

COURSE OUTLINE **Residential Design and CAD 1**

Course Description:

EN 103. Residential Design and CAD I. 3 hours credit. Prerequisite: EN 101 with a "C" better. This course will enable the student to understand and apply concepts of basic residential design and its integration into computer-aided design (CAD). The student will analyze and design the necessary elements needed for a residence.

Course Relevance:

The residential design and CAD skills learned in this class will provide students with a basic understanding of residential design and CAD, and their applications in the industry.

Required Materials:

Jefferies, A. & Madsen, D. (2005) Architectural Drafting and Design, (5th Ed.). Albany, NY: Delmar/Thomson Learning

Supplementary Materials:

The student will provide one CD-RW or one ZIP disk.

Learning Outcomes:

The intention is for the student to be able to:

1. Assist architects in the design of residential plans
2. Apply CAD in the design of residential plans
3. Understand the importance of CAD and its application in the field of residential design and architecture.

Learning PACT

Through the student involvement in this course, he/she will develop and document his/her achievement of the following PACT skills:

Primary skills (developed and documented):

1. Time Management
 - By designing a complete set of residential plans, the student will learn to manage his/her time to accurately complete their plans by the end of the semester.
2. Aesthetic Response
 - By analyzing multiple high quality residential design plans, students should know how to differentiate between low and high quality residential architectural drawings.

3. Speaking
 - Students will give a presentation addressing current or past issues in residential design.

Secondary skills (developed but not documented):

- Ethical Conduct
- Problem Solving
- Reading
- Listening
- Computer Literacy
- Nonverbal communication

Assessment Tasks:

These learning outcomes and primary Learning PACT skills will be demonstrated by:

1. Completing weekly assignments which evaluate both the knowledge and application of CAD
2. Developing and delivering an 8-10 minute presentation
3. Completing a portfolio of residential plans in CAD.

Course Content:

- I. Themes - Key recurring concepts that run throughout this course:
 - A. Residential design
 - B. Residential drafting
 - C. Communication
- II. Issues - Key issues that will be addressed in this course: areas of conflict that must be understood in order to achieve the intended outcome:
 - A. Feasibility of residence
 - B. Accuracy of drawings
 - C. Economic awareness
 - D. Functionality of residence
 - E. Environmental concerns
 - F. Codes and regulations
- III. Concepts – Key concepts that must be understood to address the issues:
 - A. Understanding and utilizing bubble diagrams for space planning
 - B. Correctly set up title blocks
 - C. Correctly set up text heights
 - D. Correctly set up lineweights
 - E. Correctly dimension drawings
 - F. Estimate the costs of land, materials, and construction
 - G. Understand the difference and relevance of paperspace/modelspace
 - H. Identify and integrate energy efficient materials into residence
 - I. Identify property lines, boundaries, and easements
 - J. Identify flood plain
 - K. Utilize various resources for product identification and pricing

- L. Research, identify, and incorporate correct codes and regulations into drawings
- IV. Skills/Competencies - Actions that are essential to achieve the course outcomes:
 - A. Identify and describe basic residential designs
 - B. Complete a bubble diagram that identifies utilization of space
 - C. Examine, identify, and describe the primary considerations needed in designing a residence
 - D. Identify various drawing techniques used in residential design
 - E. Locate, draw and describe all property lines, easements, and flood plain
 - F. Design, draw, and describe the elements needed in a sleeping area and bathroom
 - G. Design, draw, and describe the elements needed in a living area
 - H. Design, draw, and describe the elements needed in a service area
 - I. Describe and demonstrate land plotting and planning for a residence
 - J. Design, draw, and describe a typical footing for a residential structure
 - K. Design, draw, and describe a typical foundation/basement plan for a residential structure
 - L. Describe the components of a residential floor system
 - M. Design, draw, and describe the components of residential wall and ceiling system
 - N. Design, draw, and describe the doors and windows of a residence
 - O. Design, draw, and describe a residential stair system
 - P. Design, draw, and describe a residential fireplace and chimney system
 - Q. Design, draw, and describe the basic components for a residential roof system
 - R. Design, draw, and describe the elevations for a residence
 - S. Complete an estimate of all products used in the residence (i.e., materials, appliances, construction costs).

