Hillsborough Township School District

Hillsborough High School

Applied Technology Curriculum

Architectural Drawing 2

August, 2012

ELEMENTS OF CURRICULUM

Course Overview
Curriculum Outlined
Standards for Technological Literacy

Course Overview

Architectural Drawing 2 is a full-year course with focus on the principles and graphic communication of architecture, structural systems, and residential construction. With computer aided design (CAD) as a primary tool, students will study and produce floor plans, roof designs, foundation plans, cabinet construction, and elevation drawings. Prerequisites for this course are: Mechanical Drawing 1 and Architectural Drawing 1.

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 1 **Sectional, Detail, and Cabinetry Drawings**	2 to 4 days 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	What is a sectional drawing and why are they used?	Sections are used to show the exact details of construction. The ability to prepare technical architectural drawings depends on a thorough understanding of sectional drawings.	Describe types of sectional drawings. Communicate views of sections based on a cutting plane. Draw sections, using correct codes and proper dimensioning. Evaluate when a detail sectional drawing is needed. Read and prepare detail drawings. Design and prepare cabinet drawings.	Define the following terms: · Break-out sectional drawings · Cabinet coding system · Cutting plane · Cutting plane line · Detail sections · Full section · Horizontal/vertical sections · Removed section · Longitudinal section Demonstrate line usage with types of sections. Draw a full section of a house you have designed. Draw a section through the house, revolving the cutting plane line 90°.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful Completion of safety test and assignments Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

Benchmarks for standards for technological literacy: 8, 9 10, 11, 17

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Unit 2 **Site Development Plans**	2 to 4 days 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	Why is site development an integral part of design process?	Landscape architecture is primarily concerned with the use of space and the integration of landform, site character, and architecture.	Identify the major elements used in site design. Understand the role and uses of zoning ordinances in the design process. Draw survey, plat, and plot plans. Understand the polar coordinate system and its application to site plans. Design, draw, and render landscape plans and elevations.	Define the following terms: · Building envelope · Building permit · Contour lines · Density · Landscape plans · Phasing Identify and discuss the environmental and human-related influences that affect site design. Draw the setback and building area for a lot 130'x65' according to the zoning requirements.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful Completion of safety test and assignments Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 3 **Pictorial Drawings**	5 to 15 days 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	How do you differentiate between and isometric and orthographic drawing? Why are various perspectives needed in pictorial drawings?	Unlike elevations that reveal only one side of an object, pictorials show several sides of an object in one drawing. Pictorial drawings have lines that recede, creating an illusion of depth.	Differentiate between isometric, oblique, and perspective drawings. Geometric principles involved in projecting lines (from a given point or at a constant angle) to create 3D images. Apply principles of perspective drawing to create interior and exterior pictorial drawings. Projection method for drawing pictorials.	Draw a two point perspective of a building of your own design. Sketch a three point perspective of the tallest building in your community. Draw a one-point perspective of a classroom. Prepare one drawing to show more of the ceiling and left wall. Prepare another drawing to show more of the floor and the right wall.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 4 **Architectural Renderings**	36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	Why is rendering important in architectural design?	Drawings are rendered by adding realistic texture and establishing shade and shadow patterns.	Recognize the wide selection of media available for rendering. Evaluate when to use which media to achieve an artistic effect. Add realism to drawings by the use of shading, shadows, texture, entourage, and landscapes. Follow the correct sequence for preparing a rendering.	Define the following terms: · Acrylics · Entourage · Pastels · Render · Wash drawing Render a perspective drawing of your own house. Collect illustrations that could be adapted for use on renderings: drawings of people, cars in different sizes and positions, landscapes, plants, etc.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 5	1 month 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	What are two basic purposes of architectural models? What features does a representation models usually include?	Architectural models are three-dimensional representations of a complete design. Models are made to scale and can be viewed from any angle or distance.	Describe architectural models made for design study purposes. Explain the difference presentation and design study models. Tell what input is needed to create a computer model. Construct an architectural model.	Describe four types of design study models and explain their functions. List the steps for constructing a model. Construct a model layout of a house of your choice.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
Architectural Models								

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Unit 6 **Principles of Construction**	5 to 10 days 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	Why is a buildings orientation in relationship to its environment important? What is the difference between active and passive solar systems? Should building appear as appendages or functional parts of a land? Why? Explain why certain sides of a house receive the most light and heat. Compare winter and summer changes.	New construction materials and new methods of using conventional materials provide designers with great flexibility in construction design.	Name and define physical forces that act on a building. Describe the factors that determine the strength of structural components. Draw a modular floor plan, elevation, and detail drawing.	Define the following terms: · Bearing-wall structures · Building load · Cantilever · Compression force · Dead load · Deflection · Lateral load · Live load · Modula · Skeleton frame Describe four structural forces and give examples of how each can be counteracted.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 7 **Foundations and Fireplace Structures**	5 - 10 days 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	Why are reinforcing bars used in concrete slabs? What are the bases of foundations and foundation walls? List five factors that determine the type of foundation to be used? Because masonry fireplaces and chimneys are exceptionally heavy, what factors must be determined when designing a house with a fireplace?	Every structure needs a foundation. Foundations must be strong enough to support and distribute the load of the structure.	Describe the types of foundations. Identify the components and materials used in foundations. Design a fireplace with sufficient structural support and appropriate safety components. Draw foundation plans. Relate the layout and excavations for a building to the type of foundation it will have.	Define the following terms: · Damper · Firebox · (fire chamber) · Flue · Footings · Foundation sills · Permanent wood foundations · Slab · Rebar Draw the foundation plan for the house you are designing. Sketch a foundation plan for your house using a 1/4 -1-0 scale for a T-foundation. Draw a plan and elevation view of a fireplace. Draw a sill and footing detail for your house.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 8 **Electrical Design and Drawings**	1 month 36 weeks Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester. Used as needed per assignment	What size distribution panel is required for a total of 40,000 watts with a service supply of 240 volts? How many amperes flow through a 120-volt circuit with 14 ohm resistance? What are the three types of branch circuits? Name five locations where GCFI receptacles are required. Name the three types of lighting functions. Determine the location and size of the distribution box for your designed house.	The design and drawing of electrical systems requires knowledge of electrical power distribution.	Plan and draw electrical circuits for a house on a floor plan. Plan and draw lighting for each room in a house. Calculate electrical measurements for each circuit. Draw electrical and electronic symbols. Design and draw an electronic building control system.	Define the following terms: · Ampere · Circuit · Circuit breaker · Conductors · Fluorescent · Incandescent · Insulators · Kilowatt-hour · Lux · Ohms Plan the lighting needs and fixtures of the house you are designing. Specify fixtures by room. Using a CAD system, draw the complete electrical plan for your house. Show all circuits and label the capacity of each. Create a model of a wall section with No. 14 wires, receptacles, junction boxes, and 2x4 pieces to demonstrate basic wiring.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 9 **Revit Architecture**	1 month Utilizes elements and content from previously outlined units.	Why is Revit considered BIM over standard CAD systems?	Building information modeling is a process that fundamentally changes the role of Computation in architectural design.	CAD vs. Building Information Modeling. Create walls, floors, and ceilings. Edit walls by changing particle board, stud type, and air barriers. Design constraints: Levels, Reference Planes, and Grids. Design Information Organization: Components, Categories, Subcategories. View window and Project Browser: Floor Levels, Elevations, 3D modeling, and walkthroughs.	Define the following terms: · BIM (Building Information Modeling · Parameters · Component Design · Design Constraints Introduction to Revit Architecture. Demonstrate the use of interface, panels, project browser, ribbon, type and instant parameters, and options bar. Design residential and commercial projects with knowledge of architectural styles and design.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 10 **Drawing Coordination and Checking**	1 week Utilizes elements and content from previously outlined units.	What information is included in a change order? What symbol is used on a drawing to label a change or revision?	Architectural drawings must be complete and accurate. Each drawing must also be easily retrievable and consistent with all other drawings.	To organize and check a complete set of architectural drawings. How drawings in a set are related. To identify identical locations on all drawings in a set. To select the drawing needed to complete a set of architectural drawings. Methods of drawing and recording changes on drawings according to change orders.	Define the following terms: · Change orders · Checker · Combination plans List the types of information that must be checked on architectural drawings. Check the set of house plans you have developed in earlier exercises for the types of information listed. Prepare at least one change order and make a drawing of it. Use Revit to list tags and dimensions.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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Unit 11 **Careers in Architecture and Related Fields**	1 weeks Utilizes elements and content from previously outlined units.	Do research on a career you think you might find interesting. Write a brief report and share what you have learned with other members of your class.	To enter any of the career fields, a certain amount of education or training is required.	Name and describe educational and training programs available to prepare you for a career in architecture and related fields. List educational requirements for specific careers in architectural design, engineering design, and construction. Contact sources of further information about careers in architecture and related fields.	Discuss the following topics: • Opportunities for education and training. • Educational requirements. Current students studying Architecture and Civil Engineering will speak in class during class.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.B.(1).3 Integrate structural, environmental, safety, building envelope, and building service systems in the design of buildings and structures. 9.4.12.B.(1).10 Demonstrate understanding of principles, conventions, standards, applications, and restrictions pertaining to the manufacture and use of construction materials, components, and assemblies, and incorporate this understanding into project design. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

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