Wood Manufacturing V:
Life as a Modern Woodworker

Second Semester

Course Information

Grade(s):	12
Discipline/Course:	Technology education
Course Title:	Wood Manufacturing V: Life as a Woodworker, Semester II
Prerequisite(s):	Wood Manufacturing IV: Skills for the Modern Woodworker (Full Year) or Wood Manufacturing IV: Skills for the Modern Woodworker (Semester) with Teacher's Permission or Wood Manufacturing V: Life as a Woodworker, Semester I
Course Description: Program of Studies	This course is an advanced level course in manufacturing and construction. Students will construct a "modern" cabinet using the 32mm system and CAD in tandem with the CNC router to create most of their parts. Self-direction, motivation, experience and demonstrated skills must be utilized and are required for success at this level. After completion of their modern cabinet, a student-selected individualized project continues to build on prior manufacturing courses challenging the students' abilities.
Course Essential Questions:	● How can you choose a new woodworking technique or process that is appropriate for your skill level and interests? ● What are some of the challenges of constructing cabinets accurately and efficiently within the 32mm system? ● What is the best way to assemble a large project? ● How does modern hardware change cabinets design and construction? ● What are the different methods for sanding wood, and how do they affect the finished product? ● How can we ensure that a wood finish is both aesthetically pleasing and functional for the intended use of the product? ● What are the different factors to consider when choosing from the different European drawer and hinge hardware for a particular cabinet? ● How can we use European hardware to enhance the function and aesthetics of our woodworking projects?

	● How do you identify the positives and negatives of a projects' CNC construction, as well as the processes and techniques used? ● What are the different criteria that you can use to assess a CNC woodworking project?
Course Enduring Understandings:	● Modern wood manufacturing power equipment can be used to create a variety of woodworking projects, including but not limited to, modern cabinetry. ● Specialty CNC machinery can be used to create a variety of complex and intricate woodworking projects. ● Woodworking projects are made up of individual components that CNC processes can help to make faster, more efficiently and assembled more carefully to create a strong and durable product. ● There are a variety of construction and assembly techniques and in some cases CNC machining may be the most appropriate choice for a 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. ● Some CNC processed parts are made from plywood and require special sanding and finishing techniques. ● Hardware for CNC processed components must be installed correctly to ensure proper function and safety. ● Hardware installation requires a variety of tools and skills. ● The quality of a finished woodworking project depends on the quality of the raw materials used and the care taken in the construction process. ● Self-evaluation can also help students to develop a critical eye for detail and a high standard for quality.Self-evaluation is a lifelong skill that can be applied to all areas of life, including school, work, and personal relationships.
Duration/Credit:	Semester / 0.5 Credit
Course Materials/Resources:	Machinery and consumables

FPS Course Academic Expectation(s):	CC Creating and Constructing CS Collaborating Strategically
Semester at a Glance (Units)	Unit 1: Project Construction (10 weeks) Unit 2: Joinery and Assembly (5 weeks) Unit 3: Finishing (2 weeks) Unit 4: Hardware (2 weeks) Unit 5: Project Review and Evaluation (1 week)

Unit Number and Title:	Unit 1: Project Construction
Duration:	10 weeks
Resource(s):	Consumables and machines
Unit Overview:	Students will explore different 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 the CNC router and how to plan and design around modern European drawer slides and hinges. In the process they will continue to learn and practice setting-up and adjusting a variety of wood manufacturing power equipment.
Learning Goals	
Standard(s):	**CT Standards Wood Technology 2014** 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):	● How can you choose a new woodworking technique or process that is appropriate for your skill level and interests? ● What are some of the challenges of constructing cabinets accurately and efficiently within the 32mm system?

Enduring Understanding(s):	● Modern wood manufacturing power equipment can be used to create a variety of woodworking projects, including but not limited to, modern cabinetry. ● Specialty CNC 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 of setting up a CNC router with proper hold downs and spoil boards. ● proper techniques for using a CNC router.. ● CNC machine tool path optimization. ● different types of European drawer slides and hinges and how they fit into the 32mm system. ● cabinet construction. ● rabbet and dado joinery and its variations. **Skills:** (Students will be able to…) ● setup a CNC router with proper hold downs and spoil boards. ● use a CNC router. ● create optimized toolpaths. ● prepare a plywood panel for the CNC router. ● build a cabinet with full overlay, ½ overlay or inset drawers and doors.

Unit Number and Title:	Unit 2: Joinery and Assembly
Duration:	5 weeks
Resource(s):	Consumables and machines
Unit Overview:	The students will be learning how to utilize various clamps, cauls, glues, dowels and mechanical fasteners, like Confirmat fasteners in the assembly of their project.
Learning Goals	
Standard(s):	**CT Standards Wood Technology 2014** 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? ● How does modern hardware change cabinets design and construction?
Enduring Understanding(s):	● Woodworking projects are made up of individual components that CNC processes can help to make faster, more efficiently and assembled more carefully to create a strong and durable product. ● There are a variety of construction and assembly techniques and in some cases CNC machining may be the most appropriate choice for a 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 with modern fasteners. ● the procedure for a good grain match for plywood panels. ● techniques for adding edge banding.

	● the proper use of square clamping blocks to aid in assembly. **Skills:** (Students will be able to…) ● construct and assemble their project. ● demonstrate the procedures for CNC machined components of applying glue, clamping parts of a project, and attaching fasteners to the finished product. ● demonstrate methods to fasten European hinges and drawer slides to a project.

Unit Number and Title:	Unit 3: Finishing
Duration:	2 weeks
Resource(s):	Machines and Consumables
Unit Overview:	Students will demonstrate how to properly sand and prepare their projects for finish. They will determine the "best" finish from the various types of finishes and their characteristics for their cabinet. They will use this knowledge to choose and apply the finish on their cabinet.
Learning Goals	
Standard(s):	**CT Standards Wood Technology 2014** WM.16 Finish woodwork. WM.16.01, WM.16.02, WM.16.04, WM.16.07
Essential Question(s):	● What are the different methods for sanding wood, and how do they affect the finished product? ● How can we ensure that a wood finish is both aesthetically pleasing and functional for the intended use of the product?
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. ● Some CNC processed parts are made from plywood and require special sanding and finishing techniques.
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 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 4: Hardware
Duration:	2 weeks
Resource(s):	Equipment and Consumables
Unit Overview:	Students will learn how to utilize layout techniques to place hardware on CNC machined parts for maximum functionality.
Learning Goals	
Standard(s):	**CT Standards Wood Technology 2014** 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 from the different European drawer and hinge hardware for a particular cabinet? ● How can we use European hardware to enhance the function and aesthetics of our woodworking projects?
Enduring Understanding(s):	● Hardware for CNC processed components must be installed correctly to ensure proper function and safety. ● Hardware installation requires a variety of tools and skills.
Learning Goal(s): *Students will be able to use their learning to:* (Content/ Skills)	**Content:** (Students will know…) ● the role of European drawer slides and cup hinges play in the overall aesthetic of a cabinet. ● the different drawer slides and how they fit within the 32mm system and their pros and cons. ● the layout for European drawer slides and cup hinges on doors. ● why and when a pilot hole and countersink might be necessary.

	Skills: (Students will be able to…) ● lay out for European drawer slides and cup style hinges. ● drill the proper holes to accommodate screws. ● mount knobs and handles to the drawer fronts. ● apply pulls and European hinges to cabinet doors and drawers.

Unit Number and Title:	Unit 5: Project Review and Evaluation
Duration:	1 week
Resource(s):	Equipment and Consumables
Unit Overview:	Students will reflect on the process of designing, building and finishing their cabinet, evaluating the entire process in addition to the end product.
Learning Goals	
Standard(s):	**CT Standards Wood Technology 2014** 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):	● How do you identify the positives and negatives of a projects' CNC construction, as well as the processes and techniques used? ● What are the different criteria that you can use to assess a CNC woodworking project?
Enduring Understanding(s):	● The quality of a finished woodworking project depends on the quality of the raw materials used and the care taken in the construction process. ● Self-evaluation can also help students to develop a critical eye for detail and a high standard for quality.Self-evaluation is a lifelong skill that can be applied to all areas of life, including school, work, and personal relationships.
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.