



Wood Manufacturing V: Life as a Modern Woodworker

First Semester

Course Information

Grade(s):	12
Discipline/Course:	Technology Education
Course Title:	Wood Manufacturing V: Life as a Woodworker, Semester I
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
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:	<ul style="list-style-type: none"> ● Why are shop safety rules and policies so important? ● What are some of the challenges of maintaining a safe woodworking environment, and how can we overcome them? ● What are some of the things to consider when choosing a woodworking project? ● How can you create a woodworking project plan that is both feasible and realistic? ● What advantages are gained using CAD and CNC machines to do work? ● What are some of the challenges of turning raw materials into usable products efficiently and with minimal waste? ● 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?
Course Enduring Understandings:	<ul style="list-style-type: none"> ● Woodworking can be a way to express oneself creatively and uniquely. ● Safety is the most important rule in the woodshop.

	<ul style="list-style-type: none"> • Everyone has a role to play in creating and maintaining a safe workplace. • Planning is essential for successful woodworking projects. • Woodworking joints are the foundation of strong and durable projects. • Plans and technical drawings communicate the design intent of the woodworker. • CAD and CNC can help to maximize production and minimize waste. • Portable power and cutting tools are essential for many woodworking tasks. • 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.
Duration/:	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: Course Introduction and General Safety (1 week) Unit 2: Project Design (1-2 Weeks) Unit 3: Machine Use (6 weeks) Unit 4: Project Construction (13 weeks)

Unit Number and Title:	Unit 1: Course Introduction and General Safety
Duration:	1 week
Resource(s):	Consumables and machines
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):	<ul style="list-style-type: none"> • Why are shop safety rules and policies so important? • What are some of the challenges of maintaining a safe woodworking environment, and how can we overcome them?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Woodworking can be a way to express oneself creatively and uniquely. • 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...) <ul style="list-style-type: none"> • advanced machine setup. • elements to make machines safer. • the considerations in creating and utilizing jigs and custom push sticks to help with finger safety and parts creation for specialty machines like CAD driven CNC equipment. • duties and responsibilities of an apprentice.

Skills: (Students will be able to...)

- assess workplace conditions with regard to safety and health.
- describe safety practices for specific machines.
- follow OSHA, EPA and other safety regulations.
- align safety issues with appropriate safety standards to ensure 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 full scale and isometric drawings of their project including all the necessary joinery utilizing one of the many CAD programs. They will take into consideration the 32mm system of cabinet construction in designing the look and construction of their cabinet. From that they will create a stock-list and optimal toolpath that will guide them while they mill and machine their project pieces with the CNC router.
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. 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):	<ul style="list-style-type: none"> • What are some of the things to consider when choosing a woodworking project? • How can you create a woodworking project plan that is both feasible and realistic?
Enduring	<ul style="list-style-type: none"> • Planning is essential for successful woodworking projects.

Understanding(s):	<ul style="list-style-type: none"> ● Woodworking joints are the foundation of strong and durable projects. ● Plans and technical drawings communicate the design intent of the woodworker.
Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p>Content: Students will know:</p> <ul style="list-style-type: none"> ● measure using the metric system. ● how to apply the 32mm system to the design of a frameless cabinet with modern hardware. ● how to draw using a CAD program specific to CNC machine processing. ● the rules for using the 32mm system. <p>Skills: Students will:</p> <ul style="list-style-type: none"> ● demonstrate an understanding of CAD drawing and CNC machining and their interfaces. ● explain and use metric measurements. ● identify, use and maintain measuring, layout, and marking tools. ● measure accurately to a millimeter. ● create a full-scale drawing of their project with CAD.

Unit Number and Title:	Unit 3: Machine Use
Duration:	6 weeks
Resource(s):	Consumables and machines
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. In addition, students will utilize the CNC router to create the parts of their modern cabinet.
Learning Goals	
Standard(s):	CT Standards Wood Technology 2014 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):	<ul style="list-style-type: none"> • What advantages are gained using CAD and CNC machines to do work? • What are some of the challenges of turning raw materials into usable products efficiently and with minimal waste?
Enduring Understanding(s):	<ul style="list-style-type: none"> • CAD and CNC can help to maximize production and minimize waste. • Portable power and cutting tools are essential for many woodworking tasks.
Learning Goal(s): Students will be able to use their learning to: (Content/ Skills)	Content: (Students will know...) <ul style="list-style-type: none"> • advanced machine setup for manufacturing projects. • advanced operation of woodshop machines. • advanced operation of wood surfacing equipment.

- the procedure to layout, cut, and assemble joinery cut from the CNC router.
- the 32mm system for cabinetry and hardware.
- the different uses of shaper bits to create custom moldings.

Skills: (Students will be able to...)

- utilize specialty CNC machinery to fabricate all components for use in major projects.
- properly set-up and make all necessary special adjustments to CNC machinery as indicated on plans to complete CNC machining processes.
- create CNC router toolpaths from CAD programs.
- utilize all portable power and cutting tools in the manufacture of student selected projects.

Unit Number and Title:	Unit 4: Project Construction
Duration:	13 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):	<p>CT Standards Wood Technology 2014</p> <p>WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products. WM.04.01, WM.04.06</p> <p>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</p> <p>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</p> <p>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</p> <p>WM.11 Fabricate Furniture WM.11.01, WM.11.02, WM.11.06, WM.11.07, WM.11.08</p>
Essential Question(s):	<ul style="list-style-type: none"> How can you choose a new woodworking technique or process that is appropriate for your skill level and interests?

	<ul style="list-style-type: none"> ● What are some of the challenges of constructing cabinets accurately and efficiently within the 32mm system?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● 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)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> ● 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. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> ● 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.