Tennessee CTE

# Architectural & Engineering Design III

## 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

## Architectural Design 2

1 **Civil Drawings: Interpret civil drawings used to describe a site, including recognizing symbols used to describe topography. For example, in teams, interpret a topographic survey drawing to construct a model (physical or virtual) of a building site. Use the model to influence the design of the building and the building's placement on the site.** 2.1

2 **Site Analysis: Perform a site analysis to make design decisions for a building plan, including interpreting existing site conditions and evaluating site surroundings. Determine the impact environmental factors such as climate, wind patterns, and the movement of the sun have on the design and site placement of the building. Summarize site analysis findings with drawings and supporting text.** 2.2

3 **Design Constraints: Synthesize the various constraints affecting a building's design to make and justify design decisions. Items to consider should include:** 2.3

- a Evaluating the building's program based on client need. For example, appraise the requirements of the client such as total square footage and list of desired features (number of bedrooms, bathrooms, etc.). 2.3.A
- b Accommodating the needs of people of all ages and physical abilities in compliance with the Americans with Disabilities Act (ADA). 2.3.B
- c Interpreting applicable building codes based on the project type. For example, determine the minimum number and spacing of exit doors for a given building occupancy size. 2.3.C

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4 **Planning and Diagramming Techniques: Research planning and diagramming techniques used by designers. Implement planning and diagramming techniques such as bubble diagrams and traffic flow patterns to design a schematic site plan and floor plan for a given building program.** 2.4

5 **Building Model: Create a properly scaled model of a building (physical or virtual) and study the model in the context of the site layout. Present the model along with supporting sketches and diagrams to an audience (such as the instructor and peers), explaining and justifying design ideas in a logical, coherent narrative. Gather feedback and use it to refine the design.** 2.5

6 **Comprehensive Set of Drawings: Incorporate schematic design sketches, models, and peer feedback to further develop a building's design. Communicate details of the design through appropriate drawing types, utilizing industry-standard drawing conventions and software. Create a comprehensive set of drawings including the following drawing types:** 2.6

- a Site plan 2.6.A
- b Floor plan 2.6.B
- c Interior and exterior building elevations 2.6.C
- d Foundation plan 2.6.D
- e Roof plan 2.6.E
- f Building system plans (such as an electrical plan) 2.6.F
- g Door and window schedules 2.6.G
- h Three-dimensional renderings (interior and exterior) 2.6.H

7 **Sustainable Design: Research sustainable design solutions and practices; then provide sustainable design recommendations for a given design. Calculate a rating for energy responsiveness using a sustainable building guideline.** 2.7

8 **Wall Section: Examine a wall section drawing for a specific building. Identify, define, and explain the function and purpose of each component, including wall insulation, flashing, and the structure of the cornice.** 2.8

**Mechanical Design** 3

1 **Three-Dimensional Models: Create three-dimensional models of machine parts of increasing complexity utilizing parametric modeling software. Perform software operations including:** 3.1

- a Utilizing basic software tools such as extruding and cutting, and navigating around the object. 3.1.A
- b Applying and modifying geometric constraints and dimensions to capture and alter the design geometry of a part. 3.1.B
- c Creating drawing layouts with dimensioned views of parametric solids, arranging a drawing sheet according to industry standards. 3.1.C
- Printing drawing layouts at appropriate scales. 3.1.D

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e Preparing multi-sheet working drawings and assembly drawings according to industry standards. 3.1.E

2 **Field Measurements: Modify drawings based on field measurements. Building on techniques practiced in prior courses, continue to measure, record, and use field measurements to create drawings of increasingly complex objects and layouts.** 3.2

3 **Assembly Model: Compile parametric models of individual machine parts to create a model of a simple assembly. Perform advanced software operations such as animating the model to illustrate how the assembly operates.** 3.3

4 **Schematic Design: Utilize the design process to create a schematic design solution for a mechanical design problem. Identify the criteria and constraints and produce a virtual or physical model of the solution, utilizing software tools where appropriate. Test and evaluate the solution by performing an analysis of the model and gathering feedback from peers.** 3.4

5 **Schematic Design: Incorporate schematic design models, peer feedback, and test results to further develop a design. Communicate details of the design through appropriate drawing types, utilizing industry standard drawing conventions and software. Derive working drawings (detail and assembly drawings including parts lists) from the threedimensional models created using parametric modeling software. Attend to details when explaining the design, including:** 3.5

a Specifying and depicting threads, fasteners, and other hardware involved in a mechanical assembly. 3.5.A

b Applying appropriate geometric dimensioning and tolerancing based on industry standards, including understanding tolerance relationships between mating parts, interpreting geometric tolerancing symbols in a drawing, and using tolerancing in drawings. 3.5.B

c Selecting and creating appropriate section drawings, noting tolerances, hidden surfaces, and other mechanical details. 3.5.C

**Research Project** 4

1 **Research Project: Employ basic methods of data collection and analysis to compile information for projects. Use available research methods when project planning and problem solving. Synthesize research to present appropriate precedents for development of a project and articulate logical rational for the use of chosen precedents.** 4.1

**Design Project** 5

1 **Schematic Designs for Project: Use the design process to create schematic designs employing discipline-appropriate representational media (such as sketches, technical drawings, and preliminary models) for a given problem set. Prepare and present schematic designs to peers and others, citing research to justify design solutions. Note constructive feedback received and use it to refine the design.** 5.1

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**rawings, Models and Presentation Boards: Drawing on results from the chematic design phase, create discipline-appropriate drawings based on industry**

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| | | standards, a threedimensional model of the design, and presentation boards. Present final design conclusions to members of the profession as well as peers; employ design decision justifications as would an architect or engineer delivering a pitch to a prospective client. 5.2 |
| | 3 | Comprehensive Set: Compile working drawings in a comprehensive set, including a bill of materials with allowable material alternatives. Demonstrate the ability to properly select the drawing scale, select the views, lay out drawings, and organize the drawing set according to industry standards. 5.3 |
| Project Management 6 | 1 | Project Management: Examine how architects and engineers conduct project management processes, including but not limited to setting interim goals, tracking progress, and coordinating with construction professionals and clients. Compare and contrast components of project management models gathered from textbooks, online resources, and actual case studies of major or local design professionals. 6.1 |
| | 2 | Project Management Strategies: Utilize project management strategies to create and implement a work plan to complete projects according to schedule. 6.2 |
| | 3 | Report: Apply the basic steps of traditional project delivery, outlining who and what is involved in each step. Compare texts to describe alternatives to traditional project delivery methods, such as the design-build method used in construction. 6.3 |
| Portfolio 7 | 1 | Portfolio: Update the portfolio to reflect the cumulative total of all projects undertaken across the program of study. 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. 7.1 |