Passaic County Technical Institute

Wayne, NJ

Architectural Drafting and Design/CAD IV

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Course Description

This course will offer an introduction to residential architectural drafting and design from an interdisciplinary perspective, with a focus on process skills that include critical thinking, ethical reasoning, effective communication and self-directed learning.

The overall aim is to introduce the student to residential architectural drafting and design practices, in both traditional architectural standards and eco-friendly industry standards, and help them develop the necessary technical skills to communicate architectural ideas in an understandable, efficient, and accurate manner.

This course will include environmentally friendly methods for applicable areas of residential design. The eco-friendly methods outlined in this course will be taught in accordance with the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

This course provides instruction in preparing architectural working drawings using computer based methods and industry standard software. It also introduces the student to many career opportunities available in the architectural drafting and design field, and prepares them to enter directly into the work environment or pursue further educational opportunities.

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Safety

Shop safety procedures, as well as employment/"job site" safety considerations, will be stressed throughout this course.

Shop Safety Procedures

The location, purpose and use of all safety equipment in the classroom will be explained, demonstrated and periodically reviewed during the course. Students are required to pass a shop safety test and demonstrate safety rules and procedures daily. Safety hazards are to be reported to the instructor immediately. Evacuation and fire drill procedure will be demonstrated and practiced by the students routinely. Students are expected to follow all safety procedures. Failure to do so will result in disciplinary action.

Residential Safety Considerations

The students will also gain awareness of safety considerations for residential dwellings. Handicapped accessibility and safety concerns will also be introduced.

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Course Objectives

Residential Drafting and Design

Upon completion of the requirement of this course, students will be able to:

I. Residential Electrical

- Define typical residential electrical terms.
- Plan for the electrical needs of a modern home.
- Identify and explain the three types of electrical circuits used in a residential structure.
- Calculate circuit requirements for a residence.
- Explain the advantages and disadvantages of low voltage exterior lighting.

II. Information, Communication, and Security Wiring

- Identify the features related to information, communication, and security that should be considered when designing a new home.
- List the types of lines or cables used in residential telephone systems.
- Define common terms associated with information, communication, and security wiring.
- List the components of a security system designed to protect residential property.
- Discuss the components of a home automation system.
- Describe the elements of a low-voltage switching system.

III. Electrical Plan

- Describe an electrical plan and identify it's features
- Identify typical electrical symbols found on a residential electrical plan.
- Draw an electrical plan for a residential structure using manual drafting and CADD techniques.

IV. Residential Plumbing

- Discuss the purpose of a residential plumbing system.
- Identify the elements contained in a residential water supply system.
- Identify the elements of a residential water and waste removal system.
- Explain the operation of various in-house water treatment systems.
- Explain the layout of a private sewage disposal system.

V. Plumbing Plan

- Explain the purpose of a residential plumbing plan.
- Identify the components of a residential plumbing plan.
- Draw plumbing symbols and fixtures on a plumbing plan using proper techniques.
- Develop a residential plumbing plan.
- Compile a plumbing fixture schedule.

VI. Residential Climate Control

- Discuss the components of a complete climate control system.
- List the advantages and disadvantages of various types of residential heating systems.
- Perform heat loss calculations for a typical residential structure.
- Select building materials that will provide the best insulation properties.

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VII. Climate Control Plan

- List features included on a residential climate control plan.
- Plan the ductwork for a typical forced-air system.
- Select an appropriate heating or cooling unit for a given structure.
- Draw a climate control plan using proper symbols and conventions.

VIII. Perspective Drawings

- Explain the purpose of a perspective drawing.
- Explain the difference between one-, two-, and three-point perspectives.
- Prepare a one- or two-point perspective drawing using the office method.
- Explain how changing the viewing position, angle, and height alters the perspective.
- Describe and demonstrate how to create a perspective using CADD.

IX. Presentation Drawings

- Explain the purpose of a presentation drawing.
- List methods commonly used to increase the degree of realism in a presentation plan.
- Render presentation drawings using a variety of methods.
- Describe lighting for a CADD 3D model to be rendered.
- Explain walkthrough animation.

X. Architectural Models

- Explain the various types of architectural models used to represent residential structures.
- List the features commonly included in a presentation model.
- Summarize the steps for constructing a balsa wood model.

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Textbooks and Instructional Materials and Software

I. Selected Textbooks

- Clois E. Kicklighter; Architecture; Residential Drafting and Design, Goodheart-Wilcox Publishing Co., Tinley Park, Illinois, 2008
- Alan Jefferis/David A. Maden/David P. Maden; Architectural Drafting and Design,Delmar Cengage Learning, Clifton Park, New York, 2011

II. Supplemental Instructional Materials

- David A. Maden/Ron A. Palma/David P. Maden; Architectural Drafting Using AutoCAD, Glencoe-McGraw Hill Publishing Co., Peoria Illinois, 2010
- Elise Moss; AutoCAD Architectural 2011, Fundamentals, Schroff Development Corporation, Mission, KS, 2010

III. Selected Software

- AutoCAD; Autodesk Inc., Available per the Information Technology Department and according to copyright protection laws.
- AutoCAD Architectural; Autodesk Inc., Available per the Information Technology Department and according to copyright protection laws.

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Instructional Strategies and Evaluation System

I. Instructional Strategies

This curriculum will incorporate a variety of teaching methods to encourage self-motivation, participation and enthusiasm. Students will experience: lecture and demonstration, individual drawings and projects, research projects, work-based learning/professional development activities and portfolio preparation.

