Montgomery County
CONSTRUCTION TRADES FOUNDATION

Carpentry

The Montgomery County Students Construction Trades Foundation, Inc has developed a comprehensive construction technology program designed to prepare students for a rewarding career in the construction industry. Students master a variety of construction skills by applying knowledge through their participation in a "student design-built" house project. In addition, each program area has articulation agreements with an apprenticeship program as well as Montgomery College.

The apprenticeship program is aligned with the National Center for Construction Education and Research (NCCER) standards. The NCCER is a not-for-profit education foundation created to help address the critical workforce shortage facing the construction industry and to develop industry driven standardized craft training program with portable credentials. For each module, students must score a minimum of 70% on module tests and complete 100% of the Competency Profiles in order to receive NCCER credit. Parentheses indicate the approximate classroom hours spent on each module. Students who enroll in the construction program beyond 2 semesters may have an opportunity to complete optional modules in Level 3 of the NCCER curriculum.

For students who earn a B grade or better, up to seven credits may be transferred to Montgomery College's Building Trades Technology, A.A.S. or Building Trades Technology Certificate Programs.

The following describes the scope and sequence of instruction for Carpentry.

NCCER Modules-Semester 1	Unit(s)
Module 27103-06	Hand and Power Tools (20 hours)
Module 27105-06	Floor Systems (25 hours)
Module 27106-06	Wall and Ceiling Framing (20 hours)
Module 27104-06	Reading Plans and Elevations (20 hours)

NCCER Modules-Semester 2	Unit(s)
Module 27102-06	Wood Building Materials, Fasteners, and Adhesives (7.5 hours)
Module 27109-06	Windows and Exterior Doors (12.5 hours)
Module 27110-06	Basic Stair Layout (12.5 hours)
Module 27107-06	Roof Framing (37.5 hours)
Module 27101-06	Orientation to the Trade (2.5 hours)
Module 27108-06	Introduction to Concrete and Reinforcing Materials (5 hours)

NCCER Modules-Semester 3 (Optional)	Unit(s)
Module 27301-02	Exterior Finishing (35 hours)
Module 27303-02	Thermal and Moisture Protection (25 hours)
Module 27304-02	Stairs (5 hours)
Module 27306-02	Drywall One: Installation (15 hours)
Module 27310-02	Interior Finish Three: Window, Door, Floor, and Ceiling Trim (25 hours)
Module 27311-02	Interior Finish Four: Cabinet Installation (10 hours)

NCCER Modules-Semester 4 (Optional)	Unit(s)
Module 27302-02	Roofing Applications (25 hours)
Module 27305-02	Framing with Metal Studs (15 hours)
Module 27307-02	Drywall Two: Finishing (12.5 hours)
Module 27308-02	Interior Fine One: Doors (20 hours)
Module 27309-02	Interior Finish Two: Suspended Ceilings (25 hours)

LEVEL 1-CARPENTRY FUNDAMENTALS

MODULE 27103-06 HAND AND POWER TOOLS

1. Identify the hand tools commonly used by carpenters and describe their uses.
2. Use hand tools in a safe and appropriate manner.
3. State the general safety rules for operating all power tools, regardless of type.
4. State the general rules for properly maintaining all power tools, regardless of type.
5. Identify the portable power tools commonly used by carpenters and describe their uses.
6. Use portable power tools in a safe and appropriate manner.
7. Identify the stationary power tools commonly used by carpenters and describe their uses.
8. Use stationary power tools in a safe and appropriate manner.

MODULE 27105-06 FLOOR SYSTEMS

1. Identify the different types of framing systems.
2. Read and understand drawings and specifications to determine floor system requirements.
3. Identify floor and sill framing and support members.
4. Name the methods used to fasten sills to the foundation.
5. Given specific floor load and span data, select the proper girder/beam size from a list of available girders/beams.
6. List and recognize different types of floor joists.
7. Given specific floor load and span data, select the proper joist size from a list of available joists.
8. List and recognize different types of bridging.
9. List and recognize different types of flooring materials.
10. Explain the purposes of subflooring and underlayment.
11. Match selected fasteners used in floor framing to their correct uses.
12. Estimate the amount of material needed to frame a floor assembly.
13. Demonstrate the ability to:
    - Lay out and construct a floor assembly
    - Install bridging
    - Install joists for a cantilever floor
    - Install a subfloor using butt-joint plywood/OSB panels
    - Install a single floor system using tongue-and-groove plywood/OSB panels

MODULE 27106-06 WALL AND CEILING FRAMING

1. Identify the components of a wall and ceiling layout.
2. Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops.
3. Describe the correct procedure for assembling and erecting an exterior wall.
4. Describe the common materials and methods used for installing sheathing on walls.
5. Lay out, assemble, erect, and brace exterior walls for a frame building.
6. Describe wall framing techniques used in masonry construction.
7. Explain the use of metal studs in wall framing.
8. Describe the correct procedure for laying out a ceiling.

9. Cut and install ceiling joists on a wood frame building.
10. Estimate the materials required to frame walls and ceilings.

MODULE 27104-06 READING PLANS AND ELEVATIONS

1. Describe the types of drawings usually included in a set of plans and list the information found on each type.
2. Identify the different types of lines used on construction drawings.
3. Identify selected architectural symbols commonly used to represent materials on plans.
4. Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
5. Identify selected abbreviations commonly used on plans.
6. Read and interpret plans, elevations, schedules, sections, and details contained in basic construction drawings.
7. State the purpose of written specifications.
8. Identify and describe the parts of a specification.
9. Demonstrate or describe how to perform a quantity takeoff for materials.

MODULE 27102-06 WOOD BUILDING MATERIALS, FASTENERS, AND ADHESIVES

1. Explain the terms commonly used in discussing wood and lumber.
2. State the uses of various types of hardwoods and softwoods.
3. Identify various types of imperfections that are found in lumber.
4. Explain how lumber is graded.
5. Interpret grade markings on lumber and plywood.
6. Identify various types of building boards and identify their uses.
8. Identify the uses of and safety precautions associated with pressure-treated and fire-retardant lumber.
9. Describe the proper method of caring for lumber and wood building materials at the job site.
10. State the uses of various types of engineered lumber.
11. Calculate the quantities of lumber and wood products using industry-standard methods.
12. List the basic nail and staple types and their uses.
13. List the basic types of screws and their uses.
14. Identify the different types of anchors and their uses.
15. Describe the common types of adhesives used in construction work and explain their uses.

MODULE 27109-06 WINDOWS AND EXTERIOR DOORS

1. Identify various types of fixed, sliding, and swinging windows.
2. Identify the parts of a window installation.
3. State the requirements for a proper window installation.
4. Install a pre-hung window.
5. Identify the common types of skylights and roof windows.
6. Describe the procedure for properly installing a skylight.
7. Identify the common types of exterior doors and explain how they are constructed.

8. Identify the parts of a door installation.
9. Identify the types of thresholds used with exterior doors.
10. Install a threshold on a concrete floor.
11. Install a pre-hung exterior door with weather-stripping.
12. Identify the various types of locksets used on exterior doors and explain how they are installed.
13. Explain the correct installation procedure for a rollup garage door.
14. Install a lockset.

MODULE 27110-06 BASIC STAIR LAYOUT

1. Identify the various types of stairs.
2. Identify the various parts of stairs.
3. Identify the materials used in the construction of stairs.
4. Interpret construction drawings of stairs.
5. Calculate the total rise, number and size of risers, and number and size of treads required for a stairway.
6. Lay out and cut stringers, risers, and treads.
7. Build a small stair unit with a temporary handrail.

MODULE 27107-06 ROOF FRAMING

1. Understand the terms associated with roof framing.
2. Identify the roof framing members used in gable and hip roofs.
3. Identify the methods used to calculate the length of a rafter.
4. Identify the various types of trusses used in roof framing.
5. Use a rafter framing square, speed square, and calculator in laying out a roof.
6. Identify various types of sheathing used in roof construction.
7. Frame a gable roof with vent openings.
8. Frame a roof opening.
9. Construct a frame roof, including hips, valleys, commons, jack rafters, and sheathing.
10. Erect a gable roof using trusses.
11. Estimate the materials used in framing and sheathing a roof.

MODULE 27101-06 ORIENTATION TO THE TRADE

1. Describe the history of the carpentry trade.
2. Identify the stages of progress within the carpentry trade.
3. Identify the responsibilities of a person working in the construction industry.
4. State the personal characteristics of a professional.
5. Explain the importance of safety in the construction industry.

MODULE 27108-06 INTRODUCTION TO CONCRETE AND REINFORCING MATERIALS

1. Identify the properties of cement.
2. Describe the composition of concrete.
3. Perform volume estimates for concrete quantity requirements.
4. Identify types of concrete reinforcement materials and describe their uses.

5. Identify various types of footings and explain their uses.
6. Identify the parts of various types of forms.
7. Explain the safety procedures associated with the construction and use of concrete forms.
8. Erect, plumb, and brace a simple concrete form with reinforcement.

LEVEL 3-CARPENTRY

MODULE 27301-02 EXTERIOR FINISHING

1. Describe the purpose of wall insulation and flashing.
2. Identify the types and parts of common cornices.
3. Demonstrate the installation of selected common cornices.
4. Demonstrate lap and panel siding estimating methods.
5. Describe the types and applications of common wood siding:
   - Beveled
   - Tongue-and-groove
   - Shiplap
   - Board-and-batten
   - Shake or shingle
   - Plywood
   - Hardboard and particleboard
6. Install selected types of wood siding.
7. Describe fiber-cement siding and its uses.
8. Demonstrate the installation of fiber-cement siding.
9. Describe the types and styles of vinyl and metal siding.
10. Install selected types of vinyl or metal siding.
11. Describe the types and applications of stucco and masonry veneer finishes.
12. Describe the types and applications of special exterior finish systems.
13. Describe the types and styles of gutters and downspouts and their accessories.
14. Install selected types of metal or vinyl gutters and downspouts.

MODULE 27303-02 THERMAL AND MOISTURE PROTECTION

1. Describe the requirements for insulation.
2. Describe the characteristics of various types of insulation material.
3. Calculate the required amounts of insulation for a structure.
4. Demonstrate the installation of selected insulation materials.
5. Describe the requirements for moisture control and ventilation.
6. Install selected vapor barriers.
7. Describe various methods of waterproofing.
8. Describe air infiltration control requirements.
9. Install selected building wraps.

MODULE 27304-02 STAIRS

1. Identify the various types of stairs.
2. Identify the various parts of stairs.
3. Identify the materials used in the construction of stairs.
4. Interpret construction drawings of stairs.

5. Explain the methods of constructing various types of stairs.
6. Understand the various terms and definitions relating to stairs.
7. Lay out and cut stringers.
8. Determine the number and sizes of risers and treads required for a stairway.
9. Build a small stair unit with a handrail.
10. Lay out a skirt board.

MODULE 27306-02 DRYWALL ONE: INSTALLATION

1. Identify the different types of gypsum wallboard (drywall) and their uses.
2. Select the type and thickness of drywall required for specific installations.
3. Select fasteners for drywall installation.
4. Explain the fastener schedules for different types of drywall installations.
5. Perform single-layer and multi-layer drywall installations using different types of fastening systems, including:
   - Nails
   - Drywall screws
   - Adhesives
6. Install gypsum drywall on metal studs.
7. Explain how soundproofing is achieved in drywall installations.
8. Estimate material quantities for a drywall installation.

MODULE 27310-02 INTERIOR FINISH THREE:WINDOW, DOOR, FLOOR, AND CEILING TRIM

1. Identify the different types of standard moldings and describe their uses.
2. Make square and miter cuts using a miter box or power miter saw.
3. Make coped joint cuts using a coping saw.
4. Select and properly use fasteners to install trim.
5. Install interior trim, including:
   - Door trim
   - Window trim
   - Base trim
   - Ceiling trim
6. Estimate the quantities of different trim materials required for selected rooms.

MODULE 27311-02 INTERIOR FINISH FOUR: CABINET INSTALLATION

1. State the classes and sizes of typical base and wall kitchen cabinets.
2. Recognize the common types of woods used to make cabinets.
3. Identify cabinet components and hardware and describe their purpose.
4. Install factory-made cabinets, countertops, and backsplashes.
5. Install plastic laminate on a countertop core.

MODULE 27302-02 ROOFING APPLICATIONS

1. Identify the materials and methods used in roofing.
2. Explain the safety requirements for roof jobs.
3. Install fiberglass shingles on gable and hip roofs.
4. Close up a valley using fiberglass shingles.

5. Explain how to make various roof projections watertight when using fiberglass shingles.
6. Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.
7. Lay out, cut, and install a cricket or saddle.
8. Install wood shingles and shakes on roofs.
9. Describe how to close up a valley using wood shingles and shakes.
10. Explain how to make roof projections watertight when using wood shakes and shingles.
11. Complete the cuts and install the main and hip ridge caps using wood shakes/shingles.
12. Demonstrate the techniques for installing other selected types of roofing materials.

MODULE 27305-02 FRAMING WITH METAL STUDS

1. Identify the components of a metal stud system.
2. Identify and select the tools and fasteners used in a metal stud system.
3. Identify applications for metal stud systems.
4. Lay out and install a metal stud wall with openings.
5. Lay out and install a metal door frame.
6. Lay out and install a metal stud radius wall.

MODULE 27307-02 DRYWALL TWO: FINISHING

1. Explain the different levels of finishing as defined in *A Recommended Specification for Levels of Gypsum Board Finish*.
2. Identify the hand tools used in drywall finishing and demonstrate the ability to use these tools.
3. Identify the automatic tools used in drywall finishing.
4. Identify the materials used in drywall finishing and state the purpose and use of each type of material, including:
   - Compounds
   - Joint reinforcing tapes
   - Trim materials
   - Textures and coatings
5. Demonstrate the ability to properly finish drywall using hand tools.
6. Recognize various types of problems that occur in drywall finishes and identify the cause and correct method for solving each type of problem.
7. Demonstrate the ability to patch damaged drywall.

MODULE 27308-02 INTERIOR FINISH ONE: DOORS

1. Identify various types of door jambs and frames and demonstrate the installation procedures for placing selected door jambs and frames in different types of interior partitions.
2. Identify different types of interior doors.
3. Identify different types of interior door hardware and demonstrate the installation procedures for selected types.
4. Demonstrate the correct and safe use of the hand tools described in this module.
5. Demonstrate the correct and safe use of the power tools described in this module.

6. List and identify specific items included on a typical door schedule.
7. Demonstrate the procedure for placing and hanging a selected door.

MODULE 27309-02 INTERIOR FINISH TWO: SUSPENDED CEILINGS

1. Establish a level line.
2. Understand the common terms related to sound waves and acoustical ceiling materials.
3. Identify the different types of suspended ceilings.
4. Interpret plans and shop drawings related to ceiling layout.
5. Sketch the ceiling layout for a basic suspended ceiling.
6. Perform a material takeoff for a suspended ceiling.
7. Install selected suspended ceilings.