WOOD CONSTRUCTION AND TECHNOLOGY 40/50

Description

40 - This course provides the student with an overview of wood use and advanced construction techniques. Each student, through his own ability, will plan, design and construct an individualized project. The project involved will be a summation of techniques learned in the prior manufacturing courses offering a challenge to the students' abilities. Areas of construction may include joinery, carcass construction, wood turning, veneering, and jig and fixture design and use.

50 - This course is an advanced level course in wood manufacturing and construction. Students will continue to learn and develop intricate techniques and methods of wood product production. Self-motivation, experience and demonstrated skills must be utilized and are required for success at this level.

Course Overview

Course Objectives

Students should:

- practice all general shop safety rules and policies.
- properly behave in a respectable manner while in the construction area.
- demonstrate safe-working practices when using tools, equipment and machines.
- develop a personal respect for machines, equipment and colleagues in the shop area.
- name and identify, as well as operate correctly, common tools and machines in the wood shop, including…radial arm saw; table saw; jointer; planer; drill press; belt /disc sanders; panel saw; router/shaper; band saw; lathe.
- name and identify as well as operate correctly some of the more advanced tools and machines in the wood shop, including…portable circular saw, portable planer, power miter saw, hand routers, dovetailing jig, mortising machine.
- choose a project plan or create a plan and construct a project following the plan.

Essential Questions

- Why is it important to always practice safety and understand operations related to each tool and machine in the wood lab?
- What role does experience of using tools and machines have in the manufacturing of products?
- How does knowledge of each machine used in the manufacture of a product allow for greater efficiency and safety?
- Why do differing wood products utilize finishes based on their use?

Assessments

Common Assessments

- Written tests and quizzes on material presented
- Verbal questioning and explanation

Skill Assessments

- Performance Based Assessment on
- Machine /Tool Use
- Teacher visual evaluation of student practices and behavior
- Evaluation of student projects

• properly make and utilize several advanced wood joints in construction of a desk or similar furniture project. • utilize one of several methods for mounting a top piece. • recognize and use the correct abrasive paper and method for sanding wood. • upon completion of the required course project, choose and build a project with a technique or process that is new to him/her. • assess his/her project upon completion, note the positives and negatives of its construction and be able to explain the processes and techniques used.		
Content Outline I. Unit 1 - General Safety II. Unit 2 - Machine Operation III. Unit 3 - Major Project Construction (Carcass) IV. Unit 4 - Assembly V. Unit 5 - Finishing …types and methods VI. Unit 6 - Hardware VII. Unit 7 - Project Review and Evaluation VIII. Unit 8 - Secondary project construction options	**Standards** Connecticut Technology Education Standards have been met in the following area: • ***Wood Technology*** • ***Essential Knowledge and Skills***	**Grade Level Skills** Students will: • apply a hand-rubbed finish to a piece of wood. • build an overlay, lip or flush drawer with a one or two-piece front. • build at least one type of drawer mount in his/her project • connect a project side to the top with a dovetail joint. • construct advanced wood joints. • demonstrate correct methods of finish application • demonstrate the procedure for measuring out stock and squaring a board. • identify and use various hand and power tools • make web frames with mortise and tenon, dowel or biscuit joints. • miter the corners of frames and moldings • plane a board down to the needed thickness through proper adjustment and use of the surface planer. • practice all general shop safety rules and policies. • properly “resaw” a board to thickness on the table saw. • properly apply several coats of a topcoat finish to their wood project. • properly mount hinges to project doors. • properly mount knobs and handles to doors or drawer fronts. • properly mount various types of door catches on cabinet doors. • properly square-up and cut the correct joints in a cabinet side piece. • recognize and use the correct abrasive paper and method for sanding

		wood. • safely use the table and radial arm saws. • use proper clamps and tools to correctly “square-up” a project when assembling. • use proper glue and fasteners where appropriate in project assembly.

Pacing Guide							
1st Marking Period				2nd Marking Period			
September	October	November	December	January	February	March	April	May	June
Unit 1 General Safety 1 week	Unit 2 Machine Operation 2-3weeks	Unit 3 Major project Construction 10-20weeks	Unit 4 Assembly 4-6 weeks	Unit 5 Finishing 3-4 weeks	Unit 6 Hardware 2 weeks	Unit 7 Project Review and Evaluation 1 week	Unit 8 Secondary project construction(Optional)

Unit 1 –Safety, 1 week top

Standards

Wood Technology

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 Knowledge and Skills

EKS.02 Demonstrate language arts knowledge and skills required to pursue the full range of post-secondary education and career opportunities.

