

REVISED: August, 2020

Black Horse Pike Regional School District
580 Erial Road, Blackwood, NJ 08012

Architectural Design

COURSE OF STUDY

Technology Education Department

Written by:
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Date:
June 2020

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Approved by:
Matt Szuchy, Director of Curriculum & Instruction

ARCHITECTURAL DESIGN

HIGH SCHOOL

2020-2021 Course Syllabus



TEACHER



E-MAIL



PHONE #



REMIND CODE



CLASSROOM CODE

COMMON TIME AVAILABILITY

_ and _ days in _-__.

I am not available any other day, but can meet after school, if you schedule it with me in advance.

COURSE DESCRIPTION

11-12 Graders
5 Credits

In Architectural Design, you will learn how to read and interpret house plans to create functional living spaces. You will learn how to frame a house from the ground up, including how all construction, electrical and mechanical systems operate and influence on another. And at the end of the year, we will finish it out by studying sustainable design and create plans for a custom tiny house, which you will also build a scaled model of. This class is suggested for students interested in Architecture, Engineering, or the Construction Trades.

UNITS COVERED

- Architectural Form, Styles, and Design Elements
- Elevation and Floor Plans Using Autodesk's AutoCAD
- Foundations, Framing and Building to Code
- House Wiring
- Mechanical and Plumbing Systems
- Kitchen and Interior Living Space Design Using Autodesk's Revit
- Sustainable Design and Tiny Living

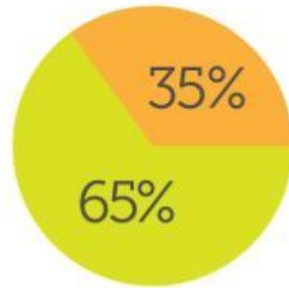


MATERIALS NEEDED

- Pencil (bring everyday)
- Two-Pocket Folder (keep in the classroom)



GRADING



CLASSWORK (65%): Anything you make or produce falls under this category including written assignments, quizzes, sketches and brainstorming activities, any computer-based work, and anything you build from your prototypes to your final designs.

PARTICIPATION (35%): You are expected to actively participate each and every day. Over a third of your grade is participation! Below are some pointers to help you succeed in class and earn full participation points every week:

LATE WORK



- You will lose 5% points of the total grade on any missed work for each day it is late. If you are absent, see below.
- Complete missed or late work during Tartan Time, not during class time.

ABSENCES

- If you are absent, it is your responsibility to e-mail me and check Google Classroom.
- You will get extensions on assignments equal to the number of days you were out
- If you know you're going to be out, notify me ahead of time so I can help you with the classwork


TOP 10 WAYS TO EARN FULL PARTICIPATION POINTS



1. Keep phone and headphones away for the entire class period
2. Keep quiet and pay attention during lectures, lessons and demonstrations
3. Ask questions if you're not sure what to do. If I am busy with someone else, try and look up the answer on your own or ask a classmate or partner (but don't do nothing)
4. Each class we will have daily/weekly checkpoints. Make sure you know what they are and work to meet those checkpoints
5. When prompted to get to work, you should get to work within just a couple minutes. Any longer and you will lose participation points
6. Be productive and try your best. You should be working on your projects for this class for the majority of the period. Breaks are ok, but should be short and limited
7. Use school appropriate language and be mindful of your classmates
8. Arrive to class on time, prepared with all necessary materials and sit in your seat
9. Use tools, machinery, and classroom equipment correctly and safely
10. Have fun!

DESIGN & TECHNOLOGY DEPARTMENT

PERFORMANCE CHART

	ADVANCED	PROFICIENT	BELOW AVERAGE
GRADING GUIDE	A 	B-C	D-F
EFFORT AND USE OF CLASS TIME (Group or Individual)	<p>Extra effort during and after class time is put into project.</p> <p>Student(s) modeled exceptional behavior, were always on task, followed all safety rules, and helped others.</p>	<p>Consistent effort is put into the project during class time.</p> <p>Student(s) modeled good behavior, but was not always on task and misused equipment.</p>	<p>Inconsistent effort during class time.</p> <p>Student(s) did not use class time wisely, misused tools and machinery, and, as a result, missed checkpoints, deadlines and due dates.</p>
ACCURACY AND NEATNESS	<p>Project is prepared neatly and carefully.</p> <p>All measurements are accurate.</p> <p>Project is aesthetically pleasing and well built.</p>	<p>Project is fairly neat. Measuring is mostly accurate.</p> <p>Project is good.</p> <p>There is room for improvement.</p>	<p>Project is prepared with little care and lacks neatness.</p> <p>Project looks rushed and doesn't work as intended.</p> <p>Lots of room for improvement.</p>
CREATIVITY	<p>Project is original and imaginative.</p> <p>Design is unique, innovative and well thought out.</p>	<p>Project has some original elements.</p> <p>Design is somewhat clever but not entirely unique.</p>	<p>Project lacks creativity and thought.</p> <p>Design is not original and is more or less a copy of an existing one.</p>
FOLLOWING INSTRUCTIONS, SPECIFICATIONS AND CONSTRAINTS	<p>All project instructions have been followed.</p> <p>Every requirement has been met and exceeded.</p>	<p>Some project instructions and requirements met, but not all.</p>	<p>The majority of project instructions and requirements were not followed, have not been met, and project is incomplete.</p>
DEMONSTRATES UNDERSTANDING	<p>Student is extremely knowledgeable of project concepts and is able to help others.</p>	<p>Student displays knowledge of most concepts, methods and/or practices involved in the project.</p>	<p>Student lacks knowledge about project concepts, methods and practices.</p>

