ADVM 0001 - TECHNICAL DRAFTING I

Catalog Description

Formerly known as DES 1
Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)
Description: Fundamental use of design equipment to create both two dimensional technical sketches and two and three dimensional computer generated (CAD) working drawings that are used for product definition. Introduction to product and process definition as specified by engineering design disciplines. This course teaches introductory 3D AutoCAD skills. Designed for students with no previous experience in engineering design/ drafting. (CSU)

Course Student Learning Outcomes

- CSLO #1: Industry Graphic Standards: Apply appropriate, current and relevant industry standards in preparing technical documentation for the appropriate discipline of their study.
- CSLO #2: Dimensioning-Industry Standards: Define and apply the conventions and standards of ASME Y14.5 relative to pictorial drawings.
- CSLO #3: Design Process: Define the five steps in the design process.
- CSLO #4: CAD Standards: Demonstrate computer aided drafting practices that conform to business and industry CAD standards.
- CSLO #5: 3D Solid Modeling UCS: Demonstrate the proper use of the UCS.

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.
Lecture Objectives:
I. The Design Process
1. Explain the importance of Computer Integrated Manufacturing
2. Describe the role of Product and Process Definition relative to Computer Integrated Manufacturing
3. Define the five steps in the design process
II. Technical Sketching
1. Explain the importance of freehand sketching in a design environment
2. Describe the materials used in freehand sketching
3. Describe the aids employed in freehand sketching
III. Geometric Constructions
1. Define the characteristics of geometric entities
IV. Introduction to 2D Computer Aided Design Software (CAD)
1. Describe the basic command structure of CAD software
2. Explain the methods used in the modification of geometry
V. Pictorial Drawings – Sketching
1. Define the advantages and disadvantages of the three types of axonometric drawings relative to representing objects
2. Describe the characteristic of oblique drawings
3. Describe the difference between the three types of perspective drawings
VI. 3D Solid Modeling CAD
1. Explain the fundamental concepts employed in 3D solid modeling
2. Describe the specifications of computer hardware used in 3D solid modeling
3. Describe the differences between solid modeling softwares
4. Describe the difference between the 2D and 3D environment
5. Describe the appropriate methods for setting view points
6. Explain the attributes relative to solid primitives
7. Describe the methods employed in solid model development
VII. Development of Pictorial Drawings – Sketching
1. Define and apply basic concepts to sketched pictorial drawings
2. Define and apply the conventions and standards of ASME relative to pictorial drawings
3. Describe planes of projection relative to pictorial drawings
VIII. Dimensioning of Solid Models – Part View
1. Define and apply dimension variables relative to solid models
2. Explain the proper procedure for setting the UCS to define a construction plane
IX. Orthographic Projection – Sketching
1. Explain the differences between first angle projection and third angle projection
2. Describe how the number of view are determined in orthographic projections
X. Orthographic Projection – CAD
1. Describe the attributes used relative to prototypes
2. Explain the proper methods used for view extraction and alignment
XI. Orthographic Projection Dimensioning – Sketching
1. Define and apply basic dimensioning concepts to orthographic drawings
2. Define and apply the conventions and standards of ASME relative to orthographic drawings
XII. Orthographic Projection Dimensioning – CAD
1. Define and apply the conventions and standards of ASME relative to orthographic drawings
2. Define and apply dimension variables relative to orthographic drawings
Laboratory Objectives (These objectives may be:
I. Technical Sketching
1. Apply geometry to freehand sketches
2. Demonstrate the application of proportion in freehand sketching
3. Demonstrate the steps in developing a single view freehand sketch
II. Geometric Constructions
1. Demonstrate the application of methods employed in geometric constructions
III. Introduction to 2D Computer Aided Design Software (CAD)
1. Demonstrate the appropriate use of CAD software for creating geometry
2. Describe the proper application of the alphabet of lines
IV. 3D Solid Modeling CAD

1. Demonstrate the proper use of the UCS
2. Describe the appropriate methods for setting view points
3. Describe the methods employed in solid model development
4. Demonstrate appropriate plotting methods for outputting solid models
V. Development of Pictorial Drawings – Sketching
1. Define and apply basic concepts to sketched pictorial drawings
2. Define and apply the conventions and standards of ASME relative to pictorial drawings
3. Demonstrate the appropriate application of dimensions relative to planes of projection
VI. Dimensioning of Solid Models – Part View
1. Demonstrate the proper methods for loading a solid model drawing
2. Apply dimensions to a defined construction plane
VII. Orthographic Projection – CAD
1. Explain the proper methods used for view extraction and alignment
VIII. Orthographic Projection Dimensioning – Sketching
1. Define and apply basic dimensioning concepts to orthographic drawings
2. Define and apply the conventions and standards of ASME relative to orthographic drawings
IX. Orthographic Projection Dimensioning – CAD
1. Define and apply the conventions and standards of ASME relative to orthographic drawings
2. Define and apply dimension variables relative to orthographic drawings

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 various 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.

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

- 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: Mc Graww Hill
    - Publication Date: 2008
    - Text Edition:
    - Classic Textbook?:
    - OER Link:
    - OER:

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