Maryland CTE Programs of Study

Architectural Design Principles (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 9-12. 1

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INTRODUCTION 2

A Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. 2.A

B The Construction Career Cluster prepares students for careers in designing, planning, and building sustainable infrastructure. This field includes architects, engineers, construction managers, and skilled trades professionals. 2.B

C The Architecture Design and Drafting program prepares students for careers in architecture, engineering, and construction management through a comprehensive four-year sequence. Students develop skills in both traditional and digital drafting techniques, building design, sustainable practices, and professional documentation. Starting with fundamental drawing and design principles, students' progress to advanced Building Information Modeling (BIM) using industry-standard software like AutoCAD and Revit. The program emphasizes sustainable design practices and culminates in opportunities to earn both Autodesk Revit Certified User and LEED Green Associate certifications. Through hands-on projects, students learn to use professional tools and equipment including drafting tools, 3D printers, laser cutters, and environmental testing equipment while developing a professional portfolio. 2.C

D Architectural Design Principles introduces students to fundamental architectural principles and basic drafting techniques. Students learn to use traditional drafting tools and begin working with computer-aided design software while studying architectural history and basic building systems. Through hands-on projects, students develop basic model-making skills and learn shop safety while beginning to explore sustainable design concepts. The course emphasizes development of spatial thinking and basic visualization skills through both hand sketching and digital tools. 2.D

Skip to main content

E **Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.** 2.E

F **Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.** 2.F

KNOWLEDGE AND SKILLS 3

A **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:** 3.A

1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work. 3.A.1
2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn. 3.A.2
3. Employ effective reading, writing, and technical documentation skills. 3.A.3
4. Solve problems using critical thinking techniques and structured troubleshooting methodologies. 3.A.4
5. Demonstrate leadership skills and collaborate effectively as a team member. 3.A.5
6. Implement safety procedures, including proper handling of tools, equipment and hardware and following appropriate safety measures in the lab/shop environment. 3.A.6
7. Exhibit an understanding of legal and ethical responsibilities in the architectural field, following accessibility laws and best practices for design. 3.A.7
8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting. 3.A.8

B **The student identifies various career pathways in the Architectural Design and Drafting field. The student is expected to:** 3.B

1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in architectural design. 3.B.1
2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations. 3.B.2
3. Demonstrate effective interview skills for roles in drafting and architectural design. 3.B.3

C **The student develops technology and digital literacy skills. The student is expected to:** 3.C

1. Use technology as a tool for research, organization, communication, and problem-solving. 3.C.1

Skip to main content

2 Use digital tools, including computers, mobile devices, collaboration platforms, and cloud services, to access, manage, and create information. 3.C.2

3 Demonstrate proficiency in using emerging and industry-standard technologies, including virtualization tools, design software, and related equipment. School systems, based on feedback from their business partners, could consider software such as TinkerCAD, AutoCAD, Revit, and Onshape, for scaffolded classroom implementation, and ultimately industry recognized certification. 3.C.3

4 Understand ethical and legal considerations for technology use, including the principles of data protection, copyright, and responsible technology use. 3.C.4

D The student integrates core academic skills into architectural design practices. The student is expected to: 3.D

1 Demonstrate the use of clear communication techniques, both written and verbal, that are consistent with industry standards. 3.D.1

2 Apply foundational mathematical concepts including scale and proportion calculations, geometric constructions, basic algebra for dimensional calculations, measurement conversions between imperial and metric systems, and area calculations for basic architectural spaces and building footprints. 3.D.2

3 Understand basic scientific principles including forces acting on simple structures, properties of common building materials, fundamentals of light and shadow in architectural spaces, and environmental factors affecting site planning and building orientation. 3.D.3

E The student understands fundamental architectural design principles and elements. The student is expected to: 3.E

1 Define the basic elements and principles of architectural design including form, space, scale, and proportion. 3.E.1

2 Analyze historical architectural styles and their influence on modern design. 3.E.2

3 Apply basic design principles in creating simple architectural sketches and drawings. 3.E.3

4 Explain the relationship between human factors and architectural design with respect to how different spaces accommodate human activities and movement. 3.E.4

5 Create basic architectural diagrams showing spatial relationships and circulation patterns through bubble diagrams and basic floor plan sketches. 3.E.5

F The student develops proficiency in basic drafting and visualization techniques. The student is expected to: 3.F

1 Demonstrate proper use and identify purpose of manual drafting tools and equipment. 3.F.1

2 Demonstrate understanding of drafting fundamentals such as orthographic projection, dimensioning, perspective drawings, and basic annotation. 3.F.2

Skip to main content

3 Understand how to create basic architectural drawings including floor plans, elevations, and sections using manual drafting techniques with appropriate architectural scales and dimensions. 3.F.3

4 Construct physical architectural models using basic materials like cardboard and foam board while maintaining precise measurements and clean craftsmanship. 3.F.4

G The student demonstrates foundational understanding of digital design software. The student is expected to: 3.G

1 Identify basic interface elements, such as the ribbon, project browser, properties palette, and navigation controls within architectural design software. 3.G.1

2 Use fundamental drawing tools—including lines, rectangles, and offset—and basic modification tools such as move, copy, and rotate to create simple geometry. 3.G.2

3 Place basic architectural elements—such as walls, doors, and windows—using default library components in architectural design software. 3.G.3

4 Navigate between 2D and 3D views, and operate zoom, pan, and other view tools to explore digital models. 3.G.4

5 Set up reference levels and grids to organize a basic project. 3.G.5

6 Initiate a new project using provided templates and configure project settings, including units and discipline. 3.G.6

7 Create basic sheets, place plan or elevation views, and output these to print or PDF. 3.G.7

8 Annotate drawings with simple dimensions and text notes to communicate essential information. 3.G.8

H The student comprehends basic building systems and components. The student is expected to: 3.H

1 Identify primary building systems and their functions. 3.H.1

2 Describe basic structural systems and components such as loads, forces, and building stability. 3.H.2

3 Compare different construction materials and identify modern, industry aligned, implementation practices. 3.H.3

4 Identify basic mechanical and electrical symbols in architectural drawings and explain their meaning. 3.H.4

Skip to main content

I **The student applies safe practices in the learning environment. The student is expected to:** 3.I

1. Demonstrate proper safety procedures in tool and equipment operation by passing safety tests and consistently following protocols during lab activities. 3.I.1
2. Identify potential safety hazards in the architectural/engineering environment and describe mitigation protocols. 3.I.2
3. Maintain a safe and organized workspace by properly storing tools, maintaining clean work areas, and following cleanup procedures. 3.I.3

J **The student understands introductory sustainable design concepts. The student is expected to:** 3.J

1. Define sustainable design and its importance in architecture. 3.J.1
2. Identify basic principles of environmental design and the impact of building orientation, natural lighting, and passive ventilation strategies have on energy use. 3.J.2
3. Create preliminary site analysis drawings that document environmental factors including sun paths, prevailing winds, and natural features. 3.J.3

K **The student develops a professional portfolio. The student is expected to:** 3.K

1. Create a digital and/or physical organizational system for collecting and categorizing project work throughout the course. 3.K.1
2. Document the design process for each project through sketches, drawings, photographs, and written descriptions. 3.K.2
3. Select and present best work examples that demonstrate understanding of architectural design principles and technical skills. 3.K.3
4. Write project descriptions that clearly communicate design intent and process. 3.K.4