EKS.02.03, EKS.02.05, EKS.02.06, EKS.02.07

EKS.06 Implement personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.

EKS.06.01, EKS.06.02, EKS.06.09

Unit Objectives

Students will be able to:

- assess workplace conditions with regard to safety and health.
- describe safety issues with appropriate safety standards to ensure a safe workplace/jobsite.
- describe safety hazards common to workplaces.
- describe and demonstrate the procedures related to workplace and job-site safety including personal protective equipment, machine safety, and material handling practices.
- read and discuss information on OSHA, EPA and other safety regulations.

Essential Question

- Why is it so important to utilize personal protective devices and follow procedures?

Focus Questions

- What needs to be done to ensure student safety in the wood shop?
- What are the basic shop safety rules?
- How should students behave in the wood shop?

Assessments

- Students will be evaluated on their knowledge of safety through objective tests, quizzes, and assignments.
- Safe working habits during shop activities will also be observed and evaluated\

Skill Objectives

Students will:

- assess workplace conditions with regard to safety and health
- identify safety issues with appropriate safety standards to ensure a safe workplace/jobsite.
- identify safety hazards common to workplaces.
- 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.
- identify safety precautions to maintain a safe worksite.
- select appropriate personal protective equipment as needed for a safe workplace/jobsite.

Unit 2 – Machine Use, 2-3 weeks/ on going as needed top

Standards

Wood Technology

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

Unit Objectives

Students will be able to:

- identify and describe the safe and appropriate use of various types of hand and power tools and machinery used for building.
- explain and be able to demonstrate the methods involved in turning raw materials into useable products.
- set-up, adjust, and maintain a variety of wood manufacturing power equipment.

Essential Question

- What advantages are gained using machines to do work?

Focus Questions

- How do we safely utilize the circular saws to cut wood?
- On what machine is it best to crosscut a board?
- What is the importance of knowing your hand position when jointing a board?
- On what machines can we cut “free-hand”?

Assessments

- Observation and evaluation of correct and safe machine operation by the student
- Student performance
- Tests and/or quizzes on individual machines
- (written and/or practical)

Skill Objectives

Students will:

- 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 3 – Major Project Construction, 10-20 weeks top

Standards

Essential Knowledge and Skills

EKS.08 Identify and demonstrate positive work behaviors and personal qualities needed to be employable.
EKS.08.01, EKS.08.02

Wood Technology

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

Unit Objectives

Students will be able to:

- extrapolate information from a set of plans.
- describe and interpret technical drawings.
- illustrate leg and rail construction.
- construct and produce parts of a "Leg and Rail" type table.
- properly make and utilize several basic wood joints in construction of a project.
- set-up, adjust and maintain a variety of wood manufacturing power equipment.

Essential Question

- Why are demonstrating positive work behavior, self-discipline and integrity important to success when competing large tasks?

Focus Questions

- Why is it essential to "square up" a board to correct size before construction begins?
- What type of joints are constructed and used in table construction?
- What types of drawers can be used under a table?
- What methods are used to join the table skirts to the corner legs?

Assessments

- Student's performance of construction
- Quality of finished parts
- Quantity of student work performed
- Safety performance

Skill Objectives

Students will:

- 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.
- taper cut a leg.
- turn a leg on the lathe using the standard tools and technique and/or cut a Cabriole leg on the Band saw.(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 4 – Assembly, 4-6 weeks top

Standards

Wood Technology

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

Unit Objectives

Students will be able to:

- construct components and assemble a drawer using dado, rabbet and/or dovetail joints.
- assemble a leg and rail type table utilizing Mortise and Tenon joints.
- demonstrate one of several learned methods to fasten a top to a project.
- explain the steps in preparing wood for gluing attach molding to the base of a cabinet, a top to the cabinet and a back to a cabinet.

Essential Question

- How are glues and adhesives utilized in the wood manufacturing industry?

Focus Questions

- Which joints are stronger in various applications?
- Where might some of these joints be used?
- What type of clamps are used for clamping lumber in various directions?
- When and how are wood screws used?
- How do we "set" a nail?
- What types of glues are available?
- How long does glue have to dry?
- What types of clamps are available?
- How do we set a "parallel" clamp correctly?

