Wood Manufacturing IV: Skills for the Modern Woodworker

Course Information

Grade(s):	11-12
Discipline/Course:	Technology Education
Course Title:	Wood Manufacturing IV: Skills for the Modern Woodworker
Prerequisite(s):	Wood Manufacturing III: Turning the Tables (Full Year) or Wood Manufacturing III: Turning the Tables (Semester) with teacher's permission
Course Description: Program of Studies	This course provides the student with an overview of wood use and advanced construction techniques. Each student will plan, design and construct an individualized project. The project builds on prior manufacturing courses and challenges the students' abilities.
Course Essential Questions:	● How can one acquire safety education and training on a tool or machine? ● How can we create a workplace culture that prioritizes safety and health? ● How do you add beauty and individuality to your woodworking designs? ● What is the relationship between creativity and problem-solving? ● What advantages are gained using machines to do work? ● How can you choose the right tool or machine for the job? ● What are some of the different ways to turn raw materials into usable products in woodworking? ● Why are demonstrating positive work behavior, self-discipline and integrity important to success when competing large tasks? ● What are some innovative ways to use advanced wood joints to create unique and functional furniture? ● How do you choose the right drawer type for a particular project? ● What is the best way to assemble a large project? ● What does one do if parts do not fit during assembly? ● How do you choose the right glue and clamping method for a particular project?. ● How does one properly sand a large project? ● What steps are necessary to prepare a project for finishing? ● When is it best to choose one finish type over another; water based versus oil based?

	● What are the different factors to consider when choosing hardware for a particular project? ● How can we use hardware to enhance the function and aesthetics of our woodworking projects? ● What is craftsmanship and how do you define and demonstrate mastery of the craft at the high school level? ● How can you identify the strengths and weaknesses of your own woodworking projects? ● How can you use feedback from others to improve your woodworking skills and project outcomes?
Course Enduring Understandings:	● Woodworking is a complex and challenging craft that requires a deep understanding of materials, tools, and techniques. ● Woodworking can be used to create objects that are both functional and aesthetically pleasing. ● Safety is the most important rule in the woodshop. ● Everyone has a role to play in creating and maintaining a safe workplace. ● Woodworking joints are the foundation of strong and durable projects. ● Plans and technical drawings communicate the design intent of the woodworker. ● Woodworking is a process of transformation. ● There are many different types of portable power and cutting tools available and it is important to choose the right tools for the job and learn how to use them safely and efficiently. ● It is important to be patient and persistent when learning to work with wood. ● Wood manufacturing power equipment can be used to create a variety of woodworking projects. ● Specialty machinery can be used to create a variety of complex and intricate woodworking projects. ● Wood manufacturing power equipment is a valuable tool for woodworkers, but it can also be dangerous if not used properly. ● Wood manufacturing power equipment can be used to perform a variety of woodworking tasks, including laminating boards, cutting legs, and turning legs on the lathe. ● It is important to be patient and persistent when learning to work with wood. ● Specialty machinery can be used to create a variety of complex and intricate woodworking projects. ● Tables can be constructed in a variety of styles. ● There are a variety of construction and assembly techniques and it is important to choose the

	methods that are most appropriate for their project. ● Precision is essential when constructing and assembling woodworking components. ● Wood finishes are used to protect and enhance the appearance of wood and it is important to choose the "right" wood finish that is appropriate for the intended use of the product and the desired appearance ● The proper sanding and finishing techniques can produce a beautiful and durable wood finish. ● Hardware can be used to add functionality and style to a project, as well as to provide a comfortable and safe user experience. ● The proper installation of hardware is essential for a finished and professional-looking project. ● Students should learn to identify the positives and negatives of their projects' construction, as well as the processes and techniques used. ● Woodworking techniques can be used to create both functional and artistic objects ● Plans can be used to visualize the finished product and to plan the construction process.
Duration/Credit:	Year / 1.0 Credit
Course Materials/Resources:	Equipment and Consumables
FPS Course Academic Expectation(s):	UCT Using Communication (Media) Tools SE Synthesizing and Evaluating
Year at a Glance (Units)	Unit 1 - Course Introduction and General Safety (1 week) Unit 2 - Project Design (1-2 Weeks) Unit 3 - Machine Use (4 weeks) Unit 4 - Project Construction (20 weeks) Unit 5 – Joinery and Assembly (4 weeks) Unit 6 - Finishing (2 weeks) Unit 7 – Hardware (2 weeks) Unit 8 - Project Review and Evaluation (1 week)

Unit Number and Title:	Unit 1 - Course Introduction and General Safety
Duration:	1 week
Resource(s):	Equipment and consumables
Unit Overview:	Students will review safety practices and policies. This will include the safety practices for specific machinery and include the procedures related to workplace and job-site safety, personal protective equipment, machine safety, and material handling practices.
Learning Goals	
Standard(s):	**CT Standards Wood Technology 2014** WM.02 Describe and demonstrate the procedures related to workplace and job-site safety including personal protective equipment, machine safety, and material handling practices. WM.02.01, WM.02.02, WM.02.03, WM.02.04, WM.02.05
Essential Question(s):	● What does it mean to have a safe attitude? ● What causes an "accident/injury" in a workplace?
Enduring Understanding(s):	● Woodworking is a complex and challenging craft that requires a deep understanding of materials, tools, and techniques. ● Woodworking can be used to create objects that are both functional and aesthetically pleasing. ● Safety is the most important rule in the woodshop. ● Everyone has a role to play in creating and maintaining a safe workplace.
Learning Goal(s): Students will be able to use their learning to: (Content/ Skills)	**Content:** (Students will know…) ● proper machine set up to prevent serious accidents or machine failure. ● the considerations and concepts involved in creating jigs and custom push sticks to help with finger safety. ● the steps taken to operate in a professional and respectful manner in a manufacturing

	environment. ● the elements and character traits are desirable as an apprentice woodworker/furniture maker. ● the policies and procedures for the wood working environment. **Skills:** (Students will be able to…) ● assess workplace conditions with regard to safety and health ● identify safety issues with appropriate safety standards to ensure a safe workplace/jobsite. ● describe safety practices for specific machines. ● follow OSHA, EPA and other safety regulations. ● select appropriate personal protective equipment as needed for a safe workplace/jobsite.

Unit Number and Title:	Unit 2 - Project Design
Duration:	1-2 weeks
Resource(s):	Equipment and consumables
Unit Overview:	Students will create a full scale and isometric drawings of their project including all the necessary joinery. They can choose to manually draft them or utilize one of the many CAD programs. From that they will create a stock-list that will guide them while they mill and machine their project pieces.
Learning Goals	
Standard(s):	**Standards Wood Technology** WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products. WM.04.01 Describe and interpret technical drawings. WM.04.02 Describe and prepare rough drawings and sketches. WM.04.03 Explain and prepare a cut list or bill of material from a basic plan and assembly drawing. WM.04.04 Interpret a design to facilitate replication. WM.04.05 Describe and identify fractional measurements from a basic plan and assembly drawings. WM.04.07 Extrapolate information from a set of plans. WM.04.08 Measure accurately to a sixteenth of an inch. WM.04.09 Estimate materials quantities in both board feet and linear feet. WM.04.10 Interpret a design to facilitate replication.
Essential Question(s):	● How do you add beauty and individuality to your woodworking designs? ● What is the relationship between creativity and problem-solving?
Enduring Understanding(s):	● Woodworking joints are the foundation of strong and durable projects. ● Plans and technical drawings communicate the design intent of the woodworker.
Learning Goal(s): *Students will know and will*	**Content:** (Students will know…)

be able to use their learning to: (Content/ Skills)	● the identity and use of the following measuring, layout, and marking tools: steel rule, tape measure, combination square, sliding "T" bevel, and compass. ● how to describe and identify fractional measurements from a basic plan and assembly drawings. ● the definition of CAD and how it can be used in creating woodworking products. ● the difference between both nominal and actual dimensions. ● how to draw and visually communicate simple geometric shapes and parts. ● the difference between board feet and linear feet. **Skills:** (Students will be able to…) ● demonstrate an understanding of rough drawings and sketches. ● explain and use fractional dimensions. ● identify, use and maintain measuring, layout, and marking tools. ● measure accurately to a sixteenth of an inch. ● create a full-scale drawing of their project using manual or computer aided drafting.

Unit Number and Title:	Unit 3 - Machine Use
Duration:	2-3 weeks
Resource(s):	Equipment and consumables
Unit Overview:	Students will continue expanding their knowledge of new tools and new techniques utilizing tools they have already learned how to use in new ways, such as table saws and routers.
Learning Goals	
Standard(s):	**Wood Technology Standards** WM.03 Identify and describe the safe and appropriate use of various types of hand and power tools and machinery used for building. WM.03.02, WM.03.04, WM.03.07 WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products. WM.04.04
Essential Question(s):	● What advantages are gained using machines to do work? ● Why is proper machine set-up so important? ● How do you choose the right tool or machine for specific tasks and how can you analyze the advantages and disadvantages of each type? ● How do you turn raw materials into usable products in woodworking?
Enduring Understanding(s):	● Woodworking is a process of transformation. ● There are many different types of portable power and cutting tools available and it is important to choose the right tools for the job and learn how to use them safely and efficiently.
Learning Goal(s): Students will be able to use their learning to: (Content/ Skills)	**Content:** (Students will know…) ● the steps in creating fine furniture joints. ● the proper use of a card scraper. ● the concepts and considerations in creating specialty jigs.

	● the proper use of a pocket hole machine. **Skills:** (Students will be able to…) ● utilize specialty machinery to fabricate all components for use in major projects. ● properly set-up and make all necessary special adjustments to machinery as indicated on plans to complete machining processes ● utilize all portable power and cutting tools in the manufacture of student selected projects

Unit Number and Title:	Unit 4 - Project Construction
Duration:	10-20 weeks
Resource(s):	Equipment and consumables
Unit Overview:	Students will explore modern construction techniques as they apply to their project and use this knowledge to construct and produce the necessary parts. They will learn how to properly make and utilize several basic wood joints with a CNC router. In the process they will continue to learn and practice setting-up and adjusting a variety of other wood manufacturing power equipment.
Learning Goals	
Standard(s):	**Wood Technology Standards** WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products. WM.04.01, WM.04.06 WM.05 Identify and assemble wood joinery and install mechanical fasteners. WM.05.01, WM.05.02, WM.05.06, WM.05.07, WM.05.08, WM.05.09, WM.05.11, WM.05.13, WM.05.14, WM.05.15 WM.07 Set-up, adjusts, and maintains a variety of wood manufacturing power equipment. WM.07.01, WM.07.03, WM.07.12, WM.07.13, WM.07,.WM.07.20, WM.07.24, WM.07.35 WM.09 Fabricate Traditional and Modern Casework (wall, base, and utility cabinets) WM.09.02, WM.09.03, WM.09.07, WM.09.08, WM.09.09, WM.09.16 WM.11 Fabricate Furniture WM.11.01, WM.11.02, WM.11.06, WM.11.07, WM.11.08
Essential Question(s):	● Why are demonstrating positive work behavior, self-discipline and integrity important to success when competing large tasks? ● What are some innovative ways to use advanced wood joints to create unique and functional furniture? ● How do you choose the right drawer type for a particular project?

Enduring Understanding(s):	● It is important to be patient and persistent when learning to work with wood. ● Specialty machinery can be used to create a variety of complex and intricate woodworking projects.
Learning Goal(s): Students will be able to use their learning to: (Content/ Skills)	**Content:** (Students will know…) ● the process for using a CNC router to machine parts. ● the process for laminating boards for different designs. ● proper techniques for using a lathe. ● different leg types and their construction. ● drawers and runner styles and their construction. ● table construction methods. ● mortise and tenon joinery and its variations. ● different rabbet variations. **Skills:** (Students will be able to…) ● transfer a CAD drawing to a CNC router to create cabinet parts. ● use a CNC router to machine parts. ● laminate boards by gluing and clamping. ● identify styles of table legs. ● construct legs by laminating squared up pieces of wood. ● square up a leg block and taper cut a leg. ● turn a leg on the lathe using the standard tools and technique and/or cut a Cabriole leg on the bandsaw.(optional). ● build an overlay, lip or flush drawer. ● construct at least one type of drawer mount. ● recognize at least three tabletop styles and construct one.

Unit Number and Title:	Unit 5 - Assembly
Duration:	4-6 week
Resource(s):	Equipment and Consumables
Unit Overview:	The students will be learning how to utilize various clamps, cauls, glues and mechanical fasteners in the assembly of their project.
Learning Goals	
Standard(s):	**Wood Technology Standards** WM.09 Fabricate Traditional and Modern Casework (wall, base, and utility cabinets) WM.09.03, WM.09.05, WM.09.06 WM.11 Fabricate Furniture WM.11.03, WM.11.06, WM.11.08
Essential Question(s):	● What is the best way to assemble a large project? ● What does one do if parts do not fit during assembly? ● How do you choose the right glue and clamping method for a particular project?
Enduring Understanding(s):	● Tables can be constructed in a variety of styles. ● There are a variety of construction and assembly techniques and it is important to choose the methods that are most appropriate for their project. ● Precision is essential when constructing and assembling woodworking components.
Learning Goal(s): Students will be able to use their learning to: (Content/ Skills)	**Content:** (Students will know…) ● the methods for assembling their project. ● the procedure for a good grain match for tops. ● techniques to mitigate grain movement to keep boards flat and in alignment.

	● the proper use of square clamping blocks to aid in assembly **Skills:** (Students will be able to…) ● construct and assemble their project. ● glue and clamp up their project. ● demonstrate methods to fasten a top to a project. ● demonstrate the procedure for applying glue and clamping a project. ● use clamps and fasteners. ● properly drill holes and install wood screws. ● properly set nails in wood stock

Unit Number and Title:	Unit 6 – Finishing
Duration:	2 weeks
Resource(s):	Equipment and consumables
Unit Overview:	Students will learn how to properly sand and prepare their projects for finish. They will also learn about various types of finishes and their characteristics that make them better in certain circumstances. They will use this knowledge to choose and apply the finish on their table.
Learning Goals	
Standard(s):	Wood Technology WM.16 Finish woodwork. WM.16.01, WM.16.02, WM.16.04, WM.16.07
Essential Question(s):	● How does one properly sand a large project? ● What steps are necessary to prepare a project for finishing? ● When is it best to choose one finish type over another; water based versus oil based?
Enduring Understanding(s):	● Wood finishes are used to protect and enhance the appearance of wood and it is important to choose the "right" wood finish that is appropriate for the intended use of the product and the desired appearance ● The proper sanding and finishing techniques can produce a beautiful and durable wood finish.
Learning Goal(s): Students will be able to use their learning to: (Content/ Skills)	**Content:** (Students will know…) ● the benefits of different finishes, such as, top coats, hard waxes, and penetrating finishes. ● the method of creating their own wood putty from sawdust and glue. ● the uses of epoxy as design elements. ● the method for correctly mixing epoxy. ● the uses of cyanoacrylate adhesive to repair cracks and checks. ● pigments and dyes and how they are used in epoxy. ● the differences between color dyes and oil based stains. **Skills:** (Students will be able to…)

	● apply a protective finish to their wood project. ● understand the difference between stains, primer coats and top coats. ● utilize the correct solvent when cleaning brushes. ● sand their project to a “finished” smoothness utilizing correct abrasive papers.

Unit Number and Title:	Unit 7 – Hardware
Duration:	2 weeks
Resource(s):	Equipment and consumables
Unit Overview:	Students will learn how to utilize layout techniques to place hardware for maximum functionality.
Learning Goals	
Standard(s):	**Standards Wood Technology** WM.10 Identify types, finishes, and mechanisms of hardware WM.10.02, WM.10.04 WM.11 Fabricate Furniture WM.11.11
Essential Question(s):	● What are the different factors to consider when choosing hardware for a particular project? ● How can we use hardware to enhance the function and aesthetics of our woodworking projects?
Enduring Understanding(s):	● Hardware can be used to add functionality and style to a project, as well as to provide a comfortable and safe user experience. ● The proper installation of hardware is essential for a finished and professional-looking project.
Learning Goal(s): *Students will be able to use their learning to:* (Content/ Skills)	**Content:** (Students will know…) ● the role of a drawer pull, knob, handle, or recessed hole play in the overall aesthetic of the project. ● the different drawer runner constructions and their pros and cons. ● the layout for the two points for a two point handle on a drawer front. ● why and when a pilot hole and countersink might be necessary. **Skills:** (Students will be able to…) ● lay out the location of knobs and/or handles.

	● drill the proper holes to accommodate screws. ● mount knobs and handles to the drawer fronts. ● set a drawer square and level. ● apply pulls to cabinet doors and drawers. ● apply drawer slides to projects. ● apply latches and catches to projects.

Unit Number and Title:	Unit 8 - Project Review and Evaluation
Duration:	1week
Resource(s):	Equipment and consumables
Unit Overview:	Students will reflect on the process of designing, building and finishing their table, evaluating the entire process in addition to the end product.
Learning Goals	
Standard(s):	**Standards Wood Technology** WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products. WM.04.01 Describe and interpret technical drawings. WM.04.02 Describe and prepare rough drawings and sketches.*(C14) WM.04.03 Explain and prepare a cut list or bill of material from a basic plan and assembly drawing.(C15) WM.05 Describe and demonstrate the attributes of wood design. WM.05.01 Utilize the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. WM.05.02 Check and critique a design continually, and improve and revise the idea of the design as needed. WM.05.03 Design and create cabinet and wood products WM.05.04 Develop a production plan, including the layout, bill of materials, and cost analysis, for the production of cabinets or wood products.
Essential Question(s):	● What is craftsmanship and how do you define and demonstrate mastery of the craft at the high school level?

	● How can you identify the strengths and weaknesses of your own woodworking projects? ● How can you use feedback from others to improve your woodworking skills and project outcomes?
Enduring Understanding(s):	● Students should learn to identify the positives and negatives of their projects' construction, as well as the processes and techniques used. ● Woodworking techniques can be used to create both functional and artistic objects ● Plans can be used to visualize the finished product and to plan the construction process.
Learning Goal(s): *Students will be able to use their learning to:* (Content/ Skills)	**Content:** (Students will know…) ● the elements that make a project successful. ● the elements make a project aesthetically pleasing. ● the procedure for assessing errors and mistakes of a finished project. **Skills:** (Students will be able to…) ● self-evaluate woodworking projects. ● identify quality aspects of completed work. ● identify changes which could improve the process.