Unit Outline

Architectural Design

Course Content

1. [Intro to Architectural Design](#) - This unit provides background information on the history and development of major architectural styles. It covers the basic principles and elements of architectural design. Architectural drafting fundamentals will be introduced providing basic information on the use of scales, drafting instruments, and CAD systems. Lastly, the student is presented the design process and drafting methods used to combine areas into functional and effective architectural plans. Procedures for designing and drawing floor plans, elevations, and sectional, detail, cabinetry, and site development drawings are explained.
2. [General Construction](#) - This unit begins with an overview of the basic scientific and modular principles upon which construction systems are based. Each major construction system will be explained as students are introduced to the specialized drawings needed to complete detailed descriptions of the structural design. Types of drawings included are those used to describe foundations and fireplaces and wood-frame, masonry, concrete, steel, and reinforced-concrete systems. This will also explain and show in detail how to design and draw the framing systems for the major construction components of a building: floors, walls, and roofs.
3. [Basic Area Design](#) - This unit covers the environmental and functional design factors needed to plan specific areas of a structure. This includes the design considerations necessary for effective solar orientation, efficient energy use, and ergonomic and ecological planning. Major considerations include the function, location, decor, size, and shape of the various areas including: kitchen, living spaces, bathroom, bedrooms, outdoor spaces and utility areas.
4. [Green Design](#) - This unit will focus on sustainable design and sustainable living. It will cover environmental design factors, building material considerations, emerging eco-friendly technologies, and energy efficient building techniques, such as passive and active solar heating and cooling systems. Other considerations will include sustainable living practices, like recycling, composting, conservation practices, and tiny living.
5. [Architectural Drawing](#) - This unit includes the principles and procedures for preparing working drawings to describe the electrical, comfort-control (HVAC), and plumbing systems of a structure. It culminates by describing how architectural plans are checked and combined into sets and how drawings are interrelated to other drawings, details, and documents such as schedules, specifications, cost estimates, financial plans, codes, and contracts. A complete set of working drawings will be created. Lastly, the unit will cover the major career opportunities in architecture and construction, including information on preparing for a career in these fields.
6. [Architectural Drafting Job Ready Assessment](#) - The Architectural Drafting industry-based credential is included in NOCTI's Job Ready assessment. This measures technical skills at the occupational level and includes items which gauge factual and theoretical knowledge. *Students can be eligible to receive college credit with a passing score.*

Programs: Autodesk AutoCAD, Autodesk Revit

Course Expectations and Skills

1. Keep and maintain an electronic portfolio.
2. Practice proper attitude and safe discipline.
3. Develop an industry standard of precision and quality in each activity.
4. Participate and contribute to group generated solutions.
5. Apply and analyze science and math related concepts to all activities.
6. Prepare for success in higher level technology courses and post-secondary education.

Resources: Hepler, Donald E., Paul Ross. Wallach, and Dana J. Hepler. Architecture: Drafting and Design. New York, NY: Glencoe/McGraw-Hill, 1998. Print

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title:</p> <p>Architectural Design</p> <p><i>Unit 1:</i> <i>Intro to Architecture</i></p>	<p>Unit Summary:</p> <p>This unit provides background information on the history and development of major architectural styles, with excellent examples shown of both past and present designs. It covers the basic principles and elements of architectural design. Basic Architectural Drafting Fundamentals will be introduced that provides basic information on the use of scales, drafting instruments, and CAD systems and explains the various architectural drafting conventions used in creating working drawings. Lastly, the student is presented the design process and drafting methods used to combine areas into composite, functional, and effective architectural plans. Procedures for designing and drawing floor plans, elevations, and sectional, detail, cabinetry, and site development drawings are explained.</p>
<p>Grade Level(s):</p> <p>11-12</p>	
<p>Essential Question(s):</p> <ul style="list-style-type: none"> • What is Architectural Design? • What are the different Architectural forms? • How did different architectural styles develop? • What are some distinct characteristics of each style? • What are the fundamentals and principals of design and how are they used to in the field of architecture? • Why is the use of scale important? • What are the different types of Architectural drawings? • What are the advantages to using CAD software? 	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none"> • Recognize the importance and scope of the world around us and distinguish the role Architects have had in your living situation. • Examine the application of different architectural forms. • Recognize historical architectural styles and identify several distinct characteristics of each style. • Relate how the development of materials and construction methods influenced architectural styles. • Relate design concepts and apply them to architecture. • Identify the six elements of design and the seven principles of design. • Measure and prepare drawings with different scales. • Differentiate between the types and purposes of architectural drawings. • Summarize the importance and function of using CAD software in Architecture.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	NJCCCS or CCS
<ol style="list-style-type: none"> 1. Formulate and list the numerous ways architectural design has impacted our way of life throughout history. 2. Evaluate the different architectural forms and create a model of each one determining their strengths and weaknesses. 3. Create a visual graphic representation of several styles and include key features of their design. 4. Assess the use of different materials and the surrounding environment related to the development of architectural styles. 5. Analyze an image of a house and compile a list of the different design aspects used in that structure. 6. List each element and principal of design and describe your preference for applying each to a residence of your own design. 7. List the scale you would use in drawing plans for different types of residences and different parts of that structure 8. Describe six types of architectural drawings in terms of the type of information that is communicated in each type. List the ones you would use for you own set of drawings. 9. Create a drawing by hand and then create a computer generated version of that listing the advantages and disadvantages of each technique. 	<ol style="list-style-type: none"> 1. TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12 B.6 2. TEC.9-12.8.2.12 B.1 TEC.9-12.8.1.12.F.2 LA.9-12.3.1.12.A.1 3. TEC.9-12.8.1.12 B.9 TEC.9-12.8.1.12.A.4 4. TEC.9-12.8.1.12 B.3 TEC.9-12.8.1.12 B.4 5. TEC.9-12.8.2.12 B.3 TEC.9-12.8.2.12 B.1 MA.9-12.4.2.12 A.2 6. TEC.9-12.8.1.12 B.10 TEC.9-12.8.1.12 B.11 7. TEC.9-12.8.2.12 B.4 8. TEC.9-12.8.2.12 B.6 MA.9-12.4.2.12 A.2 MA.9-12.4.2.12 A.1 9 TEC.9-12.8.2.12.B.3 MA.9-12.4.2.12 A.1 SCI.9-12.5.4.12 A.1

NOCTI Related Sections

Areas Covered in Unit	Learning Targets
Preparing to Draw	9
Geometric Construction	6
Applied Mathematics	4,7
Planning	1,2,3,5
Architectural Drawing Types	8

Inter-Disciplinary Connections:

- STEAM, Mathematics, Geometry, Engineering

Students will engage with the following textbook

Hepler, Donald E., Paul Ross. Wallach, and Dana J. Hepler. *Architecture: Drafting and Design*. New York, NY: Glencoe/McGraw-Hill, 1998. Print.