Assessments

- Student's performance of construction
- Quality of finished parts
- Quantity of student work performed
- Safety performance

Skill Objectives

Students will:

- construct and assemble a table.
- attach table legs to skirts.
- construct and assemble an overlay drawer.
- construct a table top.
- square-up a base and attach a table top to the base.
- glue and clamp up a "side" board, a web frame and a cabinet base.
- properly assemble a raised panel door and an overlay drawer.
- assemble a drawer using dado and rabbet joints.
- demonstrate methods to fasten a top to a project.
- demonstrate 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 5 – Finishing, 3-4 weeks top

Standards
Wood Technology
WM.16 Finish woodwork.
WM.16.02, WM.16.03, WM.16.06, WM.16.07

Unit Objectives
Students will be able to:
- describe why a wood finish is appropriate for a products intended use.
- explain the proper application of water-based and oil-based wood stains and finishes as applied to a projects intended use.

Essential Question
- When is it best to choose one finish type over another, water based versus oil based?

Focus Questions
- Why do we apply a finish to wood projects?
- How do we apply a finish to projects?
- What is the difference between finishes?
- What do we use to clean brushes?
- What does Latex mean?
- What is the difference between water-based and petroleum based products?
- What does a stain do?
- Are finish types interchangeable?
- Why and when do we wax a project?

Assessments
- Student's performance of finish work
- Quality of finished parts
- Quantity of student work performed
- Safety performance
- Finish preparation

Skill Objectives
Students will:
- 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 project to finished smoothness utilizing correct abrasive papers.

Unit 6 – Hardware, 2 weeks top

Standards

Wood Technology

WM.10 Identify types, finishes, and mechanisms of hardware

WM.10.02, WM.10.03, WM.10.04

Unit Objective

Students will be able to:

- describe the application of hardware to a project based on its function.
- describe layout techniques to correctly position various types of hardware.
- differentiate between styles and finishes of hardware

Essential Question

- What are the advantages and disadvantages of applying different types of hardware?

Focus Questions

- What is the purpose of a knob or handle?
- What ergonomic factors should be explored when considering different types of knobs and pulls?
- Why is it important to consider whether to mount hardware after or before finishing?
- What are different applications and types of drawer slides?

Assessments

- Student's performance of hardware application.
- Quality of finished "look"
- Quantity of student work performed
- Safety performance
- Properly mounted hardware

Skill Objectives

Students will:

- lay out the location of knobs and/or handles.
- drill proper holes to accommodate screws.
- properly mount knobs and handles to the drawer fronts.
- set the drawer square and level.
- apply pulls to cabinet doors and drawers.
- apply drawer slides to projects
- apply latches and catches to projects.

Unit 7 - Project Review and Evaluation, 1 week top

Standards

Wood Technology

WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products.

WM.04.01, WM.04.04, WM.04.06

Unit Objectives

Students will:

- explain and be able to demonstrate the methods involved in turning raw materials into useable product.
- extrapolate information from a set of plans.

Essential Question

- Why is it important to verify that completed work matches expectations?

Focus Questions

- Has the project been constructed properly?
- How can the project construction be improved?
- What other techniques can be used in constructing this project?

Assessments

- Student work self evaluation
- Teachers evaluation and comparison

Skill Objectives

Students will:

- self-evaluate work.
- identify quality aspects of completed work
- identify changes which could improve the process.

Unit 8 - Secondary Projects Construction, (Optional) top

Standards

Essential Knowledge and Skills

EKS.05 Employ critical thinking skills independently and in teams to solve problems and make decisions (e.g., analyze, synthesize and evaluate).

EKS.05.03, EKS.05.04, EKS.05.05

Wood Technology

WM.04 Explain and be able to demonstrate the methods involved in turning raw materials into useable products.

WM.04.01, WM.04.04, WM.04.05, WM.04.06, WM.04.07

Unit Objective

Students will:

- utilize the skills and techniques learned to fully construct an additional project piece.

Essential Question

- What is the benefit of applying previously learned skills to a new project?

Focus Questions

- What skills can I use to be trying new ideas?
- How can a design tell you what processes need to be used in manufacture?
- What other techniques can be used in constructing this project?

Assessments

- Student work self evaluation
- Teachers evaluation and comparison

Skill Objectives

Students will:

- self-evaluate work.
- identify quality aspects of completed work. identify changes which could improve the process.