Lecture Contact Hours: 32-36; Homework Hours: 64-72;
Laboratory Contact Hours: 64-72; Homework Hours: 0;
Total Student Learning Hours: 160-180

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

ENGINEERING 129 – ENGINEERING SOLID MODELING

2 hours lecture, 4 hours laboratory, 3 units

Catalog Description
Advanced 3D computer-aided mechanical design and drafting. This parametric modeling course provides skills and knowledge of appropriate software and feature based part construction 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" 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 sheet.
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) Weekly homework
2) Group project
3) Final project
4) Final drawing portfolio

Texts and References
1) Required (representative example): Shih, Randy. *Parametric Modeling with Autodesk FUSION 360,* SDC Publications, 2023.
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.
5) Create parts using additive manufacturing technology.