

» Course Overview

The Building Maintenance Technology II course examines the multi-faceted construction industry. Students will explore contract documents and how each is pertinent to establishing business relationships with designers, clients, and other stakeholders. They will identify what goes into building a successful contract and how estimates, costs, and timeframes are estimated and calculated. Drafting techniques using CAD and BIM technology will also be discussed, specifically pertaining to how these technologies have transformed the building industry. Several logistical components like zoning, property lines, property setbacks, site elevations, calculating materials and labor costs, and establishing construction schedules are critical to the building process. Students will discover the impact of the built environment on the natural environment and how it has evolved over many years. Finally, students will learn about issues related to sustainability and creating more environmentally-friendly practices, procurement, and techniques in the construction industry.

» Course Outline by Module

Module 1	Construction Documents, Contracts, and Specifications	Module 5	The Built Environment Part I
Module 2	Drafting and Federal Codes	Module 6	The Built Environment Part II
Module 3	Project Costs and Scheduling Part I	Module 7	Sustainability Issues
Module 4	Project Costs and Scheduling Part II	Module 8	Construction Projects

» Module Overview and Learning Objectives

| Module 1. Construction Documents, Contracts, and Specifications

Documentation is integral to the building and design processes. Contract documents are what will establish the building project and will outline everything from the initial agreement to payments to who will perform what work and when the work will be completed. You will review the various components of contracts as well as how the documents in a contract are interrelated and work with each other to establish the entirety of a construction project. Other construction documentation includes drawings like elevations, sections, and details, which you will review. You will identify how to create a materials list and prepare estimates for construction projects. Finally, you will review how to use architectural and engineering scales to precisely craft drawings and take measurements.

Learning Objectives: In this module, students will:

- Explain the purpose and components of contract documents and specifications.
- Read, interpret, and apply plans, elevations, sections and details.
- Explain the relationships of the elements of contract documents.
- Create lists of materials and prepare estimates.
- Use architectural and engineering scales.

| Module 2. Drafting and Federal Codes

Computer-Aided Design or Drafting (CAD) and Building Information Modeling (BIM) are used widely in design and building. They utilize technology to increase the speed and precision in design and construction. Technology like CAD and BIM is also making the communication among project team members easier. For instance, architects and other designers can more easily and effectively communicate their vision to builders. Details like building materials and assemblies can be modeled in 3D to clearly demonstrate the relationships among various components in a building project. The integration of technology into design and construction has limitless potential, as you will discover.

Learning Objectives: In this module, students will:

- Compare various computer-aided drafting (CAD) and building information modeling (BIM) products and how they can be used by designers and construction project managers. (Optional)
- Compare and analyze traditional drafting with computer-aided drafting (CAD) and building information modeling (BIM) to learn how technology has altered opportunities for innovative responses and results.
- Investigate the use of technology and other resources to inspire design decisions.
- Identify and locate local, state and federal codes, regulations and standards.
- Identify local, state and federal regulatory agencies.

Module 3. Project Costs and Scheduling Part I

In this module, you'll focus on various site-related topics. Zoning requirements pertain to the types of property that can be located in specific areas. Zoning also determines specific guidelines for the property. For instance, zoning requirements define how many parking spaces a business must have based on its size and location. You will learn about property lines and how to find them as well as how property setbacks work to keep people safe. You will investigate elevations - how to measure them and how to alter the elevation of a job site to increase or decrease the elevation. Finally, we'll discuss the critical value of keeping job sites safe through organization and cleaning.

Learning Objectives: In this module, students will:

- Understand zoning requirements.
- Understand property lines and building setbacks.
- Determine elevations.
- Understand the need to add, remove or relocate fill to proper compaction.
- Lay out and mark building location and elevation.
- Clean and maintain the site.

| Module 4. Project Costs and Scheduling Part II

When a construction project is in the initial stages, estimates and calculations must be as accurate as possible so that a timeline and budget can be established. Essentially, every task of the project needs to be broken out and a cost and time estimate or calculation should be provided for each part. First, you must calculate material quantities and cost that will be needed for the project. Next, you have to figure out how many labor hours it will take to complete the project. Labor hours refers to employee working hours. Both materials and labor have specific considerations. Scheduling activities also happens during the planning stages of a project. This takes a thorough understanding of how each task of the project works. For instance, you can't schedule the installation of electrical work until the framing is done. Finally, you will learn about the allocation of project funds when working within a budget.

Learning Objectives: In this module, students will:

- Calculate material quantities and purchase cost (including sales tax).
- Calculate labor costs including work hours, duration and cost of workers.
- Explain and compute federal, state and local taxes.
- Schedule various construction activities.

| Module 5. The Built Environment Part I

The built environment refers to the physical, human-made parts of the world where people live and work. But, according to the CDC, the built environment does more than just provide physical space. It can also things like physical activity and health. For instance, if someone lives in a neighborhood or town with no sidewalks (or no access to them), it can lead to a sedentary lifestyle. It's essential to recognize the ways in which the built environment affects things around it like people, nature, transportation, safety, health, and communication. You will explore the built environment in this and the next module.

Learning Objectives: In this module, students will:

- Research the development of construction technology, its impact on the built environment, and the impact of growth on the construction industry.
- Describe and give examples of the influences and benefits of the construction industry on health and safety, communication, transportation, and the economy.
- Examine and compare the relationship between the built environment and the natural environment.
- Compare architectural designs and/or models to understand how technical and utilitarian components impact aesthetic qualities.

| Module 6. The Built Environment Part II

This module will continue to emphasize the built environment. You will identify architectural styles and how they have changed over time and how they have been adapted to different environments and conditions. Major architects and their influence on design will be highlighted. You will also discover significant works of architecture and engineering. This will help you better understand the evolution of design and building and where it is headed. Architects, engineers, buildings, and other structures have influenced the way that we think about design today. They have carved out the path for how buildings are constructed.

Learning Objectives: In this module, students will:

- Analyze changes in architectural styles and construction practices over time relative to various environments.
- Describe the significance of major architects, engineers or inventors to understand their historical influences.
- Research innovative historical architectural and/or engineering works and examine the significance of their legacy for the future.
- Identify transitions in design media, technique, and focus to explain how technology has changed design throughout history.

| Module 7. Sustainability Issues

Building sustainably has been a major trend in the construction industry for the past couple of decades. It is a trend that will almost certainly continue due to a lack of resources and raw materials. The industry has acknowledged that its environmental impact is significant and is making strides to shift the techniques, materials, and practices to not only slow or stop the impact, but, in some cases, to reverse it. Reestablishing ecosystems and contributing to biodiversity are ways in which some of the environmental damage can be repaired. You will investigate construction's impact on the natural environment throughout a building's life-cycle, explore sustainable alternatives to conventional construction methods, and identify the practices that can lead to real change in halting and reversing the adverse impacts that construction has had on the natural environment.

Learning Objectives: In this module, students will:

- Describe the impact of the construction industry on the natural environment.
- Describe the life cycle phases of a building and its impacts on the environment throughout the life of the building.
- Recommend sustainable alternatives to conventional construction practices.
- Identify specific practices that can lessen adverse impacts on the environment.
- Understand holistic green construction.

| Module 8. Construction Projects

In this module, students will manipulate materials, techniques, and processes through practice and perseverance using malleable and/ or rigid materials to create a 3-dimensional representational or abstract model. They will use divergent thinking, abstract reasoning, and various processes to demonstrate imaginative or innovative solutions for a project as well as develop competence and dexterity through practice in the use of processes, tools and techniques. Students will solve design and construction problems, through convergent and divergent thinking, to gain new perspectives as well as apply critical-thinking and problem solving skills used in design to develop solutions for real-life issues. They will work in a project team to show creative cohesiveness, team building, respectful compromise, and time-management skills.

Learning Objectives: In this module, students will:

- Manipulate materials, techniques, and processes through practice and perseverance using malleable and/ or rigid materials to create a 3-dimensional representational or abstract model.
- Use divergent thinking, abstract reasoning, and various processes to demonstrate imaginative or innovative solutions for a project.
- Develop competence and dexterity through practice in the use of processes, tools and techniques.
- Solve design and construction problems, through convergent and divergent thinking, to gain new perspectives.
- Apply critical-thinking and problem solving skills used in design to develop solutions for real-life issues.
- Use critical thinking skills for various contexts to develop, refine, and reflect on a design theme.
- Use and maintain tools and equipment to facilitate design and construction process.
- Work in a project team to show creative cohesiveness, team building, respectful compromise, and time-management skills.