ADVM 0004A - CNC CUTTING AND FABRICATION LEVEL I

Catalog Description

Formerly known as ADVM 0063
Advisory: Completion of AAD 0070 with grade of "C" or better
Hours: 72 (18 lecture, 54 laboratory)
Description: This course introduces the application of design solutions using Computer Numerical Controlled (CNC) cutting and fabrication processes used in product prototyping and light manufacturing. Students design parts and assemblies using graphic design software and prepare digital files for 2-axis CNC laser and waterjet cutting and engraving operations. This entry-level course covers the safe setup and operation of CNC cutting machines and associated support equipment. Students fabricate components from wood, plastics, and sheet metal and apply basic forming, assembly, and finishing techniques. Laboratory activities progress from structured skill development to integrated projects, culminating in a student-developed prototype capstone project. (not transferable)

Course Student Learning Outcomes

- CSLO #1: Identify the safety aspects in a learning and job environment.
- CSLO #2: Choose commands used to sketch, model and post process with Autodesk Fusion 360.
- CSLO #3: Transfer CAD to CAM through assigned project.

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. Review the safety aspects expected in a learning environment as well as job setting expectations.
2. Discuss and examine the layout of Autodesk Fusion 360.
3. Outline the use of the interface in Fusion 360.
4. Examine the design process in Fusion 360.
5. Explain parametric solid modeling
6. Outline fusion 360 CAM environment
7. Explain drawings vs. renderings.
8. Outline the process for posting CAM tool path to the Haas milling machine.
9. Discuss and examine the layout of Autodesk Fusion 360.
Laboratory:
1. Demonstrate safe practices expected in a learning environment as well as a job setting.
2. Demonstrate the use of the interface in Fusion 360.
3. Perform parametric solid modeling through the use of a student assignment.
4. Troubleshoot the results of the student assignment.
5. Manage Cloud data.
6. Create drawings and renderings.
7. Apply CAM module to setup and application for projects on CNC machines.

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

- Skill Demonstrations
  - Example: 1. From instructor provided 2 dimensional drawings, students will create a 3D model using fusion 360. 2. Students will join multiple components to create an assembly inside fusion 360.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. The instructor will demonstrate how to create a part in the interface, followed by student performing the application of Fusion in design of a similar part.

Lecture:

1. Instructor lecture on the design steps with AutoDesk Fusion 360 CAD. Students participate in the lecture and outline the design steps in a report.

Distance Learning

1. In the modules the instructor will provide written lecture, pdf handouts, and recorded video assignment instruction. The assignment requires the student to model the project in Fusion 360 using sheet metal functions and sheet metal rules. The Student will share their cloud-based Fusion 360 software account with the instructor who will provide feedback with text and screen capture within Fusion 36

Typical Out of Class Assignments
Reading Assignments

1. Read the text material covering foundational concepts of user interface, timeline, bodies and components, and modeling techniques. Be prepared to discuss in class. 2. Read the text material covering toolpaths and programing concepts as applied to 2D, and 3D machining. Be prepared to discuss toolpaths in class.

Writing, Problem Solving or Performance

1. Through the reading assignment, create components, import and edit geometry, documentation, manage designs, working with legacy data. 2. From the reading assignment, set up and create toolpaths, post process G code, WCS probing.

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

- Autodesk Fusion 360 Introduction to Parametric Modeling
  - Author: Ascent - Center for Technical Knowledge
  - Publisher: Ascent
  - Publication Date: 2023
  - Text Edition: 6th
  - Classic Textbook?:
  - OER Link:
  - OER:

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

Instructor provided handouts/materials