II. Requirements

Students will be responsible to maintain:

- Notebook
- Participation productivity grades
- Projects
- Drawings
- Research projects
- Job sheets
- Time sheets
- Portfolio
- Evaluations
- Exam activities

III. Evaluation

Teachers Method of Assessment:

- Tests
- Quizzes
- Exercise drawings
- Project Drawings
- Notebook
- Class Participation
- Portfolio

Attendance and discipline are in accordance with Board of Education policy

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Scope and Sequence Chart

Key: I – Introduced, D – Developed, R – Reinforced

SKILLS TO BE LEARNED		SUGGESTED GRADE LEVELS			
		9	10	11	12
1.	Knowledge of all safety procedures.	IDR	R	R	R
2.	Identify current and emerging careers related to drafting.	IDR	R	R	R
3.	Explain the importance and develop freehand mulitview and pictorial sketches.	ID	R	R	R
4.	Use basic drafting tools and equipment properly and efficiently to produce technical drawings.	ID	R	R	R
5.	Demonstrate the ability to create drawings using engineering and architect scales.	ID	R	R	R
6.	Demonstrate the ability to the correct line techniques used in drafting and design.	ID	R	R	R
7.	Solve technical and mathematical problems through geometric constructions using drafting instruments and a CAD system.	ID	R	R	R
8.	Demonstrate the ability to write legibly by using standard lettering used in drafting and design.	ID	R	R	R
9.	Determine the number of views needed to describe fully the shape and size of an object.	ID	R	R	R
10.	Develop a multiview drawing from the initial idea to a finished drawing using drafting instruments and CAD system.	ID	R	R	R
11.	Use board drafting and CAD to add dimensions, notes and symbols to a technical drawing.	ID	R	R	R
12.	Differentiate between size dimensions and location dimensions.	ID	R	R	R
13.	Use ANSI and ISO standards for dimensions and notes.	I	D	R	R
14.	Prepare a drawing with sectional views using both board drafting techniques and CAD.	ID	R	R	R
15.	Prepare a drawing with auxiliary views using both board drafting techniques and CAD.	ID	R	R	R
16.	Produce detail drawings, assembly drawings and assembly working drawings.	ID	R	R	R
17.	Develop a standard bill of materials.	ID	R	R	R
18.	Compute fractions, decimals and basic trigonometry to solve related mathematics.	ID	R	R	R
19.	Knowledge of the components of a computer-aided (CAD) system.	ID	R	R	R
20.	Use computer-aided drafting (CAD) system properly and efficiently to produce technical drawings.	ID	R	R	R
21.	Prepare a drawing with revolutions using both board drafting techniques and CAD.		IDR	R	R
22.	Create isometric, oblique and perspective pictorial drawings using board drafting or CAD techniques.		ID	R	R
23.	Create a drawing with pattern developments using both board drafting techniques and CAD.		IDR	R	R
24.	Create and utilize block libraries in CAD.		ID	R	R
25.	Use CAD properly and efficiently to produce three-dimensional objects.		ID	R	R
26.	Apply materials and lighting to CAD drawings.		ID	R	R
27.	Create renderings in CAD.		ID	R	R
28.	Recognize the four basic house designs used in residential architecture			IDR	R

29.	Evaluate the primary considerations when choosing a site for residential construction.			IDR	R
30.	Identify the various areas to a home and which rooms are included in those areas.			IDR	R
31.	Incorporate necessary requirements to make rooms accessible to the disabled.			IDR	R
32.	Properly locate a building on a site.			IDR	R
33.	Identify and name parts and materials used in a building.			IDR	R
34.	Prepare a set of house plans using both board and CAD techniques.			IDR	R
35.	Dimension architectural drawings.			IDR	R
36.	Develop a budget for building a home.			IDR	R
37.	Incorporate environmentally friendly materials in design of a home.			IDR	R
38.	Incorporate energy efficient technologies in design of a home.			IDR	R
39.	Create a residential electrical plan using proper symbols and techniques.				IDR
40.	Identify the features related to information, communication, and security used in the design of a residence.				IDR
41.	Create a residential plumbing plan using proper symbols and techniques.				IDR
42.	Identify and define the various presentation drawings and techniques used in residential design.				IDR
43.	Identify and define the various types of architectural models used to represent residential structures				IDR

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Proficiencies

Upon successful completion of the requirements of this course, the students will be able to:

1. Recall and demonstrate proper adherence to shop safety rules with 100% accuracy.
2. Define typical residential electrical terms.
3. Demonstrate an understanding of the electrical needs of a modern home.
4. Identify and explain the tree types of electrical circuits used in a residential structure.
5. Identify the features related to information, communication, and security used in the design of a residence.
6. Define common terms associated with information, communication, and security wiring.
7. Describe and identify an electrical plan and all of its features.
8. Identify typical electrical symbols used on a residential electrical plan.
9. Discuss the purpose of a residential plumbing system.
10. Identify the elements used in a residential plumbing system.
11. Explain the purpose of a residential plumbing plan.
12. Identify the components of a residential plumbing plan.
13. Identify plumbing symbols and fixtures used on a residential plumbing plan.
14. Demonstrate an understanding of one-, two-, and three-point perspective drawings.
15. Explain the purpose of a presentation drawing.
16. Demonstrate an understanding of walkthrough animation.
17. Identify and define the various types of architectural models used to represent residential structures.