DESCRIPTION

Furniture Design and Manufacturing (522) is the second instructional course in a sequence that prepares students to apply technical knowledge and skills to prepare and execute furniture design projects, assemble and finish furniture articles, repair furniture, and stresses the safe use of a variety of hand and power tools and machinery.

<table>
<thead>
<tr>
<th>Total Test Questions: 74</th>
<th>Levels: Grades 10-12</th>
<th>Units of Credit: .50</th>
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</thead>
<tbody>
<tr>
<td>Prerequisite: Woodworking</td>
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STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD 1

◊ UNDERSTAND THE FURNITURE MAKING INDUSTRY.

Objective 1: Identify career opportunities in the furniture and cabinetmaking industries.

STANDARD 2 7% of Exam Blueprint

◊ UNDERSTAND THE DESIGN, PLANNING, AND ESTIMATION PROCESS.

Objective 1: Identify elements and principles of design as they apply to woodworking and cabinetmaking/millwork manufacturing.
Objective 2: Identify standard furniture dimensions relating to tables, seating, bookshelves, and shelving.
Objective 3: Draw the necessary views of a selected project.
Objective 4: Create a material list for the selected project and determine the project cost.
Objective 5: Create a procedure list for construction of a cabinet.
Objective 6: Extract pertinent cabinet information and specifications from working drawings and specifications.

STANDARD 3 9% of Exam Blueprint

◊ UNDERSTAND AND DEMONSTRATE SAFE PRACTICES.

Objective 1: Demonstrate the ability to work safely in a wood shop following general safety rules.
Objective 2: Demonstrate the safe use of woodworking tools and machines.
Objective 3: Demonstrate how to handle, store, and dispose of materials according to MSDS sheets.
Objective 4: Pass a written safety test with a score of 100 percent.

STANDARD 4 13% of Exam Blueprint

diamond Understand and demonstrate the safe use of hand tools.

Objective 1: Describe the purpose and demonstrate the proper use of the following measuring and layout tools:
1. Measuring tape
2. Scratch awl
3. Combination square
4. Try square
5. Framing square
6. Sliding T-bevel
7. Trammel points
8. Compass

Objective 2: Describe the purpose and demonstrate the proper use of the following cutting and shaping tools:
1. Utility knife
2. Back saw
3. Block plane
4. Wood chisel
5. Wood file/rasp
6. Hand saw
7. Jack plane
8. Glue scraper
9. Putty knife

Objective 3: Describe the purpose and demonstrate the proper use of the following striking tools:
1. Claw hammer
2. Dead-blow hammer
3. Rubber mallet
4. Nail set

Objective 4: Describe the purpose and demonstrate the proper use of the following drill bits:
1. Twist
2. Forstner
3. Spade
4. Countersink
5. Driver bits: Phillips, square, slotted
6. Hole saw
7. Multi spur bit
8. Hogging tool
STANDARD 5

**UNDERSTAND AND DEMONSTRATE THE SAFE USE OF PORTABLE POWER TOOLS.**

Objective 1: Describe the purpose and demonstrate the proper use of the following portable power tools:

1. Pneumatic nailer
2. Power drills
3. Router
4. Finish sander
5. Belt sander
6. Orbital sander
7. Biscuit joiner
8. Hand jig saw

STANDARD 6

**UNDERSTAND AND DEMONSTRATE THE SAFE USE OF POWER MACHINES.**

12% of Exam Blueprint

Objective 1: Describe the purpose and demonstrate the proper use of the following sawing machines:

1. Table saw
2. Power Miter Saw
3. Radial arm saw
4. Band saw

Objective 2: Describe the purpose and demonstrate the proper use of the following surfacing machines:

1. Surface planer
2. Jointer

Objective 3: Describe the purpose and demonstrate the proper use of the following sanding machines:

1. Disc sander
2. Surface sander
3. Spindle sander

Objective 4: Describe the purpose and demonstrate the proper use of the following shaping machines:

1. Router table
2. Shaper

Objective 5: Describe the purpose and demonstrate the proper use of the following drilling and turning machines:

1. Drill press
2. Line boring machine
3. Lathe
STANDARD 7
9% of Exam Blueprint

◇ **Understand Wood Products, Characteristics, and Procedures.**

Objective 1: Describe the parts of a tree and the significance that it has in cabinet construction.
1. Bark
2. Sap wood
3. Pith
4. Annual (growth) rings

Objective 2: Describe and know natural defects.
1. Warp
2. Cracks
3. Bark inclusions
4. Knots

Objective 3: Demonstrate knowledge of the seasoning and drying of lumber.

Objective 4: Distinguish between softwoods and hardwoods.

Objective 5: Identify the difference between solid wood and manmade goods and describe the use of each.