- Periodicals to include but not limited to newspapers, magazine articles, internet web pages

Students will write:

Use of Cornell Notes will be used to understand the procedures for completing drawings.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Project based and self-exploration

Real life engineering problems

Examples of solution will be given first then students will problem solve and explore to create their own solutions to the problems.

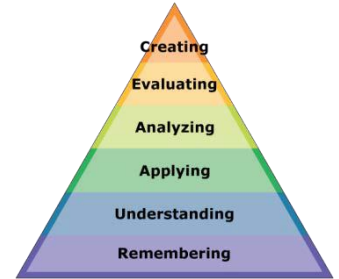
1. Students will research the history of architecture and present their findings to the class.
2. Students will create models of different architectural forms and test them to determine their strengths and weaknesses.
3. Students will create graphic posters that highlight a particular style and include information about the key features and why they picked the designs.
4. Students will choose an area of the world and show how the material affected the types of designs.
5. Students will look at a design of a house and label the different principals and elements of design and explain how each one is being used correctly or incorrectly.
6. Students will draw an ugly house that misuses principals and elements of design as well as forms and styles to reinforce the concepts of good design.
7. Students will use an architectural scale to measure a drawing and create it in AutoCAD in full scale.
8. Students will describe and construct the different types of drawings needed in a set of final plans.
9. Students will create sketches of floor plans and then create those drawings in AutoCAD and reflect on the advantages and disadvantages of each.

Students will need to have access to Autodesk AutoCAD and Revit. Drawing will come from the text and other architectural drawings produced by the teacher

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

WARM UP ACTIVITIES

Students will read the timeline, direction and constraint page for the current design journal page.
Students will check the daily entry log to ensure see where they left off and ensure it is up to date
Students will get safety glasses on and get their plans and materials ready.

CHECKPOINTS OF UNDERSTANDING

The design journals with be checked and graded after every component of learning.

Accommodations/Modifications:

Students have guided packets with questions that outline the research, and brainstorming.
The students will have an adjusted writing and mathematics packet to suit particular needs.
Students will receive extra one on one instruction to ensure safety and understanding.

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding.

Summative Assessments:

Final evaluation of the project based on a rubric.
Final grade of design journal as it is re-graded in its entirety
Reflection paper about the entire project

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding. Allow students to get their work checked frequently as the assessments are build-ups.

Performance Assessments:

Construction of a solution to the challenge
Safely utilizing computer, shop tools, and machines

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding. Allow students to get their work checked frequently as the assessments are build-ups.

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title:</p> <p>Architectural Design</p> <p><i>Unit 2:</i> <i>General Construction</i></p>	<p>Unit Summary:</p> <p>This unit begins with an overview of the basic scientific and modular principles upon which construction systems are based. Each major construction system will be explained as students are introduced to the specialized drawings needed to complete detailed descriptions of the structural design. Types of drawings included are those used to describe foundations and fireplaces and wood-frame, masonry, concrete, steel, and reinforced-concrete systems. This will also cover framing systems that explains and shows in detail how to design and draw the framing systems for the major construction components of a building: floors, walls, and roofs.</p>
<p>Grade Level(s):</p> <p>11-12</p>	
<p>Essential Question(s):</p> <ul style="list-style-type: none"> • What are the physical forces that act on a building? • What are the factors that determine the strength of a structural component? • What are the different types of foundations and when are they used? • What components are necessary for functional and safe fireplace? • What is the difference between skeleton stick framing and post and beam construction? • What are the major differences and uses of dimensional lumber, plywood and structural timber? • What are the types of masonry material used in structures? • What are the three types of steel construction and what is the purpose of each? 	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none"> • Identify and describe the forces that act on a building. • Describe the factors that determine the strength of components and the situations where they are used. • Identify the components and material used in foundations and describe the different types used. • Explain what the parts of the fireplace are and how each plays a role in the safe and effective operation. • Recognize the difference and the uses of stick framing versus post and beam construction. • Describe the differences between dimensional lumber, plywood and structural timber. • Identify the four types of masonry walls and the types of materials used in their construction. • Compare the three types of steel construction and explain the basic purpose of each.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
1. Describe and illustrate four structural forces and give an example of how each can be counteracted.	TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12 B.6 TEC.9-12.8.2.12.B.3 MA.9-12.4.2.12 A.1
2. Explain what makes up a building load and choose the best roof and structural components for that building. Evaluate the best materials for the structure.	SCI.9-12.5.4.12 A.1 TEC.9-12.8.2.12 B.1 TEC.9-12.8.1.12.F.2
3. Sketch the different types of foundations noting the advantage and disadvantage of each. List the materials used and label the different parts of the structural foundations.	LA.9-12.3.1.12.A.1 TEC.9-12.8.1.12 B.9 TEC.9-12.8.1.12.A.4 TEC.9-12.8.1.12 B.3
4. Design a fireplace for your house and show all the components of the design and describe the function of each part.	TEC.9-12.8.2.12 B.3 TEC.9-12.8.2.12 B.1 MA.9-12.4.2.12 A.2
5. Describe and illustrate the differences between skeleton-from and post-and-beam construction as well as the differences between platform and balloon framing.	TEC.9-12.8.1.12 B.10 TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12 B.6
6. List six types of fabricated member used in light construction.	MA.9-12.4.2.12 A.1 TEC.9-12.8.1.12 B.11
7. Select the lumber grade you will specify for the studs, rafters, sheathing, and joists for the house you are designing.	TEC.9-12.8.2.12.F.3 TEC.9-12.8.2.12 B.4 MA.9-12.4.2.12 A.1
8. Name three uses for softwood and three uses for hardwood in light construction.	TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12.F.3
9. Compare the types of masonry walls and describe the types of concrete construction systems.	TEC.9-12.8.2.12 B.3 TEC.9-12.8.2.12.F.3
10. Sketch the structural methods of preventing wind and earthquake damage.	MA.9-12.4.2.12 A.1

NOCTI Related Sections

Areas Covered in Unit	Learning Targets
Applied Mathematics	1,2
Planning	6,7,8,9
Structural Drawings	3,4,5
Sustainable Architecture and Design	10

Inter-Disciplinary Connections:

- STEAM, Mathematics, Geometry, Engineering

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Real life engineering problems

Examples of solution will be given first then students will problem solve and explore to create their own solutions to the problems.

