

HILLSBOROUGH TOWNSHIP SCHOOL DISTRICT
HILLSBOROUGH HIGH SCHOOL
APPLIED TECHNOLOGY CURRICULUM
ADVANCED STUDY IN WOOD TECHNOLOGY
AUGUST 2020

This curriculum was approved by the Hillsborough Township
Public Schools Board of Education on September 21, 2020.

Advanced Study in Wood Technology
Grades 11-12
Course Overview

Advanced Study in Wood Technology emphasizes individual planning and problem solving. Students construct their own jigs and fixtures and are responsible for machine set-up and break down. From an existing plan of their choice, or of their own design, students construct and finish advanced pieces of furniture. Students are responsible for supplying the necessary materials, hardware, and finishing supplies required for the project. Maintenance, safety, care, and sharpening of machine parts and hand tools will be reinforced throughout the design and build process. Students will focus on safe woodworking and shop practices, repeatability, and accuracy.

Students will take a more in-depth look at wood properties, joinery, and construction methods. An emphasis will be placed on precision machining techniques and strategies for producing molding and other furniture and case components. The harvesting of raw materials and construction methods of various time periods will be examined to determine the best choice for the student's project.

2020 HTPS Applied Technology Curriculum Map – Advanced Study in Woodworking

Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
<p>Wood: The Raw Materials, Pt. 1</p>	<p>2-4 days</p> <p>After initial instruction the subject matter will be incorporated into the daily lessons/work.</p>	<p>8.2.2.ETW.2: Identify the natural resources needed to create a product.</p> <p>8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process</p>	<p>What are uncommon ways to make a large surface for tables or furniture?</p>	<p>The diversity of the material and its physical properties offers both a challenge and a source of inspiration to the emerging woodworker</p>	<p>Students will explore the following concepts and techniques when working with wood:</p> <p>Problems of Warpage</p> <p>Rip narrower Widths</p> <p>Glue with growth rings running in opposite directions</p> <p>Grooving or slotting to relieve tension</p> <p>Expansion and Contraction: Humidity Moisture content</p> <p>Lumber-core plywood</p>	<p>Formative:</p> <p>Several pieces of wood material will be presented to the class all the same dimensions: Walnut Cherry MDF/Plywood Ash/hickory</p> <p>The pieces will be fitted with loose tenons, affixed to a substrate and affixed to a floating platform for analysis and review of joint strength and longevity.</p> <p>Summative:</p> <p>Measurements of size changes and moisture will be recorded throughout a 2-week period. Signs of stress/cracks and movement will be analyzed. Students will demonstrate their understanding of the effect of moisture by submitting their formal recorded reports.</p>	<p>8.2.2.ETW.2: Identify the natural resources needed to create a product.</p> <p>Geometric Measurement and Dimension G-GMD</p> <p>A. Explain volume formulas and use them to solve problems</p>	<p>9.2.8.CAP.10: Evaluate how careers have evolved regionally, nationally, and globally.</p> <p>8.2.5.ITH.4: Describe a technology/tool that has made the way people live easier or has led to a new business or career</p>

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Wood: The Raw Materials, Pt. 2	2- 4 days After initial instruction, the subject matter will be incorporated into the daily lessons/work.	8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process	What are three common ways to make a large surface for cabinets or furniture?	The diversity of the material and its physical properties offers both a challenge and a source of inspiration to the emerging woodworker	Students will explore the following concepts and techniques when working with wood: Frame and Panel Construction: Dimensional stability Panel groove Freedom of panel movement Avoidance of glue Edge Banding: Thin veneer Plastic laminate V-groove inlay Solid wood Attachment Humidity Control: Characteristics of Woods that affect machining Kinds of wood Rings per inch Cross grain Tangential shrinkage	Formative: Students will be given samples hardwoods, softwoods, and veneer to examine the compression, tangential and sheer strength of each sample Summative: Students will research varying methods of veneer glue ups and panel joints including vacuum and presses.	PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects	9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth. Career planning requires purposeful planning based on research, self-knowledge, and informed choices.