Objective 6: Identify wood species and list the species most suited for furniture construction.
1. Alder
2. Cherry
3. Oak
4. Walnut
5. Maple
6. Poplar
7. Pine
8. Mahogany
9. Cedar

Objective 7: Identify the common grades of lumber and sheet goods.
1. FAS
2. Select
3. #1 COM

Objective 8: Properly store material.

STANDARD 8
12% of Exam Blueprint

◇ **Understand and Demonstrate Basic Math and Measuring Concepts.**

Objective 1: Add two- and three-digit numbers.
Objective 2: Subtract two-, three-, and four-digit numbers.
Objective 3: Solve two-digit divisor numbers.
Objective 4: Multiply a two-digit factor.
Objective 5: Add, subtract, multiply, and divide fractions and mixed numbers.
Objective 6: Convert fractions to decimals.
Objective 7: Reduce fractions.
Objective 8: Add, subtract, multiply, and divide decimal numbers.
Objective 9: Calculate percentages and basic ratios.
Objective 10: Add and subtract linear measurement in feet and inches.
Objective 11: Use a ruler or measuring tape to measure within a sixteenth (1/16) of an inch.
Objective 12: Calculate board feet and square feet.
Objective 13: Demonstrate the optimization of materials.

STANDARD 9 9% of Exam Blueprint

Objective 1: Identify the various woodworking fasteners and the application of each.
   1. Nails
   2. Screws
   3. Staples
   4. Pins
   5. Bolts

Objective 2: Identify the different adhesives and preferred use of each.
   1. Yellow glue
   2. Polyurethane glue
   3. Cyanoacrylate
   4. Epoxy

Objective 3: Identify the different types of clamps.
   1. Bar
   2. “C”
   3. Spring
   4. Band
   5. Hand screw

STANDARD 10 11% of Exam Blueprint

Objective 1: Identify the basic wood joints used in furniture making.
   1. Butt
   2. Miter
   3. Rabbet
   4. Dado
   5. Spline
   6. Mortise and tenon
7. Dovetail
8. Groove (plough)
9. Lap
10. Pocket
11. Dowel
12. Biscuit
13. Blind dado

Objective 2: Construct the basic wood joints used in cabinetmaking/millwork.

STANDARD 11

8% of Exam Blueprint

UNDERSTAND AND DEMONSTRATE THE USE OF CABINET COMPONENTS AND HARDWARE.

Objective 1: Identify the cabinet components of a face frame and cabinet box.
1. Stile
2. Rail
3. Mullion
4. Side
5. Skin
6. Base
7. Shelf
8. Web frame
9. Kicker
10. Drawer runner/glide
11. Toe kick
12. Back

Objective 2: Describe the concept of a European (frameless) cabinet system and the advantages and disadvantages of that system.

Objective 3: Identify the door options in cabinetmaking:
1. Flush
2. Overlay
3. Lip
4. Tambour

Objective 4: Identify the components of a drawer.

Objective 5: Identify and properly install common cabinet/furniture hardware such as:
1. Hinges - offset, overlay, European, butt, lip
2. Drawer guides
3. Pulls and knobs
4. Shelf supports

Objective 6: Assemble a project with the proper adhesive and fasteners.

Objective 7: Use frame and panel construction in a project.

Objective 8: Construct a drawer.
Objective 9: Install lid or door and drawer.
Objective 10: Identify basic construction methods.
   1. Frame and panel
   2. Casework construction
   3. Post and rail

STANDARD 12  
UNDERSTAND AND DEMONSTRATE FINISHING TECHNIQUES.

Objective 1: Understand and properly apply the basic rules of sanding.
Objective 2: Select and correctly use each specified grit size.
Objective 3: Properly prepare a surface for finishing.
Objective 4: Properly apply stain, penetrating oil, and/or a clear finish.
Objective 5: Properly spray a clear coat.
**Performance Standard Evaluation Checklist**

Student Name ________________________________

Instructor’s Name ________________________________

School ____________________________  District ____________________________

**Performance Rating Scale:**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<th>10</th>
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*Limited Skills*..........................*Moderate Skills*..........................*High Skills*

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated written exam. To pass the performance standard the student must attain a performance standard average of **8 or higher** on the rating scale. Students may be encouraged to repeat the objectives until they average **8 or higher** for the following elements:

### Performance Skills Standards

<table>
<thead>
<tr>
<th>STANDARD 1 - Understand the design, planning, and estimation process.</th>
<th>Score:</th>
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**Score:**

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<th>STANDARD 2 - Understand and demonstrate safe practices.</th>
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<tr>
<td>☐ Demonstrate safe use of woodworking tools and machines</td>
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<tr>
<td>☐ Demonstrate how to handle and store materials according to the Material Safety Data Sheets (MSDS)</td>
<td></td>
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<td>☐ Pass a written safety test with a score of 100 percent</td>
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**Score:**

