

ADVM 0001A - COMPUTER AIDED DESIGN FOR MECHANICAL DESIGN AND DRAFTING I

Catalog Description

Formerly known as ADVM 0001

Advisory: Not recommended to take concurrently with ADVM 0002A

Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)

Description: This course covers the principles of engineering drawings in visually communicating engineering designs and an introduction to computer-aided design (CAD). Topics include the development of visualization skills, orthographic projections, mechanical dimensioning, and tolerancing practices, and the engineering design process. Assignments develop sketching and 2-D and 3-D CAD skills. The use of CAD software is an integral part of the course. This course teaches introductory 3D CAD skills and is designed for students with no previous experience in engineering design/drafting. (CSU)

Course Student Learning Outcomes

- CSLO #1: Define the five steps in the engineering design process.
- CSLO #2: Apply fundamental parametric Computer-Aided Design (CAD) techniques to develop fully defined CAD models
- CSLO #3: Define terminology aligned with ASME Y14.5 standards for technical drawings for the mechanical design industry
- CSLO #4: Demonstrate Computer Aided Design (CAD) drafting practices that conform to ASME Y14.5 standards.

Effective Term

Fall 2026

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

At the conclusion of this course, the student should be able to:

1. Apply rules of orthographic projection to create multiview drawings.
2. Create pictorials from orthographic views
3. Use CAD software to create:

- a. 2D engineering drawings, including working drawings and assembly drawings
- b. 3D models and assemblies
4. Create auxiliary and section views of an object following correct conventions
5. Apply standards of dimensioning and tolerancing to engineering drawings
6. Apply the engineering design process to a design project

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

Methods of Evaluation

- Objective Examinations
 - Example: There are also objective quizzes with the questions developed from the textbook and the weekly lecture as part of the total evaluation system. Example: How does the inclusion of "Concurrent Engineering" influence the design process. This question is evaluated for accuracy in how well the student describes, in their own words, how "Concurrent Engineering" influences the design process.
- Projects
 - Example: The weekly and semester drawings are examples to assess the depth of topic coverage and critical analysis for each student. Instructor evaluates the student performance of learned objectives such as free hand sketching, pictorial representation of design intent, orthographic representation of pictorial drawings, accuracy to ASME standards for dimensioning and the efficient use of a CAD 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 will guide students to develop hands on digital product definition for manufacturing of designed components. Students will utilize Computer Aided Design (CAD) software and drawing development techniques to produce industry quality product documentation.

Lecture:

1. Critical Thinking: The instructor will present to the students during a weekly lecture/presentation/discussion engineering design methodology that the student will synthesize and apply to assigned problems and then formulate a solution utilizing correct engineering

design methods. (Objective 3) Reading: The instructor will assign readings from the textbook and supplemental materials that the students will read and be prepared to join in group discussions lead by the instructor during the lecture/discussion sessions. Writing: The instructor will require the students to take written notes from the lecture/presentations for use while formulating solutions to their design problems.

- OER Link:
- OER:

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

Distance Learning

1. Instructor provides how-to tutorial to design a extruded part using CAD software. Students are expected to follow the instructor's directions and replicate the part in the CAD program.

Typical Out of Class Assignments

Reading Assignments

Required college level readings from chapters in the textbook regularly assigned. Students are expected to participate in the lecture/discussions based upon these readings. Sample 1: Construct a drawing, based upon course readings, demonstrating the weekly-learning objectives. These weekly drawings are either freehand sketches or computer aided design (CAD)generated. The drawings are evaluated for compliance to American Society of Mechanical Engineers (ASME)standard. Critical thinking and problem solving are part of these assignments. Sample 2: Students read an article on Multi-View Projections and complete a study guide based on the reading.

Writing, Problem Solving or Performance

College level problem solving and/or writing assignments are regularly utilized. Problem solving and skill demonstrations are crucial to any successful basic engineering design course. Sample 1: Compare and contrast manufacturing processes utilized in the definition of products. Sample 2: Problem solve the construction of 3D solid models and the relationship of geometry for feature definition and documentation.

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

Develop a portfolio that contains samples of semester assignments to show potential employers the engineering design concepts studied.

Required Materials

- Fundamentals Of Solid Modeling and Technical Graphics Communication
 - Author: Bertoline, Hartman, Ross
 - Publisher: Mc Graww Hill
 - Publication Date: 2018
 - Text Edition: 7th
 - Classic Textbook?:
 - OER Link:
 - OER:
- Parametric Modeling with SOLIDWORKS 2024
 - Author: Shih, Schilling
 - Publisher: SDC Publications, Inc.
 - Publication Date: 2024
 - Text Edition: 18th
 - Classic Textbook?: