

# Cabinetmaking/Millwork

## Curriculum Guide

### Program Description

MCTI's Cabinetmaking/Millwork Program is one of the best-equipped shops in the country for cabinetmaking and millwork training. Students are trained in the operation of state-of-the-art CNC panel processing equipment, spindle moulders, profile grinders, and numerous other woodworking machines. Students work on individual as well as production projects.

### Cabinetmaking/Millwork Program Admission Requirements:

- None

### U.S. Department of Labor Occupational Profile:

*Students who most closely match the occupational profile for a Cabinetmaker are selected for enrollment. Definitions are provided in the appendix.*

- **Aptitude/Abilities:** Average learning ability, demonstrated ability to compute dimensions, average finger and manual dexterity, average form perception, strong mechanical aptitude
- **Work Keys:** Reading/Locating Information/ Applied Math – 4
- **CASAS Scaled Score:** Reading & Math 226-235
- **Environment:** Loud, Dusty, Hazardous Materials
- **Physical Demands:** Medium to heavy
- **Temperament:** Performs a variety of tasks, ability to make judgments and execute precision work

*Instructors, program managers, and/or the referring counselor may recommend employability skills and elective classes based on the student's needs, abilities, interest and behaviors. Job Seeking Skills is required for all students anticipating to graduate from MCTI.*

**Five Year Entry-Level Wage Average: \$10.40**

### Certificate of Completion Programs (SOC code):

- Woodworking Machine Operator (51-7041)
- Woodworking Machinist (51-7041)
- Woodworking Moulder Specialist (51-7042)
- CNC Woodworking Specialist (51-7042)
- Cabinetmaker/Bench Carpenter (51-7041)

The Cabinetmaking Department issues five (5) certificates. Students first complete the Certified Woodworking Machine Operator courses (two terms) and then complete the Certified Woodworking Machinist courses (one term).

After completing those core certifications, students may be invited to continue in the program to become certified as a CNC woodworking specialist (one additional term), woodworking moulder specialist (one additional term) and/or cabinetmaker/bench carpenter (two additional terms).

Only students who demonstrate academic progress by maintaining a grade point average of 2.0 or better and good employability skills advance from term to term and certification level.

## Required Courses for Certification

*Students must demonstrate academic progress (satisfactory grade point average) and good employability skills to advance from term to term.*

*(First Term)*

Course Number	Course Name	Credits
CM 100	Introduction to Industrial Woodworking	4
CM 108A	Introduction to Industrial Woodworking Lab	6
CM 125	Blueprint Reading for Architectural Woodworking	1
CM 126	Trade Math for Architectural Woodworkers	1

### Certified Woodworking Machine Operator *(Second Term)*

Course Number	Course Name	Credits
CM 232A	Advanced Power Tool Use and Operation	1
CM 234	Advanced Woodworking Machine Operation	2
CM 235	Commercial Cabinet Construction	3
CM 208A	Woodworking Machine Operator Lab	6
EC 239	Plane Geometry/ Trigonometry	<a href="#">2-52</a>

### Certified Woodworking Machinist *(Third Term)*

Course Number	Course Name	Credits
CM 340	Introduction to CAD/CAM Programming	2
CM 350	Introduction to Spindle Moulder Operations and Principals	1
CM 360	Introduction to CNC Router Operation and Principles	2
CM 308	Woodworking Machinist Lab	7

### Certified Woodworking Moulder Specialist *(One Additional Term)*

Course Number	Course Name	Credits
CM 450A	Advanced Spindle Moulder Set-Up and Principles	2
CM 451A	Tooling and Grinding Principles for Spindle Moulders	2
CM 458A	Moulder Operator Lab	8

### Certified CNC Woodworking Specialist

*(One Additional Term)*

Course Number	Course Name	Credits
CM 440A	Advanced CAD/CAM Programming	2
CM 460A	Advanced CNC Router Operation and Principles	2
CM 468A	CNC Operator Lab	8

### Certified Cabinetmaker/Bench Carpenter

*(Two Additional Terms)*

Course Number	Course Name	Credits
CM 471	Machine Joinery Principles and Methods	2
CM 472	Advanced Veneering Principles and Methods	2
CM 478	Cabinetmaking/Bench Carpenter Lab I	8
CM 570	Face Frame Cabinet Construction and Methods	4
CM 578	Cabinetmaking/Bench Carpenter Lab II	8

### Electives

*(Instructor Approval)*

Course Number	Course Name	Credits
CM 200	Woodlinks® Certification	1
CM 201	Introduction to Production Wood Finishing	1
CM 325	Advanced Blueprint Reading	1
CM 370	Introduction to Materials and Processes Used in Aviation Cabinetry	2
CM 441	Manufacturing Software Applications	2
CM 442	Solid® Fundamentals	2
CM 443	Advanced Principles of Solid®	2
CM 444	CNC Machining with Solid®	2
CM 540A	Residential Cabinet Layout and Design	1

# Course Descriptions

## CM 100: Introduction to Industrial Woodworking

This course is for students with little or no experience who are interested in employment in industrial woodworking. Students develop a working knowledge of various materials, tools and processes applicable to the wood industry; and learn to identify and select materials and use tools and processes appropriate for general woodworking applications. **Topics covered:** safe work practices, wood identification, composite panels, plastic laminate, adhesives, fasteners, hand and portable power tools, core stationary woodworking machinery.

## CM 108A: Introduction to Industrial Woodworking Lab

This self-paced, highly participatory lab focuses on developing tactile skills required for machine operation and tool usage. Students receive hands-on instruction and demonstrations, then work on assigned projects to develop skills necessary for success in a team-oriented environment. Emphasis on workplace skills (e.g., working safely, time management, organization and productivity). **Topics covered:** tactile skills required for machine operation, tool usage and application of theory in the production of wood products. Industry accepted practices regarding time and attendance, preparedness, teamwork, communication, personal appearance, hygiene.

## CM 125: Blue Print Reading for Architectural Woodworking

This course is for students with little or no experience who are interested in employment in industrial wood-working. Students develop a working knowledge of standard blueprints to produce material and cut lists. **Topics covered:** architectural scale, orthographic and isometric views, floor plans, elevations, section views, cabinet construction, cut lists.

## CM 126: Trade Math for Architectural Woodworkers

Students become acquainted with math theories and apply them to woodshop applications. Basic math skills are required. **Topics covered:** millimeters, basic geometry, addition, subtraction, multiplication, division of fractions and decimals.

## CM 200: Woodlinks® Certification

Students interested in becoming WoodLINKS® certified learn how to prepare for the national written exam. **Topics covered:** general wood industry knowledge, history, wood science, test taking skills.

## CM 201: Introduction to Production Wood Finishing

This highly-interactive course is for students with basic woodworking knowledge/experience who are interested in production wood finishing training or those who are not able to meet the academic requirements or physical requirements of other cabinetmaking/ millwork jobs. **Topics covered:** liquid chemical measurement/dispensing, stain formulation, finish compatibility, gravity, siphon, and pressure feed air-mix spray systems, finish defects.

## CM 208A: Woodworking Machine Operator Lab

In this self-paced, highly interactive lab, students with intermediate skills/experience in cabinetmaking expand competencies in cabinet-making and workplace readiness skills. Students work on various projects and receive hands-on instruction and demonstrations relevant to tasks at hand. **Topics covered:** tactile skills required for machine operation, tool usage and application of theory in the production of commercial cabinetwork, employability skills.

## CM 232A: Advanced Portable Power Tool Use/ Operation

In this instructor-led lab, students with intermediate experience in cabinet-making advance their skills related to various portable power tools common to the wood industry. Students learn to identify and select tools appropriate for general woodworking tasks, safely use these tools to perform various wood cutting/ machining operations, and perform basic maintenance, set-ups, and tool changes. **Topics covered:** portable power tools (including, but not limited to, routers, sanders, drill motors, circular saws, and plate joiners).

**Operation CM 234: Advanced Woodworking Machine Operation**

Students with intermediate experience in cabinet-making/millwork advance their knowledge of stationary woodworking machinery common to the wood industry. Students learn to use equipment safely to perform various lumber cutting/machining operations with little or no supervision. **Topics covered:** table saw, jointer, planer, edge sander, belt/disc sander, spindle sander, wide belt sander, drill press, band saw, miter saw, cut-off saw (up-cutting), radial arm saw, straight-line rip saw, spindle shaper, veneer saw, bench grinder, sliding table panel saw, CNC panel saw.

**CM 235: Commercial Cabinet Construction**

In this instructor-led lab, students with intermediate experience in cabinet-making advance their knowledge/skill related to panel processing equipment, commercial cabinet construction, and countertop and work surface construction. Students learn to identify panel-processing equipment and safely use the equipment to perform various panel cutting/machining operations with little or no supervision. Students produce standard commercial cabinetry and work surfaces of acceptable quality, at or near an industrial pace. **Topics covered:** hot press, 32mm system technology, work surfaces including self, t-mold, and wood edge; advanced p-lam cabinet construction.

**CM 308: Woodworking Machinist Lab**

In this self-pace, highly independent lab, students build proficiency as woodworking machinists by working on advanced projects. Hands-on instruction and demonstrations relevant to assigned tasks are featured. Emphasis on safety, time management, organization, productivity. **Topics covered:** advanced tactile skills, tool usage, assembly, and application of theory in the production of wood products, employability skills.

**CM 325: Advanced Blueprint Reading**

This course is for certified woodworking machine operators. Advanced instruction in reading blueprints and complex drawings. **Topics covered:** multiple page blueprints, complex section and detail views.

**CM 340: Introduction to CAD/CAM Programming**

This introductory course in CAD/CAM technology is taught primarily in a computer lab setting and is for woodworking machine operators with little or no previous knowledge related to CNC/ CAD technology. **Topics covered:** Cartesian coordinates system, x-y-z axis, basic AlphaCAM® programming, CNC tooling, g-code editing, tool pathing

**CM 350: Introduction to Spindle Moulder Operations and Principles**

This course is for certified woodworking machine operators. Students develop a working knowledge of spindle moulders and shapers performing various machining operations, with supervision. **Topics covered:** safety, basic set-up procedure, using a precision straightedge, lumber selection, and feed procedures.

**CM 360: Introduction to CNC Router Operation and Principles**

This introductory CNC technology course is for certified woodworking machine operators with little/no previous knowledge of CNC/ CAD/CAM technology. Emphasis is on CNC router operation. Students learn to identify CNC routers and point-to-point machines and safely operate these machines with little supervision. **Topics covered:** tool holders, collets, router bits, zeroing tools, machine operation, vacuum pod set-up, spoil boards, fixtures.

**CM 370: Introduction to Materials and Processes Used in Aviation Cabinetry**

This course is for students with advanced cabinetmaking experience who want to explore employment in the aviation industry. Students develop a working knowledge of specialized materials, fasteners, adhesives and methods used in the fabrication of aircraft cabinetry. **Topics covered:** composite panels, adhesives, fasteners, and documentation.

**CM 440A: Advanced CAD/CAM Programming**

This course is for students who have met the requirements of “certified woodworking machinist” status and are interested in specializing in CNC machine operation. An advanced course in CAD/CAM technology taught primarily in a computer lab setting. Students work primarily independently on assigned projects, developing competency and proficiency in programming CNC routers using AlphaCAM®. **Topics covered:** advanced AlphaCAM® programming, G-code editing.

**CM 441: Manufacturing Software Application**

This course is for students who have met the requirements of “certified woodworking machinist” status, who want to attain cabinetmaker/bench carpenter certification. This advanced course focuses on developing competency and proficiency in using the data produced by cabinet manufacturing software, mainly Cabinet Vision®, and Cabnetware®, to produce cabinet and case work. **Topics covered:** cutlists, assembly sheets, part labeling, panel optimization and reports.

**CM 442: Solid® Fundamentals**

This course is for students who have a basic understanding of Windows XP and cabinetmaking. An introductory course in CAD/CAM technology taught primarily in a computer lab setting. Students work independently on assigned projects, developing competency and proficiency in using Cabinet Vision® manufacturing software to produce cut-lists, presentation drawings, cabinet catalogs, and bids. **Topics covered:** program set-up, parameters, material lists, construction methods, layout, drawings, reporting, cabinet editing, and bids.

**CM 443: Advanced Principles of Solid®**

This course is for students who have successfully completed Solid® fundamentals. An advanced course in CAD/CAM technology taught primarily in a computer lab setting. Students work independently on assigned projects, developing competency and proficiency in the advanced use of Cabinet Vision® manufacturing software to produce 'smart-parts' and subassemblies. **Topics covered:** advanced cabinet and part editing, object intelligence, user created standards, part libraries, and sub-assemblies.

**CM 444: CNC Machining with Solid®**

This course is for students who have successfully completed advanced principles of Solid®. An advanced course in CAD/CAM technology taught primarily in a computer lab setting and operation of CNC machines on the shop floor. Students work independently on assigned projects developing competency and proficiency in CNC machining using Cabinet Vision® manufacturing software to produce optimized output to NC saws, CNC routers, point-to-point machining centers, and part labels. **Topics covered:** intelli-joints, MDF doors, labeling, CNC machine and tool setup.

**CM 450A: Advanced Spindle Moulder Set-up and Principles**

This instructor-led lab is for students who have met the requirements of “certified woodworking machinist” status and are interested in specializing in spindle moulder operation. Students learn to set up and operate spindle moulders and shapers to produce various mouldings to specification, with little or no supervision. **Topics covered:** safety, advanced set-up procedures, machine calibration, axial constant set-up, trouble shooting, machining defects, maintenance.

