

Building Construction II

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| Curriculum/Content Area: Applied Technology & Engineering (ATE) | Course Length: 1 Term |
| Course Title: Building Construction II | Date last reviewed: October 21, 2015 |
| Prerequisites: Building Construction I | Board approval date: November 17, 2015 |

Course description and purpose:

This advanced construction course will allow students interested in a possible career in the building trades to further their knowledge and skills. Advanced building materials, components, methods, and sequences used in residential and commercial construction are explored.

Students will build upon the skills learned in Building Construction One and related trades along with an overview of extensive career opportunities available. This course will delve deeper into the mechanicals and finishing required in home construction. including practical experience with the systems involved in residential construction including carpentry, electrical, plumbing and HVAC. Emphasis is placed on safety and the proper use of both hand and power tools. Often, students may work on actual building projects both in the school and community.

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| <p>Enduring Understandings (EUs):</p> <ol style="list-style-type: none">1. Quality workmanship and systematic problem solving are essential components of technology.2. The study of construction technology includes fundamental components that have evolved over time.3. Sketches, drawings, and images are used to record and convey specific types of information depending upon the audience and the purpose of the communication.4. Structures are designed to provide solutions to a human need.5. The process of turning raw materials into a finished product has value in society.6. Architects and trades people create structures to meet code, safety specifications, and budget constraints.7. Residential structures are created with a series of interdependent systems including masonry, framing, electrical, plumbing and HVAC.8. Commercial and residential structures | <p>Essential Questions (EQs):</p> <ol style="list-style-type: none">1. What is the the impact of new technologies, both in materials, tools and processes on the construction industry?2. When solving a problem, how can one be reasonably sure that the BEST solution possible has been created?3. In what ways can technical drawings help or hinder the communication of problem solution in a global community?4. How do architects, engineers and trades people use applied mathematics and scientific principles to create solutions to structural design challenges?5. How can math concepts and skills be applied to solve construction problems?6. How is a highly skilled workforce integral in the creation of a quality structure?7. Why is adherence to standard building codes essential for the safety of a |
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| <p>must adhere to a separate set of code and building rules.</p> | <p>dwelling's occupants?</p> <p>8. How is the safe and knowledgeable use of hand and power tools in the construction industry vital to success?</p> <p>9. What are the postsecondary and apprenticeship program opportunities available in the construction industry?</p> |
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Assessment Evidence

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| <p>Performance assessment: Project based assessments will be used in all units to assess student mastery. In addition other performance assessments will include portfolios, performance tests and journals.</p> | <p>Other assessments may include:</p> <ul style="list-style-type: none"> ● oral presentations ● journals ● self & peer assessment tools ● (rubric/checklists rating scales) ● demonstrations ● paper-and-pencil tests ● laboratory reports |
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| <p>UNITS</p> |
| <ul style="list-style-type: none"> A. Safety and Measurement B. Residential and Commercial Construction Process C. Building Systems, Technologies and Materials D. Masonry E. Framing and Finish Carpentry F. Electrical G. Plumbing H. Mechanicals |

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| <p>Unit #1: Safety and Measurement</p> |
| <p>Major Topics:</p> <ul style="list-style-type: none"> 1. Tool Safety <ul style="list-style-type: none"> a. Hand Tools b. Power Tools 2. Site Safety <ul style="list-style-type: none"> a. OSHA 3. Blueprint Reading and Plan Interpretation 4. Building Code |
| <p>Standards:</p> |

Wisconsin Technology and Engineering Standards

ACAC1.f: Demonstrate the value and necessity of practicing occupational safety in the construction industry facility and job site.

AC1.f.2.e: Recognize that all work environments are places where accidents and injuries can occur.

AC1.f.4.m: Recognize the potential accidents and injuries that may occur in a given work environment.

AC1.f.6.h: Demonstrate the safety procedures and practices in various work environment settings pertaining to residential and commercial construction.

AC1.f.6.h: Demonstrate the safety procedures and practices in various work environment settings pertaining to residential and commercial construction.

AC1.b: Apply measurement systems in the planning and layout process used in the residential construction industry.

AC1.b.1.e: Recognize and identify the rooms in a home.