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Designing in Wood	3-5 days After initial instruction, and review the subject matter will be incorporated into the daily lessons/work	9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.	What does a designer need to consider in order to create a item with sound construction, while keeping in mind aesthetes and function	Designing in 3D requires the ability to visualize how an object will eventually look before you make it.	Students will be familiar with the following components of designing a wood project: The Design Process Functional/Structural Requirements Stability Wood appearance and movement Sketching methods Orthographic project dimensioning Scale drawings Cut lists	Formative: Students will be presented with advanced lessons on the need for good sketches as well as how to make one will be taught. A wooden object will be shown to the class and a discussion of the problems of representing an idea in three dimensions will follow. A review of material taught in woodworking III on how to make and label an Orthographic projection of an object will be covered. Summative: Students will use pencil and paper or the most recent software application for computer design of an object in two	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects ETS1: Engineering Design ETS1.A: Defining and Delimiting an Engineering Problem	9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills

						and three dimensions. Students will demonstrate their command of the design process by designing an instructor supplied object's dimension and completing a drawing of that object.		
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Shop Safety	3-4 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have. 8.2.2.ITH.2: Explain the purpose of a product and its value 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option	What safe practices are needed within the woodshop environment to do accurate work and to avoid injury.	Safety education begins in the schools but is carried on throughout life in the workplace and at home.	Students will utilize the following strategies for creating a safe shop environment: Lighting Workspace Ventilation Storage Shop Discipline Work zones Kill switches Protective equipment Safety Glasses Ear Plugs Face Shield Goggles Guards Push Sticks Aprons Attire	Formative: Students will be taken on a tour of the various woodshop stations, including machines, marking tape, work zones, panic switches and guards will be identified. Summative: Students will go to the eye station and put on safety eyewear immediately upon entering the room. Students will be presented with Safety regulations form to be signed and initialed. Students will be given a practicum test regarding safety measures.	8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies. 8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks	9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.5: Assess and modify a personal plan to support current interests

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Hand Tools, Pt.1	1-2 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process	What do I need to know about the safe use of woodworking hand tools to build various wood projects?	At a time when more and more woodworkers are turning to machine tools for convenience or greater accuracy, someone coming fresh to woodwork might assume hand tools were relics left over from the antique past. On the contrary, a competent woodworker can often finish a project by hand in the time it takes to set up a machine for the same purpose. In addition, working by hand gives a feel for materials that cannot be derived from operating a machine.	Students will use the tools listed below to work safely within the shop: Measuring and marking tools: Try square Ruler Marking gauge Winding boards Miter square Marking knife Tape measure	Formative: After an initial review, students will show proficiency in using a ruler to measure a series of lines to an accuracy of 1/32 of an inch. A quiz testing and enforcing the skills learned in measuring with a ruler. Summative: Students will use a marking gauge for the layout of various woodworking joints Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.12.CAP.14: Analyze and critique various sources of income and available resources and how they may substitute for earned income.

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Hand Tools, Pt. 2	2 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process	What do I need to know about the safe use of woodworking hand tools to build various wood projects?	At a time when more and more woodworkers are turning to machine tools for convenience or greater accuracy, someone coming fresh to woodwork might assume hand tools were relics left over from the antique past. On the contrary, a competent woodworker can often finish a project by hand in the time it takes to set up a machine for the same purpose. In addition, working by hand gives a feel for materials that cannot be derived from operating a machine.	Students will use the tools listed below to work safely within the shop: Hand saws: Ripsaw Crosscut saw Cabinet saw Coping saw Backsaw Dovetail saw Compass saw Japanese saws	Formative: After review, students will be able to make a series of straight and compound cuts in a practice board to show proficiency in saw' control. Students will demonstrate their ability to choose the correct saw for various cutting operations. Summative: Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.12.CAP.14: Analyze and critique various sources of income and available resources and how they may substitute for earned income.

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Hand Tools Pt. 3	1-2 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process	What do I need to know about the safe use of woodworking hand tools to build various wood projects?	At a time when more and more woodworkers are turning to machine tools for convenience or greater accuracy, someone coming fresh to woodwork might assume hand tools were relics left over from the antique past. On the contrary, a competent woodworker can often finish a project by hand in the time it takes to set up a machine for the same purpose. In addition, working by hand gives a feel for materials that cannot be derived from operating a machine.	Students will use the tools listed below to work safely within the shop: Hand Planes: Block plane Bench plane Smoothing plane Jointer plane Rabbet plane Shoulder plane Router plane Molding plane	Formative: Students will be given a rough piece of lumber and will be required to bring all surfaces into square using hand planes and winding sticks and no machinery. Students will submit their finished board for evaluation and grade Students will demonstrate safe and accurate use of the shoulder plane and rabbet plane. Students will demonstrate safe and accurate use of a shooting board and Low angle plane by making perfect ninety and forty five degree cuts in strips of wood.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.12.CAP.14: Analyze and critique various sources of income and available resources and how they may substitute for earned income.

						<p>Summative:</p> <p>Students will watch a demonstration on using hand planes and be able to correctly answer the questions on a quiz.</p> <p>Students will be able to select the correct plane for various woodworking situations and explain the reason for their choice of plane.</p> <p>Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.</p>		
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Sharpening	1-2 days After the initial instruction, and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions	What do I need to know about safely sharpening a hand tool and identifying a tool which requires sharpening?	A dull tool is more dangerous than a sharp one. Injuries and poor craftsmanship may result if a tool's edge is not maintained. Maintaining a sharp edge on a tool is of paramount importance. Compared with a dull tool, a properly angled and honed edge leaves a superior finish and handles better with minimal resistance.	Students will use the tools listed below to work safely to sharpen tools: Hand Stones: Water stones Oil stones Stone grades Stone maintenance Sharpening aids Power Sharpeners: High speed grinder Rubberized abrasive wheels Motorized whetstone Combination grinders Grinding jigs	Formative: Students will observe the instructor's demonstration of various methods of sharpening a chisel, plane iron spoke shave, and card scraper. Students will learn to use the power sharpener as well as dress the tool blade on a sharpening water stone, and leather strop. Summative: Evaluation will be based on successful demonstration of how to properly sharpen the tool, safety precautions applied, and the care of the items used in the sharpening process.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions Geometric Measurement and Dimension G-GMD 4. 3. Apply geometric methods to solve design problems	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential

					<p>Types of steel:</p> <p>Steel lattice structure</p> <p>Temper</p> <p>Burr</p> <p>Dull edge</p>	<p>Students will demonstrate knowledge of the various angles blades should be sharpened depending on the type of wood to be cut.</p> <p>Students will be able to explain the concept of heating and cooling steel in the sharpening process.</p> <p>Students will be able to identify a dull tool and present the instructor with the tool pre and post sharpening. Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.</p>	
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Joinery Pt. 1	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to	How do I join pieces of a project which will be strong, functional, and aesthetically pleasing	Regarded as the quintessential skill of every woodworker, joinery. A measure of a woodworker is the ability and the refined skill to determine the most steadfast joint, measure, cut and assemble pieces of timber in a fashion that will be timeless.	Students will explore the joints listed and learn their application in a safe shop environment: Three way: Mitered Reinforced Blind mitered Rabbit joints: Lap Joints: Corner mitered oblique Scarf Mortise and Tenon: Through Wedged Stubbed Haunched Double Tenon	Formative: Joint project 1: Students will assemble the tools needed to layout and cut a single piece of practice wood joined on each end with smaller pieces of wood using a angled butt joint and assembled dry assemble. The instructor will observe each student and advise. Joint project 2: Students will assemble the tools needed to layout and cut two angled rabbit joints on a single piece of practice wood. They will then dry fit and join two smaller pieces of wood to each rabbit joint. Joint project 3: Students will assemble the tools needed to layout and	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions Geometric Measurement and Dimension G-GMD 4. 3. Apply geometric methods to solve design problems	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential

		create a product.				cut two pieces of lumber for a long grain joint and dry fit. Summative: Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.		
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Joinery Pt. 2	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3:Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	How do I join pieces of a project which will be strong, functional, and aesthetically pleasing	Regarded as the quintessential skill of every woodworker, joinery. A measure of a woodworker is the ability and the refined skill to determine the most steadfast joint, measure, cut and assemble pieces of timber in a fashion that will be timeless.	Students will explore the joints listed and learn their application in a safe shop environment: Housing joints: Through Stopped Edge to Edge: Butt Tongue and groove Dovetail joints: Through Blind Housed	Formative: Joint project: Students will assemble the tools needed to layout and cut a multiple through and blind dovetail joints then dry assemble. Summative: Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions Geometric Measurement and Dimension G-GMD 4.3. Apply geometric methods to solve design problems	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential

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Joinery Pt. 3	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	How do I join pieces of a project which will be strong, functional, and aesthetically pleasing	Regarded as the quintessential skill of every woodworker, joinery. A measure of a woodworker is the ability and the refined skill to determine the most steadfast joint, measure, cut and assemble pieces of timber in a fashion that will be timeless.	Students will explore the joints listed and learn their application in a safe shop environment: Compound Angled Mortise and Tenon: Through Wedged Stubbed Hunched	Formative: Joint project: Students will assemble the hand tools needed to layout and cut a through mortise and tenor joint, then dry assemble the joint. The instructor will observe each team and advise. Joint project: Students will assemble layout and marking tools necessary to use the table saw/band saw or router to create through mortise and tenor joint, then dry assemble the joint. The instructor will observe each team and advise. Summative: Students will use the tool in its appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential

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Finishing	<p>2-3 days</p> <p>After the initial instruction and review the subject matter will be incorporated into daily lessons.</p>	<p>8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.</p> <p>8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.</p> <p>ETS1.B: Developing Possible Solutions</p> <p>8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.</p> <p>8.2.2.ETW.2: Identify the natural resources.</p>	<p>What do I need to know about the finishing process to make my project both durable and bring out the inherent beauty and figure of the wood?</p>	<p>Finishing is the process of applying a special kind of liquid or paste to the wood surfaces, which then dries into a protective layer. This coating transforms the appearance of the wood, making it look rich and elegant by highlighting its color and figure. Finishes also protect the wood from dirt and moisture</p>	<p>Students will use these products and techniques to apply finishing to woodwork:</p> <p>Stain: Bleaching Oil based Water based Lacquer Varnish Poly Fuming wood Wax Shellac</p> <p>Applying stain to end Grain</p> <p>Hand sanding between coats</p> <p>Dry time</p>	<p>Formative:</p> <p>Students will watch a participate in a demonstration of multiple types of applications of finishes, including brush on, whip on, and submerging techniques.</p> <p>Summative:</p> <p>Students will use stains and finishes in its appropriate manner to finish their wood working project under the evaluation of the instructor.</p>	<p>Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects</p> <p>PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions</p>	<p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving</p> <p>9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential</p>

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Cabinetry: Reinforced joinery	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	What is the best way to permanently fasten together joints in furniture construction from among the choice of glue, screws, nails and staples	Joinery is regarded as the quintessential skill of every woodworker. In order to be strong and durable, furniture shall be securely framed and braced throughout in a most skilled and workmanlike manner.	Understand the role of these joinery tools and adhesives in forming strong joints: Dowels Splines Keys: Glueblocks Kinds of Adhesives: -Animal Glue -Casein Glue -Polyvinyl or White Glue -Plastic Resin Glue -Aliphatic Resin Glue -Resorcinol glue -Contact Cement -Epoxy Resin	Formative: Students will demonstrate knowledge of the properties, uses, and correct selection of the choices of fastening and strengthening joints. They will be able to explain their choices through testing the characteristics, use, advantages and disadvantages of those various techniques. Summative: Students will use the techniques and methods appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

2020 HTPS Applied Technology Curriculum Map – Advanced Study in Woodworking

Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
<p>Cabinetry: Frame and Panel Construction</p>	<p>2-3 days</p> <p>After the initial instruction and review the subject matter will be incorporated into daily lessons.</p>	<p>8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.</p> <p>8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.</p> <p>ETS1.B: Developing Possible Solutions</p> <p>8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology.</p> <p>8.2.2.ETW.2: Identify the natural</p>	<p>How do I build cabinets and furniture with good dimensional stability, resists warpage and adds design qualities to the piece?</p>	<p>Joinery is regarded as the quintessential skill of every woodworker. A measure of a woodworker is the ability and the refined skill to determine the most steadfast joint, measure, cut and assemble pieces of timber in a fashion that will be timeless.</p>	<p>Know how to use the fundamentals of frame and panel construction to create solid woodwork.</p> <p>Interior cabinet parts: Open skeleton frame</p> <p>Exterior furniture parts:</p> <p>Panels: Flush Ogee Bead and cove Frame with insert</p> <p>Cutting the molded edges</p> <p>Rail</p> <p>Stile Cutting a raised panel:</p> <p>Circular saw</p>	<p>Formative:</p> <p>Instructor will provide physical as well as online examples of frame and panel Construction as found in Interior/Exterior cabinet parts.</p> <p>A class discussion will follow drawing of student’s previous training and knowledge about moisture, wood movement, and cabinet construction challenges and explore why Frame and Panel Construction might be advantageous.</p> <p>Summative:</p> <p>Through instructor observation students will be</p>	<p>Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects</p> <p>PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects</p>	<p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving</p> <p>9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p>

		resources needed to create a product.			Radial-arm saw Router table	assessed on their ability to construct a small example of Frame and Panel Construction which they will retain for their own reference Students will use the techniques and methods appropriate manner to construct their wood working project under the evaluation of the instructor.		
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Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
Cabinetry: Furniture Doors	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	How do I create functional and attractive doors for cabinets and furniture?	Usually designed to close off open shelves or furniture pieces, doors also should add interest to the exterior.	Work with the following strategies for creating doors: Material for Furniture and case Doors: Solid Glued- up stock Tongue-and-groove Veneer-core plywood MDF Frame and panel Hanging Doors: Flush Door in frame Lip door Doors without flames or overlay Rolling doors Sliding doors Catches; Pulls; Knobs:	Formative: Students will be able to identify styles and construction techniques of Cabinet and Furniture doors Summative: Students will demonstrate their ability to choose the correct door for various types of furniture and function. Students will use the techniques and methods appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

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Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
Cabinetry: Drawers	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	How to create drawers that resist the hardest problems in furniture, the frequent pushing and pulling they receive?	Regarded as the quintessential skill of every woodworker, joinery. A measure of a woodworker is the ability and the refined skill to determine the most steadfast joint, measure, cut and assemble pieces of timber in a fashion that will be timeless.	Students will be able to construct each of these types of drawers: Flush drawer Lip drawer Overlap drawer	Formative: Students will be given a pre-lesson questionnaire regarding what they would consider important considerations and construction challenges in constructing drawers. Students will discuss with the class findings and incorporate that information into their project sheet Summative: Students will build small models of their drawer construction solutions. The instructor will then present examples of traditional solutions to drawer and drawer guide construction practices. Students will use the methods appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

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Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
Cabinetry: Legs	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	What do I need to know about the construction of aesthetically pleasing legs and posts?	Legs and posts are an essential structural part of all tables and chairs and many chests, desks, beds, and other furniture pieces.	Students will be able to identify these common leg shapes and use them in design: Square, straight legs Square, tapered legs Round tapered legs Turned legs and posts Cabriole legs Reeding and fluting	Formative: Students will demonstrate the ability to identify in what applications various types of leg treatments would be used. Students will research online to print out and example of furniture using each of the six types of leg and post techniques. Students will be shown examples of leg and rail construction as found in tables. Summative: Students will be assigned the task of using creating creative legs designs in three dimensions table using the Leg and Rail Construction technique. Students will use the	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

						techniques and methods appropriate manner to construct their wood working project under the evaluation of the instructor.		
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Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
Cabinetry: Table and Cabinet Tops	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	There are many different methods of constructing table and cabinet tops. What method do I choose to achieve both form and function that is in line with the overall design?	What do I need to know about the selection and construction of a table or cabinet top?	Students will be familiar with these kinds of table and cabinet tops and different fastening strategies: Rough plywood Veneer-core plywood Plywood center with a band or frame Solid Glued Fastening: Screws Glue Block Hidden or pocket Wood/Metal clips Buttons	Formative: Students will demonstrate the ability to select the correct and most appropriate style of table and cabinet top when given several construction design challenges. Summative: Students will be required to correctly, and accurately construct a table or cabinet top for their related project selection. They must also demonstrate the ability to support their selection of fastening method. Students will use the techniques and methods appropriate manner to construct their wood working project under the evaluation of the instructor.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

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Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
Cabinetry: Fine Furniture	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product.	There are many different methods of constructing table and cabinet tops. What method do I choose is achieve both form and function that is in line with the overall design?	Fine furniture cabinetwork is created and is recognized immediately when studied by an expert and experienced cabinetmaker. Fine furniture includes a greater variety of fine woods, frame-and-panel construction is more commonly used, greater use is made of solid wood, complex, machined surfaces are part of many designs, more complicated joinery is used and a fine furniture finish of a transparent type is typical.	In order to create fine furniture grade cabinetwork, students will be able to use: Frame and panel construction for sides, front, doors, and drawers. Solid wood for legs, posts, rails, and other exposed structural parts that have complex, machined surfaces, including turned, carved, or routed work. More intricate joinery. Exceptional final finish applied to furniture piece.	Formative: Students will complete two small scale projects of a difficulty level which incorporates two of the new techniques such as frame and panel, drawers, leg, and post, bending techniques. Summative: A project time limit and size will be set. Each student will submit a timetable for the completion of their project within the instructor supplied parameters. The instructor will observe, advise, and grade each sectional work by the student. Evaluation will be based on successful demonstration of all states as listed on a student project progress sheet and reviewed by the student with the instructor input and	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions Modeling with Geometry G-MG A. Apply geometric concepts in modeling situations 1. Use geometric shapes, their measures, and their properties to describe objects	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

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Unit of Study	Pacing	NJ Student Learning Standards	Essential Questions	Enduring Understandings	Learning Targets	Assessment: Formative & Summative	Interdisciplinary Connections	Career Readiness, Life Literacies, & Key Skills Standards
Wood-working Project 1	2-3 days After the initial instruction and review the subject matter will be incorporated into daily lessons for the remainder of the design and build process.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources.	What do I need to know about the safe use of woodworking, tools, hand held and stationary machinery, the physical properties of the materials I am working with and a variety of woodworking joints and processes in order to build various wood projects?	This project builds upon the skills learned in previous units and takes the student through the entire furniture-making process, from design to finishing.	Students will use the following skills to create their first woodworking project: Safety The Design Process Measuring and Marking Hand cut joinery Refinement of joinery/design Structural integrity Longevity of materials Planes Chisels and gouges Power machinery	Formative: Students will be assigned or choose a woodworking project to build; they will be shown images of similar types of project. Students will be asked to interpret the examples and range of allowable dimensions and will create their own design, set of design drawings, cut list and calculation for material needed. Students will show their command of the design process by submitting a set of plans to the instructor for review and grading. Summative: Students will work independently to	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-Motion and Stability: Forces and Interactions 8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies Geometric Measurement and Dimension G-GMD B. 3. Apply geometric methods to solve design problems	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.4.12.CT.3: Enlist input from a variety of stakeholders 9.2.12.CAP.14: Analyze and critique various sources of income and available resources and how they may substitute for earned income