1. Students will demonstrate four structural forces that act on a building by modeling them from various items around the classroom.
2. Students will choose different roof styles for different buildings and list the best materials to use for each in Autodesk Revit.
3. Students will design four different foundations and create detail views of each and list the materials and the types of structures they are used in.
4. Students will label the important parts of a fire place and explain how each one relates to its safe and effective function.
5. Students will create a scale model of a small shed and illustrate the differences between skeleton-from and post-and-beam construction as well as the differences between platform and balloon framing.
6. Students will identify six types of fabricated members used in light construction and give an application of each on used in a house.
7. Students will virtually shop for the lumber they would use to create their model shed with actual sized lumber by looking at home center websites.
8. Students will present the three uses of both softwood and hard wood in light construction.
9. Students will take a picture of a masonry wall and describe the type of system used and the application it was found.
10. Students will design methods to update a structure to prevent wind and/or earthquake damage.

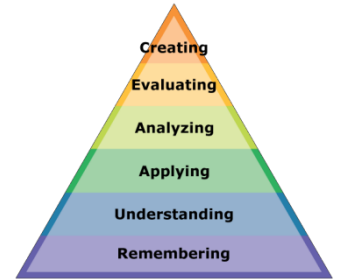
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Accommodations/Modifications:

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Summative Assessments:

Final evaluation of the project based on a rubric.
Final grade of design journal as it is re-graded in its entirety
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Accommodations/Modifications:

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Allow students to get their work checked frequently as the assessments are build-ups.

Performance Assessments:

Construction of a solution to the challenge
Safely utilizing computer, shop tools, and machines

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding.

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PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title:</p> <p>Architectural Design</p> <p><i>Unit 3:</i> <i>Basic Area Design</i></p>	<p>Unit Summary:</p> <p>This unit covers the environmental and functional design factors needed to plan specific areas of a structure. This includes the design considerations necessary for effective solar orientation, efficient energy use, and ergonomic and ecological planning. Major considerations include the function, location, decor, size, and shape of the various areas including: kitchen, living spaces, bathroom, bedrooms, outdoor spaces and utility areas.</p>
<p>Grade Level(s):</p> <p>11-12</p>	
<p>Essential Question(s):</p> <ul style="list-style-type: none"> • How do we take advantage of the environment to lower energy costs and reduce pollution? • What is Ergonomics? • What is the function of indoor living spaces? • What can be included in outdoor living spaces? • Why is the design of traffic area important to the flow of a house plan? • What are some of the codes and regulations for different areas of the structure? • What is the work triangle and why is it crucial in the design of a kitchen? • What is included in general service or utility areas? • What are important factors to consider when designing a sleeping area? • What are the different types of bathrooms? 	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none"> • Recognize how to orient a house on a lot to take the best advantage of solar energy and features of the lot. • Illustrate ways to design a structure ergonomically. • Identify the function of indoor living spaces. • Examine the different types of outdoor living spaces and how they differ by location and style. • Determine an effective traffic pattern in a home. • Interpret the guidelines for various design feature like hallways and stairs. • Determine the best size, shape, location of a kitchen in a house with special consideration of the guidelines of efficient design. • Recognize the kinds of equipment that is included in a utility room. • Identify the factors that need to be considered when designing a sleeping area. • Examine the location and different types of bathrooms in a house. • Contrast the design considerations of location, size, décor, and shape of all areas in a dwelling.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	NJCCCS or CCS
1. Demonstrate with a model why certain sides of a house receive the most light and heat. Compare and contrast winter and summer changes.	TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12 B.6 TEC.9-12.8.2.12 B.3 MA.9-12.4.2.12 A.1 SCI.9-12.5.4.12 A.1
2. Create a list of the ecological and ergonomical factors that need to be considered when designing your own residence.	2. TEC.9-12.8.2.12 B.1 TEC.9-12.8.1.12.F.2 LA.9-12.3.1.12.A.1
3. Design an open space that includes various indoor living spaces by first listing the functions that you or a client need in a home.	3. TEC.9-12.8.1.12 B.9 TEC.9-12.8.1.12.A.4
4. Create your own plan for an outdoor living space using a northern and a southern location.	4. TEC.9-12.8.1.12 B.3 TEC.9-12.8.1.12 B.4
5. Sketch the floor plan of a home of your design. Plan the most efficient traffic pattern by tracing the route of your daily routine.	5. TEC.9-12.8.2.12 B.3 TEC.9-12.8.2.12 B.1 MA.9-12.4.2.12 A.2
6. Examine the general codes for traffic areas and conclude why they are in place.	6. TEC.9-12.8.1.12 B.10 TEC.9-12.8.1.12 B.11
7. Construct kitchens using the six types of kitchen shapes and list at least one advantage and one disadvantage of each.	7. TEC.9-12.8.2.12 B.4
8. Design a full double garage and driveway for the house of your design. Include storage, laundry facilities, and a work bench. Identify the type of doors and windows you would like to include.	8. TEC.9-12.8.2.12 B.6 MA.9-12.4.2.12 A.2 MA.9-12.4.2.12 A.1
9. Plan three types of bedrooms for the following people: a six-year old, a teenager, and a master bedroom for a married couple.	9. TEC.9-12.8.1.12 B.11 TEC.9-12.8.2.12.F.3 10. TEC.9-12.8.2.12 B.4 MA.9-12.4.2.12 A.1
10. Draw plan of a bath you think is poorly designed and then draw a plan for remodeling the bath to make it more functional.	11. TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12.F.3 TEC.9-12.8.2.12 B.3 TEC.9-12.8.2.12.F.3 MA.9-12.4.2.12 A.1
11. Sketch a floorplan that takes into account all the design considerations of location, size, décor, and shape of all areas in a dwelling.	

NOCTI Related Sections

Areas Covered in Unit	Learning Targets
Drawing Techniques-Supplementary Views	11
Planning	2,4
Architectural Drawing Types	5,7,8,9,10
Site Plans	3
Specifications	6
Sustainable Architecture and Design	1

Inter-Disciplinary Connections:

- STEAM, Mathematics, Geometry, Engineering

Students will engage with the following textbook

Hepler, Donald E., Paul Ross. Wallach, and Dana J. Hepler. *Architecture: Drafting and Design*. New York, NY: Glencoe/McGraw-Hill, 1998. Print.