AC1.b.2.e: Identify and count the parts of simple structures

AC1.b.3.e: Demonstrate scale and proportion

AC1.b.4.e: Demonstrate use of the Standard Measuring System to the 1/4" and the Metric Measuring System to centimeters.

AC1.b.5.e: Add, subtract, multiply and divide in the Standard Measuring System to the 1/4" and the Metric Measuring System to centimeters.

AC1.b.7.m: Calculate the required materials for simple structures.

AC1.b.8.m: Demonstrate basic dimensioning skills including the use of: dimension, extension, center and leader lines.

AC1.b.9.m: Demonstrate use of the Standard Measuring System to the 1/16" and the Metric Measuring System to millimeters.

AC1.b.10.m: Add, subtract, multiply and divide in the Standard Measuring System to the 1/16" and the Metric Measuring System to millimeters.

AC1.b.11.h: Identify design solutions for residential construction problems.

AC1.b.12.h: Calculate required materials for residential construction applications.

AC1.b.13.h: Convert scaled blueprint drawing measurements to full dimensions for a given construction project.

AC1.b.14.h: Apply conventional construction measurement processes accurately (i.e., geometric and trigonometric functions).

AC1.b.15.h: Use conventional construction formulas to determine production requirements.

AC1.e: Demonstrate project management procedures and processes as they occur in a construction project.

AC1.e.1.e: Recognize simple drawings as representations of structures.

AC1.e.2.e: Recognize that many events occur to construct any project.

AC1.e.3.e: Recognize that building codes ensure that structures are safe.

AC1.e.5.e: Explain the importance of communication.

AC1.e.6.m: Recognize construction blueprints and specifications.

AC1.e.7.m: Demonstrate proficiency in preparing an estimate from simple drawings and specifications.

AC1.e.8.m: Explain the events that occur to construct any project.

AC1.e.9.m: Explain how building codes vary based on geological, environmental and political influences.

AC1.e.11.m: Explain the importance of positive and constructive communication skills.

AC1.e.12.h: Interpret and use residential construction blueprints and specifications.

AC1.e.13.h: Estimate materials from blueprints and specifications.

AC1.e.14.h: Explain the sequencing of events for specific construction projects.

AC1.g.4.e: List the many different professions required to complete a construction project.

AC1.d: Demonstrate the safe and appropriate use of portable power tools that are common to the residential construction industry and are appropriate to the individual student's level.

AC1.d.1.e: Discuss that all tools must be properly cared for.

AC1.d.2.m: Demonstrate the safe and proper use of power tools.

AC1.d.3.m: Demonstrate the safe and proper use of pneumatic tools.

AC1.d.4.m: Demonstrate proficiency in the proper care of all tools used in a class or lab.

AC1.d.5.h: Demonstrate the use of portable power tools, such as circular saws, table saws, saber saws, drills, planers and sanders, safely and properly.

AC1.d.6.h: Demonstrate the use of portable pneumatic tools, such as rough framing nail guns, interior finishing and brad nail guns, hammers, impact wrenches, drills and compressors, safely and appropriately.

AC1.d.7.h: Maintain and care for portable power tools and portable pneumatic tools.

AC1.f: Demonstrate the value and necessity of practicing occupational safety in the construction industry facility and job site.

AC1.f.1.e: Discuss how electricity is useful but dangerous.

AC1.f.2.e: Recognize that all work environments are places where accidents and injuries can occur.

AC1.f.3.m: Explain electrical safety standards and proper wiring methods.

AC1.f.4.m: Recognize the potential accidents and injuries that may occur in a given work environment.

AC1.f.5.h: Demonstrate the safe use of electrical connection methods and electrical wiring procedures.

AC1.f.6.h: Demonstrate the safety procedures and practices in various work environment settings pertaining to residential and commercial construction.

CCSS

CCSS.ELA-Literacy.SL.9-10.1

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-Literacy.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

Learning Targets:

I can:

- Work safely in a construction site/environment.
- Apply the tools and technologies necessary to safely build/construct a product.
- Estimate materials required for a job from blueprints and schedules.
- Explain how building codes provide for safe structures.
- Interpret a blueprint.
- Measure accurately while creating a construction project.