Learning Units:

- I. The World of Residential Architecture
 - A. Cape Colonial
 - B. Garrison
 - C. Salt Box
 - D. Southern Colonial
 - E. Contemporary
 - F. Ranch
- II. Basic House Design
 - A. One-story ranch designs
 - B. One-and-one-half story designs
 - C. Two-story designs
 - D. Split-level designs

- E. Traffic Circulation
- III. Primary Considerations
 - A. Site considerations
 - B. Community
 - C. Costs
 - D. Zoning
 - E. Codes
 - F. Topographical
 - G. Family needs
 - H. Quality of living
 - I. Plan description
- IV. Drawing Instruments and Techniques
 - A. Orthographic projection
 - B. Three principal views
 - C. Computer-aided design
 - D. Use of a scale
 - E. Dimensioning
- V. Room Planning for Sleeping Areas and Bathrooms
 - A. Sleeping areas
 - B. Bathrooms
 - C. Accessibility for the Handicapped
 - D. Furniture size and arrangement
 - E. Minimum clearance
 - F. Bath fixtures
- VI. Room Planning for Living Areas
 - A. Living room
 - B. Accessibility for the handicapped
 - C. Furniture size and arrangement
 - D. Dining room
 - E. Entryway and foyer
 - F. Minimum clearance
 - G. Family/Recreation room
 - H. Special purpose rooms
 - I. Patios, porches, and courts
- VII. Room Planning for Service Areas
 - A. The straight line kitchen
 - B. The L-shaped kitchen
 - C. Accessibility for the handicapped
 - D. The corridor kitchen
 - E. The peninsula kitchen
 - F. Cabinets and appliances

- G. Garage or carport
- H. Driveway and turnaround

VIII. Plot Plans

- A. Property lines
- B. Contour lines
- C. Topographical features
- D. Common symbols
- E. Site location of residence

IX. Footings, Foundations, and Concrete

- A. Footing shapes and specifications
- B. Foundation walls
- C. T-foundations
- D. Slab foundations
- E. Pier and post foundations
- F. Concrete and masonry basement walls
- G. Beams and girders
- H. Live and dead loads

X. The Foundation Plan

- A. Required information
- B. Material symbols
- C. Drawing a foundation plan
- D. Drawing a basement plan

XI. Sill and Floor Construction

- A. Platform framing
- B. Balloon framing
- C. Joists and beams
- D. Floor trusses
- E. Subfloor
- F. Cantilevered joists

XII. Wall and Ceiling Construction

- A. Frame wall construction
- B. Span data
- C. Ceiling construction
- D. Framing considerations
- E. Brick names and sizes

XIII. Doors and Windows

- A. Interior doors
- B. Accessibility for the handicapped
- C. Exterior doors
- D. Garage doors

- E. Specifying doors
- F. Door details
- G. Door schedules
- H. Windows
- I. Window types
- J. Special window applications
- K. Window schedules

XIV. Stairs

- A. Types of stairs
- B. Stair terminology
- C. Stair design
- D. Code requirements
- E. Stair calculations
- F. Structural details
- G. Accessibility for the handicapped

XV. Fireplace and Chimneys

- A. Fireplace design considerations
- B. Hearth and chamber
- C. Flue
- D. Framing around the fireplace and chimney
- E. Fireplace specifications
- F. Single-face fireplace
- G. Two-face fireplace
- H. Prefabricated metal fireplaces and stoves

XVI. Roof Designs

- A. Gable roof
- B. Hip roof
- C. Flat roof
- D. Shed roof
- E. Mansard roof
- F. Gambrel roof
- G. A-frame roof
- H. Other contemporary roof designs
- I. Roof trusses
- J. Ventilation
- K. Flashing
- L. Gutters and downspouts
- M. Roof sheathing and roofing

XVII. Elevations

- A. Elevation identification
- B. Grade line, floors, and ceilings
- C. Walls, windows, and doors

- D. Roof features
- E. Dimensions, notes, and symbols
- F. Determining vertical height

Learning Activities:

Learning activities will encompass lecture, demonstration, and assigned problems in all units covered. All assignments will be related to residential design, requiring the student to exercise analytical and problem solving design skills.

Grade Determination:

All assignments will be evaluated on quality and quantity of work completed. The student's final grade will be based upon the student's level of development in their residential design and CAD skills.