- Periodicals to include but not limited to newspapers, magazine articles, internet web pages

Students will write:

Use of Cornell Notes will be used to understand the procedures for completing drawings.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Project based and self-exploration

Real life engineering problems

Examples of solution will be given first then students will problem solve and explore to create their own solutions to the problems.

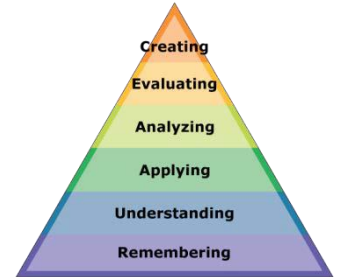
1. Students will create a model out of paper and using a light, show how the sun affects it at different times and different times of year.
2. Students will research and present a type of ecological problem that architects must overcome and then show a product or area that was designed ergonomically.
3. Students will Interview another person and ask them what they would like in an outdoor space and sketch up ideas for a site plan on a budget. They will return them to that person to generate feedback.
4. Students will take an existing house and design an two different outdoor spaces one in a cold and one in a warm climate in Autodesk Revit
5. Students will sketch the floor plan of their house and use it to create a computerized file in AutoCAD.
6. Students will research five different codes for traffic areas and explain why each one is in place.
7. Students will design the six types of kitchen shapes on paper and list at least one advantage and one disadvantage of each.
8. Students will complete a man or woman cave activity in Revit where they will remodel a broken down garage and include a bathroom, storage, laundry facilities, and a work bench. Also, include doors and windows and components.
9. Students will draw three types of bedrooms for different living situation and include the necessary furniture required in each room in Revit.
10. Students will redesign a bathroom in Revit to make it more functional.
11. Students will sketch a floor plan of a home of their choice.

Students will need to have access to Autodesk AutoCAD and Revit. Drawing will come from the text and other architectural drawings produced by the teacher.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS.



Formative Assessments:

WARM UP ACTIVITIES

Students will read the timeline, direction and constraint page for the current design journal page.
Students will check the daily entry log to ensure see where they left off and ensure it is up to date
Students will get safety glasses on and get their plans and materials ready.

CHECKPOINTS OF UNDERSTANDING

The design journals with be checked and graded after every component learned.

Accommodations/Modifications:

Students have guided packets with questions that outline the research, and brainstorming.
The students will have an adjusted writing and mathematics packet to suit particular needs.
Students will receive extra one on one instruction to ensure safety and understanding.

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding.

Summative Assessments:

Final evaluation of the project based on a rubric.
Final grade of design journal as it is re-graded in its entirety
Reflection paper about the entire project

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding. Allow students to get their work checked frequently as the assessments are build-ups.

Performance Assessments:

Construction of a solution to the challenge
Safely utilizing computer, shop tools, and machines

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding. Allow students to get their work checked frequently as the assessments are build-ups.

Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title:</p> <p>Architectural Design</p> <p><i>Unit 4:</i> <i>Green Design</i></p>	<p>Unit Summary:</p> <p>This unit will focus on sustainable design and sustainable living. It will cover environmental design factors, building material considerations, emerging eco-friendly technologies, and energy efficient building techniques, such as passive and active solar heating and cooling systems. Other considerations will include sustainable living practices, like recycling, composting, conservation practices, and tiny living.</p>
<p>Grade Level(s):</p> <p>11-12</p>	
<p>Essential Question(s):</p> <ul style="list-style-type: none">• What is sustainable design?• What is sustainable living?• What are the seven components of green building?• What are some examples of emerging eco-friendly building materials?• What is the difference between passive and solar heating and cooling systems?• What environmental factors influence a building's design?• Are tiny houses "sustainable?"• How are tiny houses designed similarly and differently than most modern residential houses?	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none">• Describe sustainable design.• Describe sustainable living.• Identify and describe the seven components of green building.• Name and describe modern eco-friendly building materials from the last decade.• Recognize the difference and the uses of passive vs. solar heating and cooling systems.• Examine location, orientation and other geographical and environmental factors when designing a building.• Weigh the pro's and con's of tiny living and determine if tiny houses are sustainable.• Compare and contrast the design considerations of tiny houses to modern residential construction.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

<u>Learning Target</u>	<u>NJCCCS or CCS</u>
1. Explain what sustainability is and how this influences both design and lifestyle choices.	1. 9.3.12.AC-DES.2 TECH.8.1.12.C.CS1 TECH.8.1.12.C.CS3 TECH.8.2.12.D.CS3
2. List the seven components of green building.	2. TECH.8.1.12.F.CS1 TECH.8.1.12.F.CS3 TECH.8.2.12.B.CS2
3. Compare newer eco-friendly building materials, styles and processes with traditional materials, styles and processes.	3. TECH.8.1.12.F.CS1 TECH.8.1.12.F.CS3 TECH.8.2.12.B.CS2
4. Describe and illustrate the differences passive and solar heating and cooling systems.	4. TECH.8.2.12.B.2 TECH.8.2.12.B.5
5. Create a list of the ecological and ergonomical factors that need to be considered when designing modern houses and compare that to the ecological and ergonomical factors of planning and designing a tiny house.	5. 9.3.12.AC.4 9.3.12.AC.1 9.3.12.AC-DES.5
6. Assess the sustainability of tiny living.	6. TECH.8.2.12.B.CS1 TECH.8.2.12.D.1
7. Design a tiny house, complete with all necessary living and utility areas found in all modern house designs.	7. 9.3.12.AC.6 9.3.12.AC-DES.6 TECH.8.2.12.D.CS1 TECH.8.2.12.C.CS1 TECH.8.2.12.C.CS2 TECH.8.2.12.C.5

NOCTI Related Sections

Areas Covered in Unit	Learning Targets
Applied Mathematics	7
Drawing Techniques-Supplementary Views	7
Planning	3, 4, 7
Architectural Drawing Types	7
Mechanical and Electrical Systems	2-4
Sustainable Architecture and Design	1-7

Inter-Disciplinary Connections:

- STEAM, Mathematics, Geometry, Engineering

Students will engage with the following textbook

Hepler, Donald E., Paul Ross. Wallach, and Dana J. Hepler. *Architecture: Drafting and Design*. New York, NY: Glencoe/McGraw-Hill, 1998. Print.

- Periodicals to include but not limited to newspapers, magazine articles, internet web pages

Students will write:

Use of Cornell Notes will be used to understand the procedures for completing drawings.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills?

Project based and self-exploration

Real life engineering problems

Examples of solution will be given first then students will problem solve and explore to create their own solutions to the problems.

1. Students will self-evaluate their eco-friendliness and whether or not their current living habits are considered sustainable.
2. Students will work together with a partner to identify ways they can alter their lifestyles to become eco-friendlier.
3. Students will research and identify the seven components of green building and explain their impacts.
4. Students will research and compare newer eco-friendly building materials, styles and processes with traditional materials, styles and processes learned in the previous unit.
5. Students will research and present a type of ecological problem that architects must overcome and then show a product or area that was designed ergonomically.
6. Students will assess existing tiny house designs and redesign the interiors to better suit their wants, needs, and current lifestyles.
7. Students will group up and debate the sustainability of tiny living, considering ecological, political, economic, and social factors.
8. Students will create a scale model of a tiny house that must include all the necessary living and utility areas found in all modern house designs, but do so in less than 400 sq. ft.

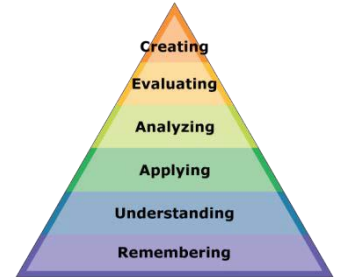
Students will need to have access to Autodesk AutoCAD and Revit. Drawing will come from the text and other architectural drawings produced by the teacher.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS.

Formative Assessments:



WARM UP ACTIVITIES

Students will read the timeline, direction and constraint page for the current design journal page.
Students will check the daily entry log to ensure see where they left off and ensure it is up to date
Students will get safety glasses on and get their plans and materials ready.

CHECKPOINTS OF UNDERSTANDING

The design journals with be checked and graded after every component of learning.

Accommodations/Modifications:

Students have guided packets with questions that outline the research, and brainstorming.
The students will have an adjusted writing and mathematics packet to suit particular needs.
Students will receive extra one on one instruction to ensure safety and understanding.

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding.

Summative Assessments:

Final evaluation of the project based on a rubric.
Final grade of design journal as it is re-graded in its entirety
Reflection paper about the entire project

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding.

Allow students to get their work checked frequently as the assessments are build-ups.

Performance Assessments:

Construction of a solution to the challenge
Safely utilizing computer, shop tools, and machines

Accommodations/Modifications:

Alternative assignments, additional time for assignments, preferential seating arrangements one on one interaction, after school help, and assistance for organization. Check frequently for student understanding.

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Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

PART I: UNIT RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<p>Course/Unit Title:</p> <p>Architectural Design</p> <p><i>Unit 5:</i> <i>Architectural Drawing</i></p>	<p>Unit Summary:</p> <p>This unit includes the principles and procedures for preparing working drawings to describe the electrical, comfort-control (HVAC), and plumbing systems of a structure. Passive and active solar heating and cooling systems are also explained. It culminates by describing how architectural plans are checked and combined into sets and how drawings are interrelated to other drawings, details, and documents such as schedules, specifications, cost estimates, financial plans, codes, and contracts. A complete set of working drawings will be created. Lastly the unit will cover the major career opportunities in architecture and construction, including information on preparing for a career in these fields so students can find out what they are interested in.</p>
<p>Grade Level(s):</p> <p>11-12</p>	
<p>Essential Question(s):</p> <ul style="list-style-type: none"> • What information do you need and what is included in the design of a floor plan? • How do you draw a floor plan? • How do you apply the principals and elements of design when design elevations? • How do you accurately scale and draw a complete elevation from a floor plan? • What are the different types of section and detail views? • What are the major elements used in site design? • What are some basics of framing drawings? • Why are electrical and mechanical drawings important to the development of a house? • What are the final stages of creating an architectural plan? • What are possible careers in the field of Architecture and how do you prepare for them? 	<p>Enduring Understanding(s):</p> <ul style="list-style-type: none"> • Gather information needed to design an architectural project and understand how to create a floor plan sketch. • List the sequence of steps to draw a floor plan. • Recognize the principals and elements of design in creating an elevation drawing. • Recall the steps to project an elevation from a floorplan and complete an accurate elevation drawing. • Describe the types and components of sectional, detail, and cabinetry drawings. • Identify they major elements of site design and use them to create a survey and plot plan. • Describe the construction of a house through framing plans. • Recognize the symbols used in electrical and mechanical drawings and be able to interpret schematics of each system. • Organize and check a complete set of architectural drawings. • Name and describe the many career opportunities available in architecture and related fields.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	NJCCCS or CCS
1. Develop a floor plan for a family of four, including two small children and a person who uses a wheelchair.	TEC.9-12.8.2.12 B.4 TEC.9-12.8.2.12 B.6 TEC.9-12.8.2.12 B.3 MA.9-12.4.2.12 A.1 SCI.9-12.5.4.12 A.1
2. Draw and dimension the floor plan of your own home.	
3. Create a sketch of an elevation of your own house. Move or change the doors and windows to improve the design.	2. TEC.9-12.8.2.12 B.1 TEC.9-12.8.1.12.F.2 LA.9-12.3.1.12.A.1
4. Project the front, rear right, and left elevations of a floor plan of your own design. Add elevations symbols.	3. TEC.9-12.8.1.12 B.9 TEC.9-12.8.1.12.A.4
5. Draw a full section view of a house you have designed. Include detail views as well.	4. TEC.9-12.8.1.12 B.3 TEC.9-12.8.1.12 B.4
6. Evaluate and discuss the environment and human-related influences that affect site design. Include these when you draw a site plan of your own house.	5. TEC.9-12.8.2.12 B.3 TEC.9-12.8.2.12 B.1 MA.9-12.4.2.12 A.2
7. Prepare a stud layout for a home of your design and construct a scale model out of balsa wood.	6. TEC.9-12.8.1.12 B.10 TEC.9-12.8.1.12 B.11
8. Draw the complete electrical plan for the house you are designing. Show all circuits and label the capacity of each. Identify the circuits protected by a GCFI device.	7. TEC.9-12.8.2.12 B.4
9. Check the set of house plans you have developed in earlier exercises for the types of information included you listed previously and prepare at least one change order.	8. TEC.9-12.8.2.12 B.6 MA.9-12.4.2.12 A.2 MA.9-12.4.2.12 A.1
10. Interview a person in a career related to architecture. Find out why the person chose the career, the education or training required, and the facts about the work the person does. Prepare a list of at least five questions you might ask the person before the interview.	9. TEC.9-12.8.1.12 B.11 TEC.9-12.8.2.12.F.3 10. TEC.9-12.8.2.12 B.4 MA.9-12.4.2.12 A.1