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<th>STANDARD 3 - Understand and demonstrate the safe use of hand tools.</th>
<th>Score:</th>
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## PERFORMANCE SKILLS STANDARDS

- **STANDARD 4 - Understand and demonstrate the safe use of portable power tools.**

- **STANDARD 5 - Understand and demonstrate the safe use of power machines.**

### PORTABLE POWER TOOLS
- **Pneumatic nailer**
- **Finish sander**
- **Biscuit joiner**
- **Power drills**
- **Belt sander**
- **Hand jig saw**
- **Router**
- **Orbital sander**

### SAWING MACHINES
- **Table saw**
- **Brand saw**
- **Power Miter saw**
- **Radial arm saw**

### SURFACING MACHINES
- **Surface planer**
- **Jointer**

### SHAPING MACHINES
- **Router table**
- **Shaper**

### SANDING MACHINES
- **Disc sander**
- **Surface sander**
- **Spindle sander**

### MEASURING AND LAYOUT TOOLS
- **Measuring Tape**
- **Try square**
- **Tammel points**
- **Combination square**
- **Sliding T-bevel**
- **Scratch Awl**
- **Framing square**
- **Compass**

### CUTTING AND SHAPING TOOLS
- **Utility knife**
- **Wood chisel**
- **Jack plane**
- **Back saw**
- **Wood file/rasp**
- **Glue scraper**
- **Block plane**
- **Hand saw**
- **Putty knife**

### STRIKING TOOLS
- **Claw hammer**
- **Dead-blow hammer**
- **Rubber mallet**

### DRILL BITS
- **Twist**
- **Countersink**
- **Hogging tool**
- **Forstner**
- **Hole Saw**
- **Spade**
- **Multi spur bit**
- **Driver bits:** Philips, Square, slotted
### PERFORMANCE SKILLS STANDARDS

- **STANDARD 6 - Understand the wood components and characteristics.**
  - Identify wood species and list the species most suited for furniture construction:
    - Alder
    - Walnut
    - Pine
    - Cherry
    - Maple
    - Mahogany
    - Oak
    - Poplar
    - Cedar

- **STANDARD 7 - Understand the basic math and measuring concepts.**
  - Add two- and three-digit numbers
  - Subtract two-, three-, and four-digit numbers
  - Solve two-digit divisor numbers
  - Multiply a two-digit factor
  - Add, subtract, multiply, and divide fractions and mixed numbers
  - Convert fractions to decimals
  - Calculate board feet and square feet
  - Reduce fractions

- **STANDARD 8 - Understand and demonstrate the use of fasteners/adhesives/abrasives.**
  - Identify the various woodworking fasteners and the application of each:
    - Nails
    - Bolts
    - Pins
    - Staples

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## PERFORMANCE SKILLS STANDARDS

- Screws

- Identify the different adhesives and preferred use of each
  - Yellow glue
  - Epoxy
  - Polyurethane glue
  - Cyanoacrylate

- Identify the different types of clamps
  - Bar
  - Band
  - “C”
  - Handscrew
  - Spring

### STANDARD 9 - Understand and demonstrate the use of joinery.

<table>
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- Identify the basic wood joints used in furniture making
  - Butt
  - Lap
  - Dovetail
  - Pocket
  - Miter
  - Spline
  - Groove (plough)
  - Dowel
  - Rabbet
  - Mortise and tenon
  - Dado/blind dado
  - Biscuit

- Construct the basic wood joints used in cabinetmaking/millwork

### STANDARD 10 - Understand cabinet components/hardware.

<table>
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<tr>
<th>Score:</th>
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</table>

- Identify basic construction methods
  - Frame and panel
  - Casework construction
  - Post and rail

- Identify the cabinet components of a face frame and cabinet box
  - Stile
  - Side
  - Shelf
  - Rail
  - Skin
  - Web frame
  - Toe kick
  - Drawer runner/glide
  - Mullion
  - Base
  - Kicker
  - Back

- Identify the door options in cabinetmaking
  - Flush
  - Tambour
  - Lip

- Identify and properly install common cabinet/furniture hardware such as:
  - Shelf supports
  - Drawer guides
  - Pulls and knobs
  - Hinges – offset, overlay, European, butt, lip

- Assemble a project with the proper adhesive and fasteners
- Describe the concept of a European (frameless) cabinet system and the advantages/disadvantages
- Construct a drawer
- Identify the components of a drawer
- Use frame and panel construction
### PERFORMANCE SKILLS STANDARDS

<table>
<thead>
<tr>
<th>STANDARD 11 - Understand and demonstrate finishing techniques.</th>
<th>Score:</th>
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<tbody>
<tr>
<td>□ Understand and properly apply the basic rules of sanding</td>
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### PERFORMANCE STANDARD AVERAGE

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<tr>
<th>PERFORMACE STANDARD AVERAGE</th>
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