



## EXAM INFORMATION

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**Items**

70

**Points**

73

**Prerequisites**

WOODWORKING

**Grade Level**

10-12

**Course Length**

ONE SEMESTER

**Career Cluster**

ARCHITECTURE AND CONSTRUCTION

MANUFACTURING

**Performance Standards**

INCLUDED

**Certificate Available**

YES

## DESCRIPTION

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The second instructional course in a sequence that prepares individuals 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 a variety of hand and power tools and machinery. Recommended projects would be anything that would allow students to incorporate all joints and tools e.g. a chest of drawers.

## EXAM BLUEPRINT

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**STANDARD****PERCENTAGE OF EXAM**

1- Furniture Design, Manufacturing & Theory	15%
2- Safety	25%
3- Processing Material	29%
4- Milling & Assembly	22%
5- Automated Manufacturing Processes	7%
6- Professional Development	2%



## STANDARD 1

STUDENTS WILL UNDERSTAND FURNITURE DESIGN, MANUFACTURING, AND THEORY

- Objective 1** Understand basic elements of the furniture manufacturing industry.
1. Identify career opportunities using career pathways in furniture and cabinetmaking/millwork manufacturing.
  2. Identify career opportunities in related millwork industries.
  3. Describe the integration of cabinetmaking into construction schedules.
- Objective 2** Understand the design, planning and estimation process.
1. Identify elements and principles of design as they apply to woodworking and cabinetmaking/millwork manufacturing.
  2. Identify standard furniture dimensions relating to tables, seating, and shelving.
  3. Draw/sketch the necessary views of a selected project.
  4. Create a material list for the selected project and determine the project cost.
  5. Follow a procedure list for construction of a cabinet.
  6. Extract pertinent cabinet information and specifications from working drawings and specifications.
- Objective 3** Understand and demonstrate basic math and measuring concepts.
1. Add two- and three-digit numbers.
  2. Subtract two-, three-, and four-digit numbers.
  3. Solve two-digit divisor numbers.
  4. Multiply a two-digit factor.
  5. Add, subtract, multiply, and divide fractions and mixed numbers.
  6. Convert fractions to decimals.
  7. Reduce fractions.
  8. Add, subtract, multiply, and divide decimal numbers.
  9. Calculate percentages and basic ratios.
  10. Add and subtract linear measurement in feet and inches.
  11. Use a ruler or measuring tape to measure within a sixteenth ( $1/16$ ) of an inch.
  12. Calculate board feet and square feet.
  13. Demonstrate the optimization of materials.

Standard 1 Performance Evaluation included below (Optional)

## STANDARD 2

STUDENTS WILL UNDERSTAND AND DEMONSTRATE THE SAFE USE OF WOODWORKING TOOLS

- Objective 1** Understand and demonstrate the safe use of hand tools.
1. Describe the purpose and demonstrate the proper use of the following measuring and layout tools:
    1. Measuring tape
    2. Caliper (digital or dial)
    3. Scratch awl
    4. Framing square



5. Combination square
6. Try square
7. Sliding T-bevel
2. Describe the purpose and demonstrate the proper use of the following cutting and shaping tools:
  1. Back Saw
  2. Block plane
  3. Wood chisel
  4. Wood file/rasp
  5. Hand saw
  6. Glue scraper
  7. Putty knife
  8. Jack plane
  9. Card scraper
3. Describe the purpose and demonstrate the proper use of the following striking tools:
  1. Claw hammer
  2. Nail set
  3. Dead-blow hammer
4. Describe the purpose and demonstrate the proper use of the following drill bits:
  1. Twist
  2. Spade
  3. Countersink
  4. Driver bits: Phillips, Square, Flat
  5. Multi spur bit

## Objective 2

Understand and demonstrate the safe use of portable power tools.

1. Describe the purpose and demonstrate the proper use of the following portable power tools:
  1. Pneumatic/power nailer
  2. Power drills
  3. Router
  4. Finish sander
  5. Belt sander
  6. Orbital sander
  7. Biscuit jointer
  8. Hand jig saw

## Objective 3

Understand and demonstrate the safe use of power machines.

