Tennessee CTE

Architectural & Engineering Design II

Safety 1

1 **Safety Rules: Accurately read, interpret, and demonstrate adherence to safety rules, including but not limited to rules published by the Occupational Safety and Health Administration (OSHA), and state and national code requirements. Be able to distinguish between the rules and explain why certain rules apply.** 1.1

2 **Safety Equipment: Identify and explain the intended use of safety equipment available in the classroom. Demonstrate how to properly inspect, use, and maintain safe operating procedures with tools and equipment. Incorporate safety procedures and complete safety test with 100 percent accuracy.** 1.2

Career Exploration 2

1 **Postsecondary Options: Research postsecondary institutions (colleges of applied technology, community colleges, and four-year universities) in Tennessee and other states that offer architecture or engineering programs. Evaluate the tentative career plan developed in the introductory course and update the career plan to reflect any new discoveries, citing evidence from the research.** 2.1

Advanced Technical Drawing 3

1 **Two-Dimensional Drawings: Use computer-aided drafting (CAD) software to create two-dimensional drawings of advancing complexity, accurately incorporating symbols, notes, dimensioning, and line types to design drawings. Perform software operations such as utilizing sheets/layouts for printing, scaling viewports in sheets/layouts for printing, printing drawings to proper scale, outputting drawings to electronic and paper media, and overlaying drawings on externally-referenced drawings.** 3.1

2 **Multi-View Drawings: Use CAD software to create accurate multi-view drawings of objects of advancing complexity using orthographic projection, incorporating symbols, notes, dimensions, and line type (such as hidden lines to show internal or hidden features).** 3.2

3 **Pictorial Drawings: Use CAD software to create pictorial drawings of advancing complexity, such as isometric, oblique, and perspective drawings. Attend to detail by using proper angles and ensuring holes, cylinders, prisms, and other features are in proper alignment and relationship to each other. Incorporate symbols, notes, dimensions, and line type according to industry standards.** 3.3

	4 **Sectional View Drawings: Create accurate sectional view drawings of advancing complexity (such as full, half, offset, broken-out, removed, and revolved sections), incorporating symbols, notes, and dimensions, using appropriate layout within title blocks, and appropriate drawing composition (including line weight and line type).** 3.4
	5 **Auxiliary View Drawings: Create accurate auxiliary view drawings of advancing complexity including depth, height, or width auxiliary views; partial auxiliary views; and auxiliary section views.** 3.5
	6 **Drawings of Threads and Fasteners: Draw detailed, schematic, and simplified drawings of various types of threads and fasteners, including unified, square, and acme threads. Demonstrate the ability to accurately interpret industry-standard thread notes to calculate the thread pitch as well as layout and construct the drawing.** 3.6
	7 **Set of Project Drawings: Produce a complete set of project drawings including a completed assembly drawing and an exploded assembly drawing. Supplement assembly drawings with appropriate representations of individual components and a bill of materials as needed for the project type. Fully describe the design by selecting the most appropriate drawing type for the given component, including plan, section, and three-dimensional drawings.** 3.7
	8 **Refine Drawings: Demonstrate the ability to refine drawings based on critique from peers, instructors, and self-evaluation. Drawing on evidence from textbooks and other resources, evaluate the effectiveness of a drawing based on industry standards for technical drawing. Interpret and incorporate feedback when refining drawings.** 3.8
Dimensioning 4	1 **Annotate Drawings: Interpret industry standards to accurately apply dimensions, notes, and symbols on CAD drawings, including arranging dimensions, using various dimension styles and symbols, and avoiding redundancy. Demonstrate the ability to adjust annotation styles and sizes based on the drawing type and scale. Define tolerance and give examples of general methods for noting tolerances on drawings.** 4.1
	2 **American National Standards Institute: Research the American National Standards Institute (ANSI) and describe the goals of the organization and the impact it has on technical drawing, particularly for dimensioning a drawing.** 4.2
Introduction to Three-Dimensional Modeling 5	1 **Three-Dimensional Modeling: Use three-dimensional modeling software to create a simple three-dimensional model. Interpret instructional materials to perform basic operations using three-dimensional modeling software. Instructional materials may include textbooks, instructional manuals, websites, video tutorials, and more.** 5.1

Applications of Technical Drawing 6

1. **Physical Model: Interpret technical drawings to build a physical model of a design. Select and use the appropriate materials and tools to safely measure components and construct the model. Upon completion, use the technical drawings to check the model for accuracy.** 6.1

2. **Use Field Measurements: Building on techniques practiced in the introductory course, continue to measure, record, and use field measurements to create drawings of increasingly complex objects and layouts. For example, create an accurate half section drawing of an actual mechanical gear by measuring and examining the physical object to visualize and draw the section.** 6.2

3. **Three-Dimensional Model: Create two-dimensional plans for a simple three-dimensional object utilizing drawing techniques learned in the course, such as auxiliary drawing. Use the plans to build a rough study model of the object. Evaluate the model and revise the design on the basis of collected test data. For example, create a two-dimensional drawing of three-dimensional sheet metal design or package design as if the object were unfolded. Print the drawing on paper and construct a paper model of the object. Evaluate the model for inaccuracies and identify opportunities to improve efficiency of materials or construction. Use these conclusions to refine the design.** 6.3

4. **Drawing and Model Comparisons: Understand how designs are communicated through different types of two-dimensional and three-dimensional drawings, physical models, and virtual three-dimensional models within various disciplines, such as architectural, civil, mechanical, electrical, and industrial design. Interpret symbols and notations within the context of each type.** 6.4

Technology 7

1. **Troubleshooting: Identify and demonstrate basic troubleshooting strategies related to fundamental hardware and software problems. Evaluate electronic media to diagnose and fix hardware and software problems encountered during the coursework. For example, consult software forums, tutorial videos, and other instructional materials to diagnose and correct a drawing that prints on paper differently than intended.** 7.1

2. **Impact of Technology: Explain how technology has changed design throughout history, and identify current transitions occurring in design media, technique, and focus.** 7.2

Projects 8

1. **Project Plan: Develop a project plan and use the design process to create a solution for moderately complex problem sets, utilizing both simple three-dimensional modeling techniques and detailed technical two-dimensional and three-dimensional scale drawings.** 8.1

2. **Alternate Designs: Choose between alternate design solutions for a given design problem and justify the choices. Demonstrate the ability to pitch the idea to the client in a presentation, defending the design by pointing to specific features that meet the client's specifications.** 8.2

3 **Portfolio: Update materials from coursework to add to the portfolio begun in the introductory course. Continually reflect on coursework experiences and revise and refine the career plan generated in the introductory course. Include written descriptions of drawing types and learning outcomes.** 8.3