ADVM 0002B - INTRODUCTION TO COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING

Catalog Description

Formerly known as ADVM 0062
Prerequisite: Completion of ADVM 0002A with grade of "C" or better or equivalent as determined by instructor
Hours: 90 (36 lecture, 54 laboratory)
Description: Introduction to Computer Aided Design (CAD) parametric modeling and Computer Aided Manufacturing (CAM) using CAD/CAM software. Covers practical on-the-job parametric modeling skills needed for precision machining. Students will learn skills needed to read and understand detailed drawings, create 3D CAD model files, develop a process plan for machining parts, and create CNC tool paths for manufacturing processes. (not transferable)

Course Student Learning Outcomes

- CSLO #1: Create parametric Computer Aided Design (CAD) models of parts and assemblies using CAD software.
- CSLO #2: Create Computer Aided Manufacturing (CAM) toolpath from Computer Aided Design (CAD) models using CAM software.
- CSLO #3: Validate the accuracy and functionality of designed parts and assemblies using quality control measures.

Effective Term

Fall 2026

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

Lecture:

1. Define CAD

2. Define CAM

3. Create Computer Aided Design (CAD) models to facilitate Computer Aided Manufacturing (CAM) on assigned project.

4. Develop a strategy of operations for projects using Computer Aided Manufacturing (CAM) programming.

5. Analyze and compare Computer Aided Design (CAD) specifications with completed part geometry and provide logical recommendations for corrections.

Laboratory:
1. Demonstrate simulation of machine set-up and operation using created design.
2. Create Aided Manufacturing (CAM) tool path operation on a part model.

3. Create post processed Computer Numerical Control (CNC) code from Computer Aided Manufacturing (CAM) tool path operation to run on a CNC machine.

4. Create machine set-up documentation for a Computer Numerical Control (CNC) machine operator to complete a part.

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

Methods of Evaluation

- Classroom Discussions
  - Example: Class discussion on parametric modeling. Students will be evaluated on participation.
- Projects
  - Example: Students will be evaluated on designing a 3D model using CAD software. Example: Reverse engineering of a hard jaw.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. The instructor will demonstrate how to align the coordinate system on a CAD model in the CAM software interface to the Work Coordinate System (WCS) of a milling machine work holding fixture, followed by the student practice.

Lecture:

1. The instructor will lecture on creating a fully defined CAD model from a technical drawing, followed by students outlining the steps to create a fully defined CAD model.

Distance Learning

1. Instructor provides how-to tutorial on creating a "lego block." Students are expected to follow steps to re-create the lego block using CAD software.

Typical Out of Class Assignments

Reading Assignments

1. Read chapter from text on understanding chip development of central focus point called interference contact. (IX - rake, clearance, cutting angles). Be prepared to discuss in class. 2. Read chapter measurement and be able to identify three methods to measure the 1.75 inch diameter hole within 0.0005 tolerance. (XIII - Inspection methods).

Writing, Problem Solving or Performance

1. Experiment #1: Using modeling clay, try varying the rake angle comparing positive rake vs negative rake. (XI - define the shear line in a chip). 2. Machine center holding tooling, identify fixture and material holding.

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

Required Materials

- Machining and CNC Technology
  - Author: Fitzpatrick, Smith
  - Publisher: McGraw Hill
  - Publication Date: 2024
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:

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