ADVM 0005D - CNC MILLING LEVEL 2

Catalog Description

Formerly known as ADVM 0067
Prerequisite: Completion of ADVM 0005C with grade of "C" or better
Hours: 72 (18 lecture, 54 laboratory)
Description: Applications using three-axis CNC machining. Developing complicated part geometry with Computer Aided Design (CAD), importing files, planning machine operations, and developing machine codes by Computer-Aided Machining (CAM). Includes simulation modeling used to proof the assigned laboratory exercises and set-up for 3 axis operation of CNC machining centers. (not transferable)

Course Student Learning Outcomes

- CSLO #1: Demonstrate safety standards with Computer Numerical Control milling equipment in a learning lab and a worksite environment, including work holding safety.
- CSLO #2: Explain and apply the use of the following terms: work holding, incremental vs. absolute coordinates, multiple work offsets, in machine probing and tool setting systems primary axis of linear motion.
- CSLO #3: Demonstrate use of Computer Aided manufacturing (CAM) software for assigned project(s) to program development to create CNC code to manufacture assigned multi-operation parts.

Effective Term

Fall 2026

Course Type

Credit - Degree-applicable

Contact Hours

72

Outside of Class Hours

36

Total Student Learning Hours

108

Course Objectives

Lecture:
1. Identify safe work expectations when using CNC equipment
2. Outline a CAM process to create a finished part
3. Determine the work development process
6. Explore tolerances and metrology standards
7. Compare processes when different materials are specified

Laboratory:
1. Apply shop safe practices
2. Prepare CAD process for creating CAM application render assigned project;
3. Develop program operations
4. Demonstrate CNC machining center set-up and operation using created design
5. Compare and practice applications of metrology
6. Analyze and compare CAD specifications with completed part geometry and provide logical recommendations for corrections

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

- Objective Examinations
  - Example: Students will take a multiple-choice and fill-in examination on G-code. Standard Grading. Example; List the G-Codes for the four common hole operations.
- Projects
  - Example: Successfully demonstrate the ability to process and plan a project through the lab until completion. Using CAM application, proofing code in simulation, perform machining from raw stock to completed part, meeting specifications assigned in the course.
- Skill Demonstrations
  - Example: Demonstrate competency in CAM design and manufacturing by successfully creating programming code that proofs out with no mistakes in simulation.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Laboratory demonstration of workholding procedures to verify safe machining of parts. Students are expected to experience and perform workholding steps with the various types of workholding systems.

Lecture:

1. Instructor presents lecture on metro-logy uses and applications. Students are expected to utilize Q.C. methods and techniques of verifying parts accuracy with the parts produced in lab assignments.

Distance Learning

1. Following a brief introduction video and reading assignment on 3 Axis Machining. Students will complete an online quiz utilizing multiple-choice and essay questions. Students will be expected to know when 3-axis machining is appropriate for the application.

Typical Out of Class Assignments
Reading Assignments

1. Read material on workholding vises used in multi part applications, multi operations and of types of workholding - non-marking vs. marking used in 4th and 5th axis applications. Be prepared to outline each type. 2. Read material on methods of addressing multi-axis machinery, vertical mill with indexer or rotary table or trunnion. Report on the advantages of add on devices such as rotary table or trunnion vs. Universal Mill and how embedded 5 axis machines compare to add on approaches.

Writing, Problem Solving or Performance

1. Diagram tooth style vs dovetail holding and compare sequence of manufacturing process of dovetail versus bite holding systems. Give examples of where each application has best use. 2. Identify the positive and negative aspects of each type of multi-axis CNC machines.

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

1. Apply a subprogram in application of assigned student part to be made. 2. Identify spindle speed and cutter feed rate for different materials.

Required Materials

- CNC Machining Fundamentals and Applications
  - Author: Richard A. Gizelbach
  - Publisher: Goodheart-Wilcox
  - Publication Date: 2009
  - Text Edition: 1st
  - Classic Textbook?:
  - OER Link:
  - OER:
- Machining and CNC Technology
  - Author: Michael Fitzpatrick
  - Publisher: McGraw-Hill
  - Publication Date: 2024
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:
- Programming of CNC Machines
  - Author: Ken Evans
  - Publisher: Industrial Press
  - Publication Date: 2016
  - Text Edition: 4th
  - Classic Textbook?:
  - OER Link:
  - OER:

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