SCHOOL DISTRICT OF THE CHATHAMS
CURRICULUM PROFILE

CONTENT AREA(S): Design & Technology   **GRADE LEVEL(S):** 10-12

COURSE: Architectural Design   **TIME FRAME:** Full Year (5 Credits)

I. Course Overview

The Architectural Design course engages students in an intensive study of architecture, its relationship to design, and the implementation of the Design Process in the design and construction of residential and commercial structures. Students are challenged to develop and design architectural drawings, floorplans, and models following industry standards. Students will learn to use architectural CAD software, such as AutoDesk Revit and AutoCAD, which are both used in the architectural and design industries. Students will be able to experience what it is like to be an architect. Main topics include, residential design considerations, floorplans and working in scale, CAD modeling and architectural drawings, and architectural modeling techniques.

II. Units of Study

Unit 1: Safety *[will be reviewed and embedded within the units listed below, as most appropriate]*
- Overall Safety Expectations & Regulations
- Machine/Tool Safety Considerations, Parts, Safe Use, and Demonstration
  - Followed by written and hands-on assessments
  - Documentation of demonstration/lesson dates, as well as passing of written and hands-on assessment with notes (as well as any reassessments)
- Machines/Tools/Practices:
  - General Safety Practices
  - Eye Safety
  - Hot Glue Gun
  - X-Acto Knives
  - Drill Press *(if applicable)*
  - Bandsaw *(if applicable)*
  - Belt & Disc Sanders *(if applicable)*

Unit 2: Residential Design
- Basic Areas of a Home
  - Room Requirements
- Traffic Circulation
- Basic House Designs

Unit 3: Architectural Floorplans & Working in Scale
- Architectural Standards & Symbols
  - Doors & Windows
  - Standard & Utility Walls
- Working in Scale (Using the Architect's Scale)
- Dimensioning
- Basic Hand Drawing Techniques

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Unit 4: Architectural CAD Techniques & Modeling
- Hand Drawings vs. Computer Aided Design
- Software Introduction & Lessons (screens, toolbars, tools)
- Creating Floorplans & Design Using CAD
  - Floorplans
  - Elevations
  - Detailed Section Drawings
  - Interior Design
- Walkthroughs

Unit 5: Architectural Models
- Foam Core Techniques
- Balsa Wood Techniques
- Additional Modeling Mediums

III. Essential Questions *(The open-ended, provocative questions that help frame inquiry)*

Unit 1: Safety
- Why is it important to comply with the rules, regulations, and procedures in a lab environment?
- Why is it important to pass tool and machine safety exams (both written and hands-on) with a score of 100%?

Unit 2: Residential Design
- What makes a structure residential?
- How can you design a residential structure to include a comfortable balance between social, private, and utility space (sleeping, living, & service areas)?
- How does room placement affect traffic flow?
- Why, where, and how do we utilize the layout and organization of each type of basic house design to meet our design needs?

Unit 3: Architectural Floorplans & Working in Scale
- How is an architect scale used?
- What is the purpose of a scaled drawing?
- How can we clearly convey a design to someone unfamiliar with the idea?
- How is an architectural drawing similar to and different from an artistic drawing or an engineering drawing?
- What are the pros and cons for each type of architectural drawing (floorplans, elevations, detailed section drawings)?
- When would I use each type of architectural drawing (floorplans, elevations, detailed section drawings)?

Unit 4: Architectural CAD Techniques & Modeling
- How can the use of a CAD program (AutoDesk Revit) improve the understanding of developing and reading floor plans?

- How can the use of a CAD program improve the design and creation of a residential floor plan?
- What real world examples can you find that uses or is improved by an architectural based CAD program?

Unit 5: Architectural Models
- What is the role of models in the architectural design process and how would we determine which type of model, mediums, and techniques are most appropriate for our goals/design?
- What are the essential skills and methods needed to develop an architectural model?

IV. Learning Objectives

8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
8.1.12.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
8.2.12.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
8.2.12.D.1	Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.
8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
8.2.12.D.5	Explain how material processing impacts the quality of engineered and fabricated products.
9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.6	Read, interpret and use technical drawings, documents and specifications to plan a project.

9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
9.3.12.AC-DES.1	Justify design solutions through the use of research documentation and analysis of data.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.7	Employ appropriate representational media to communicate concepts and project design.

V. Instructional Materials
- Safety Resources & Exams
- Teacher created design briefs and rubrics
- Use of videos, DVD's, computer software, online resources, posters, and other audio-visual materials as appropriate
- Computer Aided Design Software (AutoDesk Suite)
- Adobe Creative Cloud Suite
- G-Suite for Education (Google Docs, Sheets, Slides, etc.)

VI. Key Performance and Benchmark Tasks
- Safety demonstration & assessments.
- Communicate through the use of architectural drawings and models.
- Identify and define architectural vocabulary and terminology.
- Analyze and critique floorplans and elevations of existing homes and home plans.
- Review basic software commands in CAD.
- Complete a series of exercises designed to introduce students to the technical aspects of architecture.
- Choose a piece of property from a plan and draw the house that they have designed on the property including all exterior details.
- Design and draw a complete set of floor plans for a residential structure using CAD compete with windows, doors, appliances, and cabinetry.
- Write schedules for all windows, doors, appliances, and cabinetry.
- Model architectural concepts through various mediums to proper scale.
- Utilize CAD software to develop professional drawings that adhere to architectural principles, standards, and design formats.

Student Outcomes and Methods of Assessment:
- Attendance as per school policy
- Individual challenge problems
- Tests
- Engineering projects
  - Design and rationale
  - Performance
  - Rubrics
- Digital Portfolio

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