

» Course Overview

The Building Maintenance Technology course will focus on all aspects of the construction industry from health and safety to the tools that every construction professional needs in their collection. They will learn about the various roles in the industry as well as job outlooks, educational and experiential requirements, and salary information. Some activities will focus on career exploration to discover career options that best align with interests and talents. Students will learn basic construction math and how it is applied during design and building phases of projects. They will learn specifics about carpentry, construction drawings, framing floor systems, framing walls, and framing roofs. Throughout, they will establish a foundation for what opportunities exist for them in the industry.

» Course Outline by Module

Module 1	Health, Safety, and Environmental Management Systems	Module 8	Construction Drawings
Module 2	The Construction Industry Part I	Module 9	Framing Floor Systems Part I
Module 3	The Construction Industry Part II	Module 10	Framing Floor Systems Part II
Module 4	Basic Hand and Power Tools	Module 11	Framing Walls and Ceilings Part I
Module 5	Construction Math Part I	Module 12	Framing Walls and Ceilings Part II
Module 6	Construction Math Part II	Module 13	Framing a Roof
Module 7	Carpentry		

» Module Overview and Learning Objectives

| Module 1. Health, Safety, and Environmental Management Systems

Every job comes with a certain level of risk. Some industries are more prone to dangers and risks than others. Construction can be a hazardous career without the proper precautions. With the appropriate safety measures and continued emphasis on health and protective practices, risks can be significantly reduced or even eliminated all together. Health and safety play a critical role in minimizing the risk on a construction site and to workers. Safety must be the first priority and should be implemented from day one - even before work begins. Throughout the module, you will learn about the many safety and health precautions that are put into place to maintain secure conditions for each and every person.

Learning Objectives: In this module, students will:

- Understand the role and the purpose of the Occupational Safety and Health Administration (OSHA) rules and regulations.
- Identify and locate Safety Data Sheets (formerly called Material Safety Data Sheets (MSDS)) and follow the procedures as necessary.
- Describe "Right-to-Know" Law as recorded in (29 CFR-1910.1200)
- Identify and use safety equipment and personal protective equipment (PPE).
- Describe personal and jobsite safety rules and regulations that maintain safe and healthy work environments.
- Explain emergency procedures to follow in response to workplace accidents.

| Module 2. The Construction Industry Part I

To understand where the construction industry is today, it is important to recognize its beginnings. Many of the techniques used in modern construction were founded in early civilizations. Examples of this significant architecture still exist all over the globe. Once the history of construction is considered, it's important to understand its current state and the direction in which it is headed. Construction projects are impactful on everything from the natural environment to state and federal economies.

There are direct correlations between how construction is completed and how people and society function. Understanding the tie-in is critical.

Learning Objectives: In this module, students will:

- Describe the development of construction technology, its impact on the built environment and the impact of growth on the construction industry.
- Describe the benefits of the construction industry on health and safety, communication, transportation and the economy.
- Demonstrate an understanding of the relationship between construction and the environment.
- Describe the role of trade unions in the construction industry and research apprenticeship opportunities.
- Identify the different classifications of construction projects.

| Module 3. The Construction Industry Part II

Wherever your interest lies in the construction industry, there is a likely a role that will fit it. From building to managing to designing, there is something for everyone who is interested in creating the built environment. Every role within the industry is an important piece of the overall design and construction of homes, buildings, and other structures. In this module, we'll identify some of the key players in the construction and engineering industries as well as examine how all of these roles and responsibilities interact on project teams for the completion of construction projects big and small.

Learning Objectives: In this module, students will:

- Define the roles and responsibilities of the general contractor, specialty contractor, construction management and design build firms.
- Research construction trade occupations and the roles and responsibilities of each craft.
- Research construction management occupations and the roles and responsibilities of each.
- Identify design and engineering occupations and the roles and responsibilities of each.

- Explain the relationship between construction and the economy.
- Describe the process of applying for building permits and variances and demonstrate an understanding of zoning requirements.

| **Module 4. Basic Hand and Power Tools**

You can have the world's best spoon, but it's not going to help you eat a steak. Having a good tool is good, but having the right tool for the right job is how it gets done. Throughout the module we'll explore basic hand and and power tools that are used throughout the construction industry. Whatever your role, you will need tools to do your job. If you thought a hammer was just a hammer or a screwdriver was just a screwdriver, think again. There are a number of varieties of just about every tool. You will learn about how they are used and for what purpose.

Learning Objectives: In this module, students will:

- Identify, select and use appropriate hammers and saws used in the construction industry.
- Identify and use various common screwdriver and drill bit types.
- Select and use various types of non-adjustable wrenches, adjustable wrenches and plumbing tools, chisels and punches, pliers, ripping bars and nail pullers, woodworking files, spirit levels, socket wrench sets, hand or block sanders, carpenters' squares, clamps and shovels.
- Identify power tools including sanders, drills, circular saws, jig saws, reciprocating saws, radial-arm saws, table saws, band saws miter saws, drill presses, grinders, electric routers and pneumatic nailers.
- Describe the proper operation of power tools and equipment.

| **Module 5. Construction Math Part I**

When you saw the title of this module, you either thought, "Good, I love math!" or "Oh no... why?!" Rest assured that the math you'll learn and review in this module will be explained thoroughly and have a clear link to the building industry. These are concepts that, when you enter the industry, you will be well-practiced in doing. Take the notion that you're not "good at math" and realize that these are applications you'll be using in the industry and

you're GOING to get good at it. Also, get it out of your head that you're not good at anything because you absolutely can be! If you feel less than confident about your math skills, just take your time. Work through the lessons at a pace that makes sense for you. Practice as much as you can. And don't forget to reach out to your instructor if you need a little extra help.

Learning Objectives: In this module, students will:

- Solve job-related problems by adding, subtracting, multiplying and dividing numbers, using fractions, decimals and whole numbers.
- Change numbers to percentages.
- Demonstrate knowledge of arithmetic operations.
- Read a ruler and a tape measure.
- Compute feet, inches and yards.

| Module 6. Construction Math Part II

In this module, you'll continue learning about various math applications and how they apply to the construction industry. Problem-solving and conversion are the applications on which you will continue to focus. Again, these are likely math concepts that you have learned in various classes in school. You probably even apply many of these concepts to your every day life. In the previous module, you learned about basic mathematic functions as well as converting to and from percentages. This module will highlight time - converting hours and minutes to decimals and fractions. You will also learn how math concepts can help you to analyze and interpret documents that you will use in your career. You will also solve problems related to things like area, volume, and weight and determine ratios and proportions.

Learning Objectives: In this module, students will:

- Change hours and minutes to decimals, fractions and mixed numbers.
- Analyze and apply data and measurements to solve problems and interpret documents.
- Determine ratios and proportions.

- Convert decimals to fractions and fractions to decimals.
- Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares and cylinders.

| Module 7. Carpentry

Carpentry is both an art and a trade. It refers to the building of a structure. Primarily, carpentry is about cutting, joining, and working with wood or timber, but it can include all building materials. The building of a structure begins with foundation. The foundation is the most critical part of any structure as it needs to support the weight (load) of the structure itself, the load of what is contained in the structure, as well as the humans inside. Additionally, the foundation and the structure itself need to withstand weather elements. From hurricanes to piles of snow accumulated on the roof, a structure has to be solid. Much of ensuring the solidity and endurance of a structure is based in carpentry. In the readings that follow, you'll learn about cement formwork that creates the foundation and other areas of a structure, framing and the significance of proper utility of connecting the various pieces of a structure, and finally, how to protect it with a process called dry-in or dry-boxing.

Learning Objectives: In this module, students will:

- Construct various types of concrete forms.
- Describe in-beds used in concrete formwork.
- Identify appropriate form stripping and handling techniques.
- Lay out and install framing members for a structure.
- Dry in a structure.

| Module 8. Construction Drawings

At first glance, a construction drawing (or blueprint) can look like it's written in a foreign language. While that's not exactly true, there are definitely things you need to learn in order to be able to read a construction drawing properly. Regardless of your role, you will come across construction drawings. If you're involved in designing construction projects, you

may even create them. Throughout the module, you will learn about the nuances of construction drawings - the terminology, scaling, abbreviations, symbols, and, most importantly, how to read it all and understand the vision for the project communicated through the drawing.

Learning Objectives: In this module, students will:

- Identify basic construction drawing terms, components and symbols.
- Locate sections, elevations and details to their location on the plan view.
- Use drawing dimensions to lay out a construction project,
- Read architectural scales.

| Module 9. Framing Floor Systems Part I

Flooring and its proper installation is vital to any structure. The floor of a home or building helps to create its basic structure. It supports walls, furnishings, home systems like heating and cooling ductwork. Perhaps most importantly, floors withstand constant use by the people occupying a space every day. Floors probably aren't something you spend a lot of time thinking about. But take a moment to consider all that they must do. They must be level or else you would slide around or fall. Furniture would move. Everything else that is in the house would not be level. The creation of flooring systems in a home or other dwelling has to be done with precision and expert craftsmanship. There also needs to be proper consideration of all that the floor will have to withstand over the lifecycle of a building.

Learning Objectives: In this module, students will:

- Identify floor and sill framing and support members.
- Name the methods used to fasten sills to the foundation.
- Understand how girder/beam and joist sizes are selected.
- Identify different types of floor joists.
- Identify different types of bridging.

| **Module 10. Framing Floor Systems Part II**

In this continuation of framing flooring systems, you'll continue to learn about the importance of the structural integrity of each flooring layer. You'll delve deeper into the materials used and why specific choices are made regarding materials. These choices pertain to things like moisture, weather conditions, and sustainability. You'll discover the importance of each specific layer separately and as each works together to support the finish layer of flooring. Finish layers can include various textures, colors, patterns, and materials. The layers underneath the finish layer are critical in ensuring a long life for the finish layer on top. From fasteners to the right thickness of underlayment for flooring, you'll gain a thorough understanding of how the right knowledge makes a world of difference under your feet.

Learning Objectives: In this module, students will:

- Identify different types of flooring materials.
- Explain the purposes of subflooring and underlayment.
- Match selected fasteners used in floor framing to their correct uses.
- Estimate the amount of material needed to frame a floor assembly.
- Demonstrate the ability to:
 - Lay out and construct a floor assembly
 - Install bridging (wood cross bridging, solid wood bridging and steel cross bridging).
 - Install joists for a cantilever floor.
 - Install a subfloor using butt-joint plywood/OSB panels and structural particle board.
 - Install a single floor system using tongue-and-groove plywood/OSB panels

| **Module 11. Framing Walls and Ceilings Part I**

Framing a home - floors, walls, ceilings, roofs - is one of the most important if not the most important part of a home building project. If a frame isn't built correctly, things will go wrong. They may be minor (think back to the squeaky floors in previous lessons) or major - a house could be without structural integrity and crumble to the ground. Special care must be taken when framing each part of a house. Over the next several lessons, you'll

learn about proper procedures, tools, materials, and techniques to make sure that framing is done properly. Framing is where the structure of a home, or any building, takes shape. It's integral to every other part of the process that it be done well.

Learning Objectives: In this module, students will:

- Identify the components of a wall and ceiling layout.
- Lay out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing and the use of fire stops where applicable.
- Describe the correct procedure for assembling and erecting an exterior wall.
- Identify the common materials and methods used for installing sheathing on walls.
- Lay out, assemble, erect, and brace exterior walls for a frame building.

| Module 12. Framing Walls and Ceilings Part II

In this module, you'll continue to learn about the techniques used in framing. The previous module focused predominantly on wood framing of interior and exterior walls. Here, you'll learn about some different techniques. Masonry wall systems involve substantial use of concrete and have a specific set of steps, tools, materials, and terminology associated with them. You also learned about wood studs. In this module, you will learn about using metal studs in wall framing. Again, the materials and techniques have their own nuances that are important to learn. Finally, you'll finish the module with several lessons on assembling ceilings. You have a solid understanding of flooring systems and this will help you tremendously as you learn about the opposite end of the room - the ceiling!

Learning Objectives: In this module, students will:

- Describe wall framing techniques used in masonry construction.
- Explain the use of metal studs in wall framing.
- Demonstrate correct procedure for laying out ceiling joists.
- Cut and install ceiling joists on a wood frame building.

| **Module 13. Framing a Roof**

In this module, students will define the terms associated with roof framing, identify the roof framing members used in gable and hip roofs, calculate the length of a rafter using various methods, identify the various types of trusses used in roof framing, and use a rafter framing square, speed square and calculator in laying out a roof. Students will identify various types of sheathing used in roof construction, frame a gable roof with vent openings, frame a roof opening, erect a gable roof using trusses, and estimate the materials used in framing and sheathing a roof.

Learning Objectives: In this module, students will:

- Define the terms associated with roof framing.
- Identify the roof framing members used in gable and hip roofs.
- Calculate the length of a rafter using various methods.
- Identify the various types of trusses used in roof framing.
- Use a rafter framing square, speed square and calculator in laying out a roof.
- Identify various types of sheathing used in roof construction.
- Frame a gable roof with vent openings.
- Frame a roof opening.
- Erect a gable roof using trusses.
- Estimate the materials used in framing and sheathing a roof.