**CM 451A: Tooling and Grinding Principles for Spindle Moulders**

This course is for students who have met requirements of “certified woodworking machinist” status and are interested in specializing in spindle moulder operation. Focus is on advanced knowledge of spindle moulder and shaper tooling. Students set up and operate a profile grinder to produce various spindle moulder and shaper knives. **Topics covered:** grinding room safety, tool steel selection, various carbide knife systems; vitrified, CBN, CBX, and diamond grinding wheels and their appropriate application; template layout and design, axial constant grinding, knife balancing, grinding angles and clearances, insert tooling, straight bore and hydro-lock cutter heads, and dual angle cutterheads.

**CM 458A Moulder Operation Lab**

Self-paced, highly independent class to develop skills as a moulder operator. Students work on projects and receive hands-on instruction and demonstrations. Emphasis on developing workplace skills (e.g., safety, time management, organization and productivity while completing advanced projects. **Topics covered:** advanced tactile skills required for machine operation, set-up, tool grinding, and application of theory used in the operation of spindle moulders and shapers, employability skills.

**CM 460A: Advanced CNC Router Operations and Principles**

This course is for students who have met the requirements to reach “certified woodworking machinist” status, who want to specialize in CNC machine operation. Instructor led lab. Written work, Internet assignments, hands-on demonstrations, and projects. Students will learn skills proficiency to gain employment as an entry-level operator. **Topics covered:** spoil boards, fixture boards, vacuum pods, tooling, maintenance, trouble-shooting machining defects, nesting.

**CM 468A: CNC Operator Lab**

Students develop skills related to CNC operations; work on various projects, receive hands-on instruction and demonstrations relevant to assigned tasks. Emphasis on developing workplace skills (e.g., safety, time management, organization and productivity while completing advanced projects. Self-paced, highly independent class. **Topics covered:** advanced tactile skills required for machine operation, tool usage, fixturing, application of theory used CNC router operation.

**CM 471: Machine Joinery Principles and Methods**

This course is for students who have met the requirements to reach “certified woodworking machinist” status and want to achieve cabinetmaker/bench carpenter certification. An advanced course in machine operation specifically relating to joinery. Students learn skills to produce complex joinery and use joinery in practical project applications. **Topics covered:** machine dovetails, box/finger joints, tongue and rabbet joints, various lap joints, pocket hole joinery, plate joinery, mortise and tenon joinery.

**CM 472: Advanced Veneering Principles and Methods**

This course is for students who have met the requirements to reach “certified woodworking machinist” status, who want to achieve cabinetmaker/bench carpenter certification. Students apply learned skills to produce quality, veneered surfaces for use in furniture and related projects. **Topics covered:** splicing, matching, sketch faces, vacuum bags, adhesives, curve work.

**CM 478: Cabinetmaker/Bench Carpenter Lab I**

A self-paced, highly independent lab. Developing competency as a cabinetmaker/bench carpenter. Students work on assigned projects and receive hands-on instruction and demonstrations. Emphasis on developing workplace skills (e.g., safety, time management, organization and productivity while completing advanced woodworking projects). **Topics covered:** advanced tactile skills required for machine operation, tool usage, assembly and application of theory in producing wood products.

**CM 540A: Residential Cabinet Layout and Design**

This course is for students who have met the requirements to reach “certified woodworking machinist” status and want to achieve cabinetmaker/bench carpenter certification. An advanced course in CAD/CAM technology taught primarily in a computer lab setting. Students primarily work independently on assigned projects; develop skills using cabinet manufacturing software mainly Cabinet Vision® and Cabnetware® to design residential kitchen cabinetry. **Topics covered:** work triangles, appliance layout, and specialty cabinets.

**CM 570: Face Frame Cabinet Construction and Methods**

This course is for students who have met the requirements to reach “certified woodworking machinist” status and want to achieve cabinetmaker/bench carpenter certification. An advanced course specifically related to residential face frame cabinet construction methods and principles. Students learn skills to produce quality, face-frame cabinetry. **Topics covered:** pocket hole frame joinery using Castle or Kreg machinery, production frame assembly using a frame press, dado carcass construction, pocket hole carcass construction, and data usage.

**CM 578: Cabinetmaker/Bench Carpenter Lab II**

A self-paced, highly independent lab to develop advanced competency as a cabinetmaker/bench carpenter. Students work on assigned projects and receive hands-on instruction and demonstrations relevant to tasks at hand. Emphasis on developing workplace skills (e.g., working safely, time management, organization and productivity while completing advanced woodworking projects).

**Topics covered:** advanced tactile skills required for machine operation, tool usage, assembly and application of theory in producing wood products.

**EC 239: Plane Geometry/Trigonometry**

This course is for students who can solve basic math problems but need some advanced math skills to work in the field of cabinetmaking/millwork or machine technology. Basics of geometry and trigonometry are introduced. **Topics covered:** basic geometric figures, angles, triangles, circles, basic trigonometry functions, calculating sides and angles of right triangles, practical machine applications, and calculating sides and angles of oblique triangles.