NOCTI Related Sections

Areas Covered in Unit	Learning Targets
Applied Mathematics	7
Drawing Techniques-Supplementary Views	3,4,
Planning	1
Architectural Drawing Types	2,5
Mechanical and Electrical Systems	8,
Supplemental Drafting Activities	9,10
Sustainable Architecture and Design	6

Inter-Disciplinary Connections:

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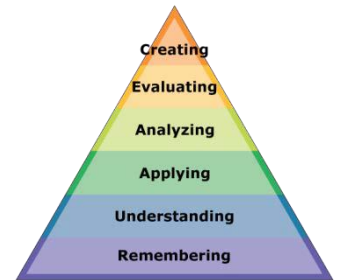
Examples of solution will be given first then students will problem solve and explore to create their own solutions to the problems.

1. Students will sketch a floor plan for the given situation that meets the needs of the family.
2. Students will draw their own house floor plan in Revit.
3. Students will take a picture of their house and sketch an elevation on paper. They will then use that sketch to create a drawing in Revit.
4. Students will design an elevation projected from their floor plan they created from their own design earlier in the unit.
5. Students will draw a full section view of their house in AutoCAD
6. Students will be given environmental factor to consider that they must design around when creating their own site plan.
7. Students will create a scaled model of their house designed from the floor plans and elevations made from balsa wood to show the structural framing of the dwelling.
8. Students will create an electrical plan for the house you are designing. Show all circuits and label the capacity of each. Identify the circuits protected by a GCFI device.
9. Students will check someone else's final plans and act as an architect that signs off on the plans for ready for construction. List and prepare at least one change order.
10. Students will interview a person in a career related to architecture. Find out why the person chose the career, the education or training required, and the facts about the work the person does. Prepare a list of at least five questions you might ask the person before the interview.

Students will need to have access to Autodesk AutoCAD and Revit. Drawing will come from the text and other architectural drawings produced by the teacher.

PART IV: EVIDENCE OF LEARNING

**IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.
IDENTIFY BLOOM'S LEVELS.**



Formative Assessments:

WARM UP ACTIVITIES

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Accommodations/Modifications:

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Performance Assessments:

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Safely utilizing computer, shop tools, and machines

Accommodations/Modifications:

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Job Ready Assessment Blueprint

Architectural Drafting



Test Code: 4104 / Version: 01

General Assessment Information

Blueprint Contents

General Assessment Information	Sample Written Items
Written Assessment Information	Performance Assessment Information
Specific Competencies Covered in the Test	Sample Performance Job

Test Type: The Architectural Drafting industry-based credential is included in NOCTI's Job Ready assessment battery. Job Ready assessments measure technical skills at the occupational level and include items which gauge factual and theoretical knowledge. Job Ready assessments typically offer both a written and performance component and can be used at the secondary and post-secondary levels. Job Ready assessments can be delivered in an online or paper/pencil format.

Revision Team: The assessment content is based on input from secondary, post-secondary, and business/industry representatives from the states of Florida, New Mexico, Pennsylvania, and Virginia.



15.1303- Architectural Drafting and Architectural CAD/CADD



Career Cluster 1- Architecture and Construction



17-3011.01- Architectural Drafters



In the lower division baccalaureate/associate degree category, 3 semester hours in Architectural Drafting



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!

Written Assessment

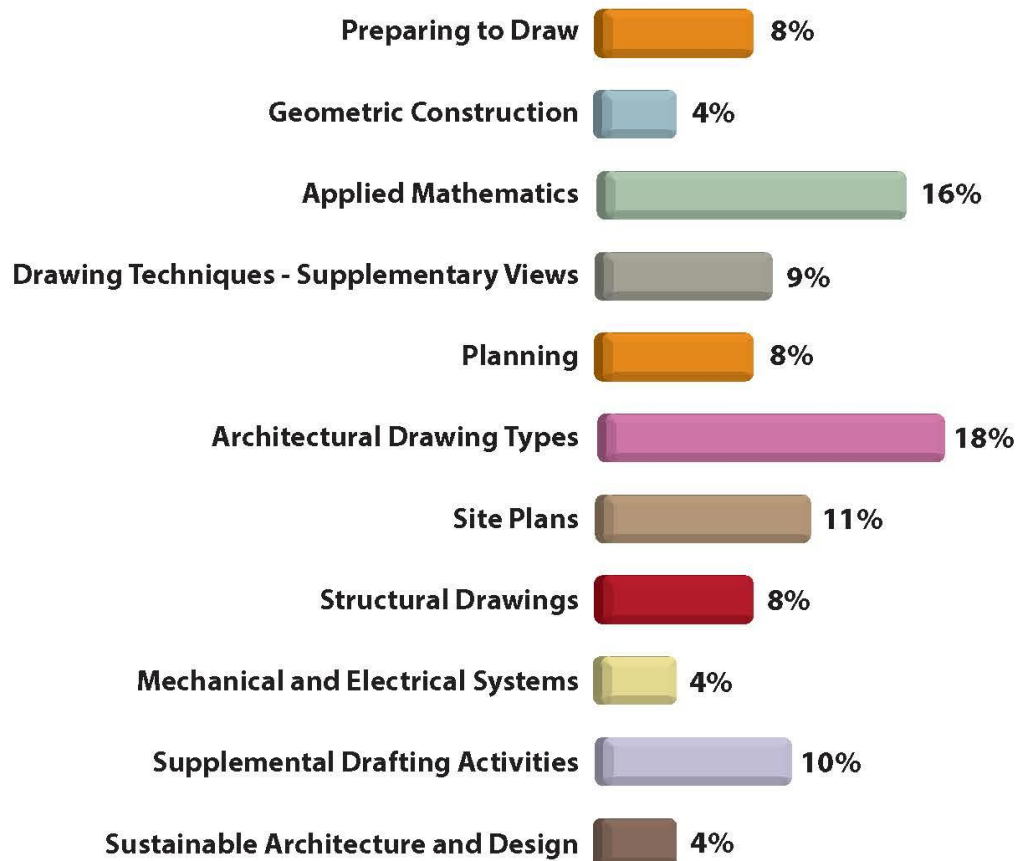
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

Administration Time: 3 hours

Number of Questions: 152

Number of Sessions: This assessment may be administered in one, two, or three sessions.

