ADVM 0001C - ADVANCED COMPUTER AIDED DESIGN MODELING

Catalog Description

Formerly known as ADVM 0011
Prerequisite: Completion of ADVM 0001B with grade of "C" or better or equivalent as determined by instructor
Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)
Description: Processes employed in developing design solutions using a feature-based parametric Computer Aided Design mechanical solid model design software. Includes 3D part modeling using advanced model geometry techniques, development of Model Based Definition (MBD) annotated models per ASME Y14.41 standards, and advanced model assembly techniques. (CSU, UC)

Course Student Learning Outcomes

- CSLO #1: Apply appropriate, current, and relevant industry standards in preparing digital technical documentation for the appropriate mechanical design discipline.
- CSLO #2: Create annotated Computer Aided Design (CAD) Models using Model Based Definition (MBD) techniques to digitally define mechanical design to ASME Y14.41 standards
- CSLO #3: Develop computer Aided Design (CAD) models for a family of mechanical parts driven by design tables

Effective Term

Fall 2026

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

By the end of this course the student should be able to:

1. Develop an advanced Product Design Information (PDI) plan based on design intent
2. Describe Emerging Technologies, including Generative Design concepts
3. Apply MBD Annotations to models per ASME Y14.41
4. Develop Part Models Using Advanced Part Modeling Techniques
5. Render CAD Models in photo-realistic finishes and textures with different lighting conditions
6. Develop Configurations and display states of parts and assemblies
7. Create Design Tables and Families of parts
8. Create and configure CAD Libaries
9. Develop and analyze Advanced Assemblies, including weldments
10. Develop template and configuration files to increase productivity

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable
- UC Transferable

Methods of Evaluation

- Objective Examinations
  - Example: Describe the benefits of parametric modeling and how it influences product design. This question is evaluated relative to how well the student describes the benefits and how these benefits influence product design.
- Projects
  - Example: Students are to design a commercial quality metal structure following industry standards, and design criteria for optimum performance. Students will develop the 3D Models, Assemblies and complete set of detailed working drawings along with bills of materials for the project. Instructor evaluates the student performance of learned objectives such as part and assembly modeling, two dimensional part and assembly drawings that represent the design intent, accuracy to American Society of Mechanical Engineers (ASME) standards for compliance and the efficient use of a computer system. A point system is used and a letter grade assigned to the point totals.
- Skill Demonstrations
  - Example: Student will use proper techniques to develop CAD models and produce ASME compliant detail drawings from the models. Instructor evaluates the student performance of learned objectives such as part and assembly modeling, two dimensional part and assembly drawings that represent the design intent, accuracy to American Society of Mechanical Engineers (ASME) standards for compliance and the efficient use of a computer system. A point system is used and a letter grade assigned to the point totals.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. The instructor provides physical parts and precision measuring equipment to students and guides them in the proper inspection and documentation techniques for reverse engineering a product design.

Students will utilize the tools and parts to gather design criteria and data and synthesize the information onto design sketches.

Lecture:

1. The instructor will present to the students 3 dimensional parametric solid modeling methodologies. Students will discuss the various methods and strategize a plan to develop the models.

Distance Learning

1. Instructor will create a how-to tutorial for creating sketches as well as provide a video explaining different methods of conveying design intent through sketching. Students will be expected to create sketches that express the desired design intent.

Typical Out of Class Assignments Reading Assignments

1. Students read chapter on assembly development and are expected to participate in the lecture/discussions based upon these readings. 2. Students are to construct a drawing, based upon their course readings, demonstrating the weekly-learning objectives. These weekly drawings are either freehand sketches and/or computer aided design (CAD) generated. The drawings are evaluated for compliance with American Society of Mechanical Engineers (ASME) standards. Critical thinking and problem solving are part of these assignments. 3. Students are required to search the Internet for articles that reference design for manufacture and assembly, then utilize their findings to design a commercial quality weldment, producing the 3D models and ASME documentation.

Writing, Problem Solving or Performance

1. Students will write a report comparing and contrasting methods employed in design for manufacture and assembly. 2. Students are required to prescribe appropriate fits and tolerances to mating parts in a working assembly. Calculations of Tolerance, Limits, Maximum and Least Material Condition, Minimum and Maximum Clearance are required.

Other (Term projects, research papers, portfolios, etc.)

1. Students are required to develop a portfolio that contains samples of their semester assignments to show potential employers the engineering design concepts studied.

Required Materials

- Parametric Modeling with SOLIDWORKS
  - Author: Randy Shih, Paul Schilling
  - Publisher: Schroff Development Corporation Publications
  - Publication Date: 2024
  - Text Edition: 18th
  - Classic Textbook?:
  - OER Link:
  - OER:
- Fundamentals of Solid Modeling and Graphic Communication
  - Author: Gary Bertoline, Ross, Hartman
  - Publisher: McGraw Hill
  - Publication Date: 2018
  - Text Edition: 7
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.