Mechanical Drafting and Design I

Mechanical Drafting and Design I provides students with a basic understanding of the detailing skills commonly used by drafting technicians. Areas of study include: lettering, sketching, proper use of equipment, geometric constructions with emphasis on orthographic (multi-view) drawings that are dimensioned and noted to ANSI standards. Another purpose of this course is to provide students with a basic understanding of the features and considerations associated with the operation of a computer-aided design (CAD) system. Students will gain valuable hands-on experience with Auto CAD. They will be expected to complete several projects (increasing in difficulty) relating to command topics. Topics include: 2D drawing commands, coordinate systems, editing commands, paper and model space, inquiry commands, layers, plotting, text, and basic dimensioning.

- DOE Code: 4836
- Recommended Grade Level: Grade 11-12
- Recommended Prerequisites: Computers in Design and Production Systems
- Credits: 2-3 credit per semester, maximum of 6 credits
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas
- This course is aligned with postsecondary courses for Dual Credit:
  - Ivy Tech
    - DESN 102 – Technical Graphics
    - DESN 103 - CAD Fundamentals
  - Vincennes University
    - DRAF 140 – Introduction to CAD

**Dual Credit**

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

**Application of Content and Multiple Hour Offerings**

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences. When a course is offered for multiple hours per semester, the amount of laboratory application or work-based learning needs to be increased proportionally.

**Career and Technical Student Organizations (CTSOs)**

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in SkillsUSA, the CTSO for this area.

**Content Standards**

**Domain – Utilizing the Design Process in Mechanical Drafting**
Core Standard 1 Students apply and adapt the design process to challenges found in mechanical drafting.

Standards
MDDI-1.1 Identify and utilize the design process
MDDI-1.2 Recognize that budget constraints and customer needs are part of the design process
MDDI-1.3 Interpret demographics in a given area and relate it to the design process
MDDI-1.4 Use precision measuring tools to appropriately determine measurements

Domain – Drawing Methods in Mechanical Drafting
Core Standard 2 Students connect basic drafting standards to applications.

Standards
MDDI-2.1 Sketch proportionately and recognizably a given object
MDDI-2.2 Create vertical Gothic lettering to quality standards
MDDI-2.3 Exhibit proper equipment usage
MDDI-2.4 Demonstrate acceptable line work and construction techniques
MDDI-2.5 Project and detail orthographic drawing to scale
MDDI-2.6 Demonstrate effective understanding and usage of dimensions, symbols, and notations to ANSI standards
MDDI-2.7 Use sectioning techniques to better illustrate complex detail drawings involving numerous line types
MDDI-2.8 Create working 2D drawings

Domain – Utilization of CAD Software in Mechanical Drafting
Core Standard 3 Students select specific commands to develop drawings to meet industry standards.

Standards
MDDI-3.1 Demonstrate competence in the use of CAD software through assignments
MDDI-3.2 Use word processing and CAD file export commands when completing assignments
MDDI-3.3 Identify and use multiple input methods to select commands on the CAD system
MDDI-3.4 Retrieve and use help commands
MDDI-3.5 Navigate through and identify various parts of the CAD environment
MDDI-3.6 Modify drawing elements using editing commands
MDDI-3.7 Create drawings using: grid, snap, tracking, layer, text, text styles, block, design center, tool palette, drawing setup, and dimensioning commands
MDDI-3.8 Explain coordinate systems

Domain – Solving Design Challenges in Mechanical Drafting
Core Standard 4 Students develop mechanical knowledge to design and create solutions.

Standards
MDDI-4.1 Draw orthographic views of mechanical objects
MDDI-4.2 Apply tolerances to objects
MDDI-4.3 Design assembly drawings
MDDI-4.4 Create a title block
MDDI-4.5 Plot drawings
MDDI-4.6 Develop a parts list
MDDI-4.7 Create mechanical notes

Domain – Careers in Mechanical Drafting

Core Standard 5 Students confirm that there are mechanical careers and opportunities available.

Standards

MDDI-5.1 Research mechanical drafting careers
MDDI-5.2 Find mechanical drafting opportunities offered by a technical school or college
MDDI-5.3 Determine mechanical drafting occupation wages/salaries