1. Describe the purpose and demonstrate the proper use of the following sawing machines:
  1. Table saw
  2. Power miter saw
  3. Band saw
2. Describe the purpose and demonstrate the proper use of the following surfacing machines:
  1. Surface planer
  2. Jointer
3. Describe the purpose and demonstrate the proper use of the following sanding machines:
  1. Disc sander
  2. Wide belt sander
  3. Spindle sander
4. Describe the purpose and demonstrate the proper use of the following shaping machines:
  1. Router
  2. Shaper
  3. CNC machine
  4. Lathe
5. Describe the purpose and demonstrate the proper use of the following drilling machines:



1. Drill press
2. Line boring machine
3. Mortising machine

Standard 2 Performance Evaluation included below (Optional)

## STANDARD 3

### STUDENTS WILL UNDERSTAND THE METHODS OF PROCESSING MATERIALS

- Objective 1** Understand and demonstrate safe practices.
1. Demonstrate the ability to work safely in a cabinet shop following general safety rules.
  2. Demonstrate how to handle, store, and dispose of materials according to SDS sheets.
  3. Pass a written safety test with a score of 100 percent.
- Objective 2** Understand and demonstrate the use of fasteners and adhesives.
1. Identify the various woodworking fasteners and the application of each.
    1. Nails
    2. Screws
    3. Staples
    4. Pins
    5. Bolts
  2. Properly use an adhesive in the construction of a project.
    1. Yellow glue
    2. Polyurethane glue
    3. Cyanoacrylate
    4. Epoxy
  3. Identify the different types of clamps.
    1. Bar
    2. "C"
    3. Spring
    4. Handscrew
    5. Band
  4. Understand the gage system (nails, staples, pins, etc.)
- Objective 3** Understand wood products, characteristics and procedures.
1. Describe the parts of a tree and the significance that it has in cabinet construction.
    1. Bark
    2. Sap wood
    3. Heart wood
    4. Pith
    5. Annual (growth) rings
    6. Lignin
  2. Describe and identify natural defects in wood.
    1. Warp
    2. Cracks
    3. Bark inclusions
    4. Knots
  3. Understand the methods of the seasoning and drying lumber.
    1. Standard moisture content levels for kiln and air dried lumber
    2. The effects of moisture on materials (expansion and contraction)



4. Distinguish between softwoods and hardwoods.
5. Identify the difference between solid wood and manufactured materials and describe the use of each.
6. Identify wood species and their specific characteristics.
  1. Alder
  2. Cherry
  3. Oak
  4. Walnut
  5. Maple
  6. Poplar
  7. Pine
  8. Mahogany
  9. Red Cedar
7. Identify common manufactured wood products.
  1. Plywood
  2. Particle board
  3. MDF
  4. Baltic Birch
8. Identify the common grades of lumber and sheet goods.
  1. FAS
  2. Select
  3. #1 COM
  4. Rustic

Standard 3 Performance Evaluation included below (Optional)

## STANDARD 4

### STUDENTS WILL UNDERSTAND MILLING AND ASSEMBLY

**Objective 1** Understand and demonstrate the use of joinery.

1. Identify the basic woodworking joints.
  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
2. Construct the basic wood joints used in furniture construction.

**Objective 2** Understand and demonstrate the use of furniture components and hardware.

1. Identify the components of a face frame and cabinet box.
  1. Stile
  2. Rail
  3. Mullion
  4. Side



5. Veneer
6. Base
7. Shelf
8. Web frame
9. Kicker
10. Drawer runner/glide
11. Back
2. Identify the door options in furniture making:
  1. Flush
  2. Overlay
  3. Lip
  4. Tambour
3. Identify the components of a drawer.
4. Identify and properly install common furniture hardware such as:
  1. Hinges - offset, overlay, European, butt
  2. Drawer guides,
  3. Pulls and knobs,
  4. Shelf supports
5. Assemble a project with the proper adhesive and fasteners.
6. Construct a drawer.
7. Install lid or door and drawer.
8. Identify basic construction methods.
  1. Frame and panel
  2. Casework construction
  3. Post and rail

**Objective 3** Understand and demonstrate sanding and finishing techniques.

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

**Objective 4** Understand order of operations

1. Identify the steps for squaring a board.
  1. Joint an edge
  2. Rip to width
  3. Cut one end square
  4. Cut to length

Standard 4 Performance Evaluation included below (Optional)

## STANDARD 5

STUDENTS WILL BE ABLE TO PERFORM AUTOMATED MANUFACTURING PROCESSES USING CNC EQUIPMENT.

