



## Northern York County School District

### Curriculum Overview

**Course: Architectural Design**

**Grade Level: 9-12**

**Approval Date: March 2023**

**Length of Time: 90 days / 0.5 credits**

**Course Description:**

This course builds on Introduction to Engineering.

Architectural Design is a semester-long course emphasizing the use of AEC (Architecture/Engineering/Construction) software including computer-aided drafting (CAD), building information modeling (BIM), and three-dimensional modeling and rendering software applications such as AutoCAD and Revit. Utilizing various architectural drawing types, such as floor plans, foundation plans, plot plans, detail drawings, section views, and elevations, students learn to plan and prepare construction documents appropriate to the architecture, interior design, and construction industries. While doing so, they develop a fundamental knowledge of building systems and a familiarity with basic residential building codes.

**Course Objectives:**

- Students will explore the history of architectural styles, as well as careers related to architecture and construction.
- Students will create a set of construction documents to communicate their design intent.
- Students will design residential homes and commercial buildings using AutoCAD and Autodesk Revit.
- Students will estimate the costs and materials associated with constructing their design(s).
- Students will present their design(s) using various presentation methods and techniques (i.e., drawings, models, renderings, walk-throughs).

**Related Standards:**

Pennsylvania Technology and Engineering Standards

*Nature and Characteristics of Technology & Engineering:*

- Demonstrate the use of conceptual, graphical, virtual, mathematical, and physical modeling to identify conflicting considerations before the entire system is developed and to aid in design decision making.

*Design Thinking in Technology and Engineering Education:*

- Apply a broad range of design skills to a design thinking process.
- Evaluate and define the purpose of a design.
- Conduct research to inform intentional inventions and innovations that address specific needs and wants.
- Apply principles of human-centered design.

<ul style="list-style-type: none"> <li>Optimize a design by addressing desired qualities within criteria and constraints while considering trade-offs.</li> </ul>	
<b>Units:</b> <ol style="list-style-type: none"> <li>Architectural Styles</li> <li>Construction Documents</li> <li>Residential Design and Construction</li> <li>Commercial Design and Construction</li> <li>Estimating Construction Costs and Materials</li> <li>Design Presentation Methods</li> <li>Careers in Architecture and Construction</li> </ol>	
<b>Concepts:</b> <ul style="list-style-type: none"> <li>Design process</li> <li>CADD</li> <li>Architectural styles</li> <li>Construction documents</li> <li>Plans</li> <li>Elevations</li> <li>Sections</li> <li>Details</li> <li>Schedules</li> <li>Specifications</li> <li>Residential design and construction</li> <li>Commercial design and construction</li> <li>Estimating costs and materials</li> <li>Scale</li> <li>Measuring with an architect's scale</li> <li>Design presentation methods</li> <li>Drawings</li> <li>Scale models</li> <li>BIM</li> <li>Renderings</li> <li>Walk-Throughs</li> <li>Careers in architecture and construction</li> </ul>	<b>Competencies:</b> <ul style="list-style-type: none"> <li><u>AutoCAD drawing tools and commands:</u> OSNAP/OTRACK, Polar/Ortho, Zoom/Pan, Line, Rectangle, Offset, Trim/Extend, Polyline, Spline, Circle, Arc, Ellipse, Fillet/Chamfer, Rotate, Scale, Mirror, Break/Join, Divide/Measure, Array, Stretch/Lengthen</li> <li><u>AutoCAD annotation tools and commands:</u> Text Styles, TEXT/MTEXT, Dimension Styles, Linear, Aligned, Angular, Radius/Diameter, Baseline, Continue</li> <li><u>Using Autodesk Revit:</u> Setting Up Levels and Grids, Working with Walls, Understanding Dimensions, Adding Doors and Windows, Modifying the Design, Loading Families, Creating Ceilings and Lights, Exploring Additional Modeling Tools, Creating a Section, Working with 3-D Views, Editing in Any View, Color Scheme Diagram, Visibility, Creating an Enlarged Floor Plan, Dimensioning a Plan, Creating Tags, Customizing Tags, Adding a Schedule View, Customizing a Schedule View, Creating a Construction Detail, Path of Travel, Importing a CAD File, Importing Image and .pdf Files, Linking Another Revit File, Performing an Interference Check, Working with Sheets, Plotting a Set of Documents, Exporting the Model, Generating a Cloud Rendering</li> </ul>
<b>Learning Activities:</b> <ul style="list-style-type: none"> <li>Instructional video tutorials</li> <li>Teacher demonstrations</li> <li>Individual classwork</li> </ul>	<b>Performance Tasks:</b> <ul style="list-style-type: none"> <li>Researching and reporting on the history of architectural styles.</li> </ul>

<ul style="list-style-type: none"> <li>• Small/large group projects</li> </ul>	<ul style="list-style-type: none"> <li>• Creating architectural plans, elevations, sections, details, schedules, and specifications using AutoCAD and Autodesk Revit.</li> <li>• Designing a residential home using AutoCAD and Autodesk Revit.</li> <li>• Designing a commercial building using AutoCAD and Autodesk Revit.</li> <li>• Building a BIM model of your design using Autodesk Revit.</li> <li>• Estimating construction costs and materials.</li> <li>• Presenting your design using various methods and techniques.</li> <li>• Researching and reporting on career opportunities in architecture and construction.</li> </ul>
<b>Other Assessment Measures:</b> <ul style="list-style-type: none"> <li>• Student reflection</li> <li>• Online test/quizzes</li> <li>• Research reports</li> </ul>	
<b>Textbook/Primary Resource:</b> <ul style="list-style-type: none"> <li>• AutoCAD 2023 Essential Training (LinkedIn Learning/Shawn Bryant)  <a href="https://www.linkedin.com/learning/autocad-2023-essential-training">www.linkedin.com/learning/autocad-2023-essential-training</a></li> <li>• Learning Revit 2023 (LinkedIn Learning/Paul F. Aubin)  <a href="https://www.linkedin.com/learning/learning-revit-2023">www.linkedin.com/learning/learning-revit-2023</a></li> </ul>	
<b>Supplemental Resource Materials:</b> <ul style="list-style-type: none"> <li>• Teacher-generated instructional resources</li> <li>• AutoCAD software</li> <li>• Autodesk Revit software</li> </ul>	