Areas Covered



Specific Standards and Competencies Included in this Assessment

Preparing to Draw

- Identify drafting tools and equipment (including CAD)
- Identify and select paper sizes/types, and determine scale and layout
- Identify various line types

Geometric Construction

- Construct and manipulate geometric elements
- Construct and manipulate lines, arcs, and angles

Applied Mathematics

- Demonstrate knowledge of basic mathematical operations
- Perform calculations involving fractions, decimals, and percents
- Demonstrate knowledge of geometry
- Demonstrate knowledge of trigonometry with respect to pitch, rise, and run
- Calculate measures, area, and volume
- Convert scales



(Continued on the following page)

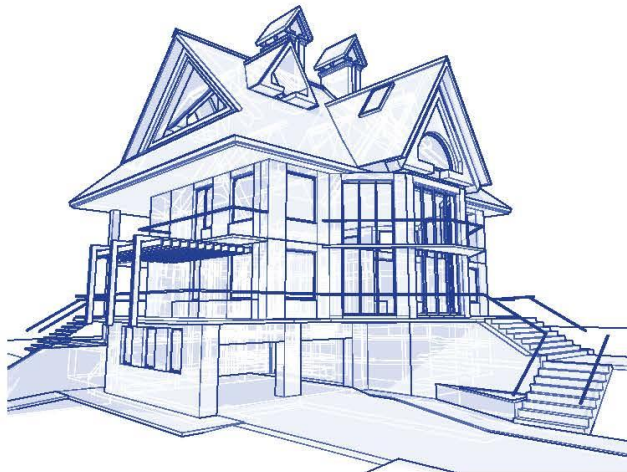
Specific Standards and Competencies (continued)

Drawing Techniques - Supplementary Views

- Identify pictorial drawings (e.g., perspective)
- Demonstrate knowledge of schematic diagrams
- Demonstrate knowledge of orthographic drawings
- Place dimensions and notes

Planning

- Examine spatial relationships
- Identify types of house design (e.g., duplex, split level, ranch)
- Determine client needs
- Identify common construction material, properties, and use



(Continued on the following page)

Specific Standards and Competencies (continued)

Architectural Drawing Types

- Identify architectural terms and symbols
- Identify and develop roof types
- Identify and develop floor plans
- Develop basement and foundation plans
- Identify kitchen and bath arrangements
- Develop interior and exterior elevations
- Develop a wall and a building section
- Draw architectural details

Site Plans

- Draw and dimension site plans
- Interpret landscape plans
- Interpret contours and topographical profiles
- Identify setbacks and easements
- Identify above- and below-ground utilities



(Continued on the following page)

Specific Competencies and Skills (continued)

Structural Drawings

- Draw structural details
- Identify framing and structural components

Mechanical and Electrical Systems

- Identify electrical terms, symbols, and components
- Identify plumbing terms, symbols, and components

Supplemental Drafting Activities

- Draw cover sheet and title block information
- Develop schedules
- Describe responsibilities of related parties (e.g., design professional, contractor)
- Identify basic ADA accessibility compliance regulations
- Recognize ordinances and local building codes

Sustainable Architecture and Design

- Identify various rating systems (e.g., LEED, R-Value)
- Recognize recyclable and “green” building materials and systems



Sample Questions

Bisecting a line creates a second line that is _____ to the original line.

- A. parallel
- B. tangent
- C. perpendicular
- D. horizontal

What is the minimum landing depth required for an entrance door to meet ADA regulations?

- A. 24 inches
- B. 36 inches
- C. 48 inches
- D. 60 inches

A landscape plan uses much of the same information as a _____ plan.

- A. structural
- B. plumbing
- C. site
- D. floor

In a right triangle, the tangent of an acute angle is equal to the

- A. opposite side divided by the hypotenuse
- B. adjacent side divided by the hypotenuse
- C. adjacent side divided by the opposite side
- D. opposite side divided by the adjacent side

Where would a stringer be used?

- A. at a door frame
- B. on a roof truss
- C. at a stair
- D. as part of a joist

(Continued on the following page)

Sample Questions (continued)

A structural component that rests on the sole plate and extends to the top plate is called a

- A. rafter
- B. cripple
- C. stud
- D. jack

In the water supply system, the pipe that enters the house is known as the

- A. branch supply
- B. building main
- C. prime line
- D. branch line

Where can detailed information for windows and doors be found?

- A. Bill of Material
- B. rendering
- C. schedules
- D. compass rose

Which of the following regulates the design of a building?

- A. building codes
- B. OSHA standards
- C. general conditions
- D. specifications

Which is most associated with active solar energy?

- A. photovoltaic panels
- B. rainscreens
- C. windmills
- D. Trombe walls

Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

Administration Time: 4 hours and 15 minutes

Number of Jobs: 3

Areas Covered:

17% Construction Components

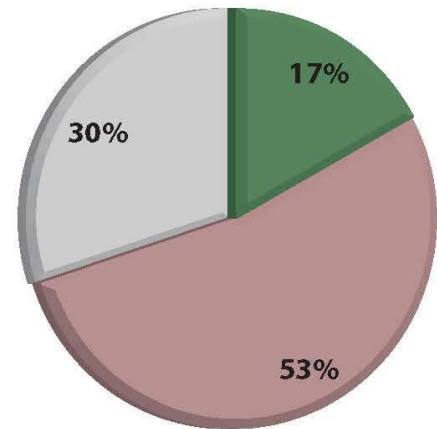
Participant will match the number in the diagram of construction components with corresponding term.

53% Kitchen and Bath Floor Plan

Participant will create the correct drawing of the kitchen and bath layout, sheet size, line work, dimensions, and notes.

30% Front Elevation

Participant will create a front elevation using a plan view and wall section to a correct scale and present final project in digital or hard copy format.



Sample Job

Kitchen and Bath Floor Plan

Maximum Time: 1 hour and 30 minutes

Participant Activity: Each participant will redraw the kitchen/bath plan according to specifications. The final project will be presented in digital or hard copy format.