in simple engineering design.
- 2) Final project that measures students' capabilities and skills in advanced and complex engineering design including engineering part assembly.
- 3) Participation in class activities that measures students' ability to orally articulate 3D solid modeling fundamentals and skills.

Special Materials Required of Student

None

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) **Reading:** reading assignments such as those from Architectural journals and other course-related materials.
- 2) **Writing:** preparing reports such as bi-weekly group projects and a final project or final drawing portfolio.
- 3) **Other:** none.

Texts and References

- 1) Required (representative example): Shih, Randy. *Parametric Modeling with Autodesk FUSION*, SDC Publications, Spring 2025.
- 2) Supplemental: Handouts

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, section, auxiliary, and detail views.
- 3) Provide documentation, including exploded pictorial view, and 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 standards.