**Objective 1** Understand X, Y, Z axis.

**Objective 2** Understand vector lines/drawings.

**Objective 3** Define G-code.

**Objective 4** Create a tool path and use a CNC machine to make a cut.

**Objective 5** Understand the process of booting and running a file.



Standard 5 Performance Evaluation included below (Optional)

## STANDARD 6

STUDENTS WILL BE ABLE TO UNDERSTAND AND APPLY PROFESSIONAL DEVELOPMENT SKILLS IN THE WORKPLACE

**Objective 1** Understand the need for professional development in school and the workplace.

1. Complete a personal inventory.
2. Set and meet goals.
3. Be self-motivated.
4. Know how to make decisions.
5. Know how to manage time.
6. Organize personal belongings and lab equipment.
7. Learn to communicate verbally.
8. Write effective communications.
9. Establish a personal reading program.
10. Develop effective work skills and attitudes.
11. Master a working knowledge of SkillsUSA.\*
  1. Learn the acronym SkillsUSA.
  2. State the SkillsUSA motto.
  3. State the SkillsUSA creed.
  4. Learn the SkillsUSA colors.
  5. Describe the official SkillsUSA dress.
  6. Describe the procedure for becoming a SkillsUSA officer.

**Objective 2** Understand the need for leadership skills.

1. Serve on a committee.
  1. Prepare an agenda.
2. Assist in planning a meeting.
3. Review basic parliamentary procedure.
4. Make a main motion.
5. Participate in a school project.
6. Attend a community meeting.
  1. Practice effective speaking.
7. Present a three- to five-minute talk.
8. Implement a leadership project.
  1. Master a working knowledge of SkillsUSA.
  2. Describe the meaning of the SkillsUSA emblem.
  3. State the SkillsUSA pledge.
  4. Describe the duties of a SkillsUSA officer.

**Objective 3** Understand the need for career planning.

1. Define your future occupation.
2. Survey employment opportunities.
3. Report on a trade journal article.
4. Explore opportunities for advanced training.
5. Conduct a worker interview.
6. Contact a professional association.
7. Explore entrepreneurship opportunities.
8. Give a talk about your career.
9. Review career goals.

**Objective 4** Understand the importance of employability skills and workplace habits.



1. Develop a list of work standards to follow at school and on the job.
2. Evaluate your personal ethics.
  1. Evaluate your personal ethics against acceptable workplace ethics.
3. Build a job search network.
4. Find job leads.
5. Write a resume.
6. Create a job portfolio.
7. Complete a job application.
8. Write a business letter and memo.
9. Participate in an actual or simulated job interview.





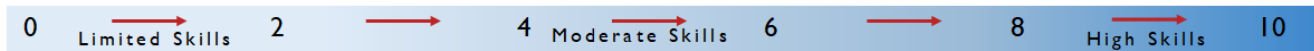
## Furniture Design & Marketing Performance Standards (Optional)

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 standards and 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**.

Students Name \_\_\_\_\_

Class \_\_\_\_\_

### PERFORMANCE RATING SCALE



#### STANDARD 1 – Furniture Design, Manufacturing & Theory

Score:

- Understand furniture design, manufacturing, and theory.
  - Understand basic elements of the furniture manufacturing industry.
  - Understand the design, planning, and estimation process.
  - Understand and demonstrate basic math and measuring concepts.

#### STANDARD 2 – Safety

Score:

- Understand and demonstrate the safe use of woodworking tools.
  - Understand and demonstrate the safe use of hand tools.
  - Understand and demonstrate the safe use of portable power tools.
  - Understand and demonstrate the safe use of power machines.

#### STANDARD 3 – Processing Material

Score:

- Understand the methods of processing materials.
  - Understand and demonstrate safe practices.
  - Understand and demonstrate the use of fasteners and adhesives.
  - Understand wood products, characteristics, and procedures.

#### STANDARD 4 – Milling & Assembly

Score:

- Understand milling and assembly.
  - Understand and demonstrate the use of joinery.
  - Understand and demonstrate the use of furniture components and hardware.
  - Understand and demonstrate sanding and finishing techniques.
  - Understand order of operations.

#### STANDARD 5 – Automated Manufacturing Processes

Score:

- Perform automated manufacturing processes using CNC equipment.
  - Understand X, Y, Z axis.
  - Understand vector lines.
  - Define G-code.
  - Create a tool path and use a CNC machine to make a cut.
  - Define vector and raster.

### PERFORMANCE STANDARD AVERAGE SCORE: