ADVM 0002 - TECHNICAL DRAFTING II

Catalog Description

Formerly known as DES 2
Prerequisite: Completion of ADVM 1 with grade of "C" or better or equivalent as determined by instructor
Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)
Description: Intermediate concepts of engineering design including sections, auxiliaries, threads, fasteners, and dimensional tolerancing. Basic concepts of Geometric Dimensioning and Tolerancing. Design for manufacturability and assembly explored to include material selection and properties of materials. This course teaches intermediate/advanced 3D AutoCAD skills. Designed for students who have attained a fundamental knowledge of the processes and practices of engineering design/drafting. (CSU)

Course Student Learning Outcomes

- CSLO #1: Apply appropriate, current and relevant industry standards in preparing technical documentation for the appropriate discipline of their study.
- CSLO #2: Construct partial auxiliary views, half auxiliary views and auxiliary sections and apply them to part drawings.
- CSLO #3: Design complete working drawings in discipline of study for use in manufacturing/building application.
- CSLO #4: Demonstrate computer aided drafting practices that conform to business and industry CAD standards.
- CSLO #5: Demonstrate the appropriate Section view conventions according to the ASME standard for views development.

Effective Term

Fall 2022

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

This course requires 36 hours lecture and 54 hours laboratory. In some class sections, the 54 hours of laboratory may be scheduled "to be arranged" or "TBA." The TBA hours and objectives are expected of all students enrolled in the course.
Upon successful completion of the course, the student will:
Lecture Objectives:
I. Computer Integrated Manufacturing (CIM)
1. Explain the role that Design for Manufacturability plays in product design.
2. Describe the benefits that Design for Assembly plays in product design.
3. Describe the benefits that Design for Service plays in product design.
4. Explain the material selection process.
5. Compare and contrast the properties of materials used in product design.
II. CAD-Drawing Setup
1. Explain the importance that preplanning plays in drawing setup.
2. Interpret the ASME Standard and apply its conventions.
3. Describe the setup procedures for Computer Aided Design (CAD) specific entities relative to prototypes.
III. Sections
1. Differentiate between the symbols used in section lining.
2. Formulate the solution for section development.
3. Differentiate between the types of sections used in drawing development.
4. Analyze the appropriate use of partial views in part descriptions.
IV. Auxiliary Views
1. Differentiate between the possible auxiliary planes used in part descriptions.
2. Differentiate between the three main auxiliaries.
3. Describe dihedral angle.
4. Describe true length lines.
5. Describe how ellipses are projected in auxiliary views.
V. Threads and Fasteners
1. Apply the ANSI/Metric Standards for application specific conventions.
2. Describe the characteristics of screw threads.
3. Differentiate between screw thread forms.
4. Define the pitch of threads.
5. Describe the difference between right/left hand threads.
6. Describe the difference between single and multiple threads.
7. Differentiate between the classifications for American National thread fits.
8. Differentiate between the Metric and Unified thread fits.
VI. Introduction to Dimensional Tolerancing
1. Evaluate how dimensional tolerance affects feature size.
2. Analyze drawings for accumulation of tolerances and how they affect size description.
VII. Introduction to Geometric Dimensioning and Tolerancing
1. Describe the rationale behind the system of geometric dimensioning.
2. Evaluate drawings for accurate application of geometric characteristic symbols.
VIII. Assembly Drawings
1. Describe the methods used in creating installation assembly drawings.
2. Describe the methods used in creating check assembly drawings.
3. Describe the methods used to create drawings used for patent applications.
IX. Semester Project
1. Evaluate the experience working as part of a design team.
Laboratory Objectives:
I. CAD-Drawing Setup
1. Interpret the ASME Standard and apply its conventions.
2. Describe the setup procedures for Computer Aided Design (CAD)specific entities relative to prototypes.
II. Sections
1. Apply the process for cutting plane placement.
2. Apply the standards and conventions for lines in section drawings.
3. Differentiate between the symbols used in section lining.
4. Formulate the solution for section development.
5. Differentiate between the types of sections used in drawing development.