		<p>8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have</p> <p>8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks</p> <p>8.2.8.ED.5: Explain the need for optimization in a design process.</p> <p>8.2.8.ED.6: Analyze how trade-offs can impact the design of a product</p>			<p>Sanding</p> <p>Adhesives</p> <p>Finishing</p>	<p>build their project</p> <p>Students will present finished project for critiques, refinement and grading.</p>		
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Wood-working Project 2	2-3days After the initial instruction and review the subject matter will be incorporated into daily lessons for the reminder of the design and build process.	8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process. ETS1.B: Developing Possible Solutions 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources.	What do I need to know about the safe use of woodworking, tools, hand held and stationary machinery, the physical properties of the materials I am working with and a variety of woodworking joints and processes in order to build various wood projects?	This project builds upon the skills learned in previous units and takes the student through the entire furniture-making process, from design to finishing.	Students will use the following skills to create their second woodworking project: Safety The Design Process Measuring and Marking Hand cut joinery Refinement of joinery/design Structural integrity Longevity of materials Planes Chisels and gouges Power machinery	Formative: Students will complete a project of a difficulty level which builds on the skills and tools used to complete their first furniture project piece. Examples of mastery of advanced skills will be: use of more difficult joinery advanced machine processes additional decorative elements project size These elements will be incorporated in the design and completion of their advanced project. Students may use instructor supplied reference material, the internet or their own design ideas. Demonstration of the student intent to use advanced techniques, will be indicated by a sketch submitted to the instructor for approval.	Geometric Measurement and Dimension G-GMD B. Visualize relationships between two-dimensional and three-dimensional objects PS2: M K-2-ETS1-2otion and Stability: Forces and Interactions 8.2.5.NT.4: Identify how improvement in the understanding of materials science impacts technologies Geometric Measurement and Dimension G-GMD B. 3. Apply geometric methods to solve design problems	9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential 9.4.12.CT.3: Enlist input from a variety of stakeholders 9.2.12.CAP.14: Analyze and critique various sources of income and available resources and how they may substitute for earned income

		<p>8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have</p> <p>8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks</p> <p>8.2.8.ED.5: Explain the need for optimization in a design process.</p> <p>8.2.8.ED.6: Analyze how trade-offs can impact the design of a product</p>			<p>Sanding</p> <p>Adhesives</p> <p>Finishing</p>	<p>The project ideas will reflect the student's awareness of the design process, the tools and materials on hand in the shop and the student's level of ability.</p> <p>Students will be able to submit a tentative timetable for the time needed to complete the project selected.</p> <p>Summative:</p> <p>Students will show their command of the design process by submitting a set of plans to the instructor for review and grading.</p> <p>A cut list, board foot measurement and total cost sheet will be handed to the instructor for a grade. Students will work independently to build their project. Students will present finished project for critiques, refinement and grading.</p>		
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WEBLIOGRAPHY

None.

ASSOCIATED JOBS LIST BY UNIT

Safety Unit

PPE Sales Representatives and Sales
 PPE Manufacturing
 Service Technician in Safety Equipment
 First Aid Specialist
 Marketing Agent for Safety and First aid Equipment
 Medical Sales Associate
 Product Manager
 Product Designer
 Equipment Operator
 Research and development of Safety Equipment and PPE

Cabinetry Unit

Apprentice Carpenter	Millwright
Lead Carpenter	Shipwright
Carpenter Foreman	Woodwright
General Construction	Fine Furniture
Tool Manufacturing	Antique reproduction
Machinist	Product Tester
Product Developer/Tester	Finish Carpenter
Sales and Marketing	Cabinetmaker

Joinery Unit

Apprentice Carpenter	Millwright
Lead Carpenter	Shipwright
Carpenter Foreman	Woodwright
General Construction	Fine Furniture
Tool Manufacturing	Antique reproduction
Machinist	Product Tester
Product Developer/Tester	Finish Carpenter
Sales and Marketing	Cabinetmaker

Project Unit

Apprentice Carpenter	Deck Builder
Lead Carpenter	Fine Furniture Construction and Repair
Carpenter Foreman	Designer
General Construction	Millwright
Framing Installer	Shipwright
Roofer	Woodwright
Site Manager	Product Manager
Finish Trim Carpenter	Manufacturing
Cabinet Maker	Small Business owner/operator