6. Apply the conventions for conventional breaks to views in drawing development.
III. Auxiliary Views
1. Construct reference planes for auxiliary views.
2. Construct partial auxiliary views and apply them to part drawings.
3. Construct half auxiliary views and apply them to part drawings.
4. Construct auxiliary sections and apply them to part drawings.
5. Construct secondary auxiliaries and apply them to part drawings.
IV. Threads and Fasteners
1. Describe the characteristics of screw threads.
2. Create drawings that employ thread and fastener symbology.
3. Construct appropriate representations for threads in section views.
4. Construct thread notes on drawings for part description.
5. Construct representations for threads and fasteners in drawings.
6. Construct representations keyways and/or keyseats in drawings.
7. Construct representations of machine pins in drawings.
V. Introduction to Dimensional Tolerancing
1. Apply tolerance dimensioning to part features.
2. Construct drawings that contain examples of the methods for tolerance dimensioning.
3. Construct drawings that employ the metric system of tolerances and fits.
VI. Introduction to Geometric Dimensioning and Tolerancing
1. Apply geometric symbols to part features on drawings.
VII. Assembly Drawings
1. Prepare general assembly drawings by applying the ASME standards and conventions.
2. Create drawings that illustrate appropriate assembly sectioning techniques.
3. Create working assembly drawings according to ASME conventions.
VIII. Semester Project
1. Create working drawings as an aspect of the document package for the semester project.
2. Create assembly drawings of the semester project to be incorporated into the document package.

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: Example: One of the key guidelines for part design is to insure that a manufacturer specifies quality parts from reliable sources. Describe the "Rule of Ten" and how it affects product cost. This question is evaluated relative to accuracy of knowing what the "Rule of Ten" is and being able to articulate how product cost is influenced.
- Problem Solving Examinations
  - Example: Students are presented with a problematic engineering sketch of a Pulley. Students must analyze the sketch to determine optimum methods for 3D modeling the item, then develop the correct orthographic and section views along with complete dimensioning per ASME standards. This is evaluated by the instructor in accordance with current industry standards.
- Projects
  - Example: Students are presented with partial design criteria for a working assembly. Students must research correct components to include and develop a complete set of working drawings in compliance with ASME standards. This project is evaluated by comparison to current industry standards for development of working drawings.
- Skill Demonstrations
  - Example: The weekly and semester drawings are examples to assess the depth of topic coverage and critical analysis for each student. A faculty member evaluates the student performance of learned objectives such as technical sketching, representation of sectional and auxiliary views, orthographic representation of design intent, accuracy to ASME standards for prototype development 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. Instructor will lead students through the development of Section Views for technical documentation. Students will develop their own appropriate section views for each assigned part. The resulting Technical Drawings will be assessed based on current Industry standards.

Lecture:

1. Instructor will present to the students during lecture/presentation/discussion intermediate engineering design methodology that the student will synthesize and apply to assigned problems and then formulate a solution utilizing correct engineering design methods.

Typical Out of Class Assignments
Reading Assignments

1. Students read textbook chapter on Auxiliary View Development then Construct a drawing, based upon course readings, demonstrating the learning objectives. The drawings are evaluated for compliance with ASME standards. Critical thinking and problem solving are part of these assignments. 2. Search the Internet for articles that reference Design for Manufacture and Assembly and be prepared to discuss with the group.

Writing, Problem Solving or Performance

1. Compare and contrast methods employed in Design for Manufacture and Assembly- report either written or orally upon return to the lecture. 2. Problem solve the construction of 3D solid models and the relationship of geometry for feature definition.

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

1. Develop a portfolio that contains samples of semester assignments to show potential employers the engineering design concepts studied.
2. Participate as a member of a design team for the completion of a semester design project.

Required Materials

- AutoCAD and its Applications
  - Author: Shumaker
  - Publisher: Goodheart-Wilcox Publisher
  - Publication Date: 2019
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:
- Technical Graphics Communication
  - Author: Bertoline
  - Publisher: McGraw Hill
  - Publication Date: 2008
  - Text Edition: 4th
  - Classic Textbook?:
  - OER Link:
  - OER:

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