Unit #2: Building Systems, Structures and Technologies

Major Topics:

1. Construction applications
2. Building materials
3. Structure Designs
4. Materials and subsystems
5. System interdependencies
6. Careers

Standards:

Wisconsin Technology and Engineering Standards

- AC1.g.4.e: List the many different professions required to complete a construction project.
- AC1.g.2.e: Describe simple processes and materials that are used to construct a structure.
- AC1: Students will be able to select and use architecture and construction technologies.
- AC1.a: Analyze construction requirements, materials, structures, techniques and maintenance.
- AC1.a.1.e: Recognize that people live, work and go to school in buildings, which are of different types: houses, apartments, office buildings and schools.
- AC1.a.2.e: Identify types of temporary and permanent structures.
- AC1.a.3.e: Describe how structures need to be maintained.
- AC1.a.4.e: Identify multiple systems that are used in buildings.
- AC1.a.5.m: Select designs for structures based on factors such as building codes and requirements, style, convenience, cost, climate, culture and function.
- AC1.a.6.m: Explain the function of foundations and why structures rest on a foundation.
- AC1.a.7.m: Discuss how modern communities are usually planned according to guidelines.
- AC1.a.8.m: Identify a variety of materials and subsystems that buildings generally contain.

AC1.a.9.h: Assess how infrastructure is the underlying base or basic framework of a system.

AC1.a.10.h: Analyze how structures are constructed using a variety of processes and procedures.

AC1.a.11.h: The design of structures includes a number of requirements.

AC1.a.13.h: Explain how structures can include prefabricated materials.

AC1.g.6.m: Identify the common processes and materials used to construct a structure.

AC1.g.7.m: Describe the importance of placing and engineering the structure.

AC1.g.8.m: Recognize that many phases are required to complete a construction project. construction.

BB1.f.1.e: Identify and correlate human made structures that are inspired by structures that occur in nature.

BB1.f.2.e: Recognize that materials have properties that inspire their use in structures (e.g. wood, plastic, aluminum, brick, concrete, cast iron, steel).

BB1.f.3.m: Identify and describe basic types of structures (i.e., mass, bearing wall, framed) as they relate to their function.

BB1.f.4.m: Use scientific inquiry to test, collect data and make conclusions about the performance of different materials and their application in the making of structures (i.e., tensile, compression, sheer testing).

BB1.f.5.h: Calculate and define the different loads acting on structures (i.e., static, dynamic, stress, strain, compression, tension).

BB1.f.6.h: Justify the application of structural materials and their trade-offs in the design of structures based on design requirements through optimization (i.e., engineering design process).

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CCSS.ELA-Literacy.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

Learning Targets:

I can...

- identify and relate to multiple careers in the construction industry
- identify and describe the basic systems required to construct a residential home
- create a chart distinguishing between the basic building types
- apply the various materials required to construct a basic wall section

Unit #3: Masonry

Major Topics:

1. Materials and methods
2. Footings
3. Foundations
4. Brick and Block
5. Flat Work
6. Careers

Standards:

Wisconsin Technology and Engineering Standards

AC1.g.10.h: Demonstrate proficiency in the practical application of the processes and materials (e.g., structural, electrical, mechanical, finish) appropriate to architectural design and construction.

AC1.g.1.e: Discuss how structures are based on drawings and completed according to schedules and timelines.

AC1.g.2.e: Describe simple processes and materials that are used to construct a structure.

AC1.g.3.e: Identify that many factors can affect the location and type of structure.

AC1.g.4.e: List the many different professions required to complete a construction project.

AC1.g.5.m: Create a drawing and completion schedule for a simple project.

AC1.g.6.m: Identify the common processes and materials used to construct a structure.

AC1.g.7.m: Describe the importance of placing and engineering the structure.

AC1.g.8.m: Recognize that many phases are required to complete a construction project.

AC1.g.9.h: Develop building plans and schedules by using processes common to residential and commercial construction.

AC1.g.10.h: Demonstrate proficiency in the practical application of the processes and materials (e.g., structural, electrical, mechanical, finish) appropriate to architectural design and construction.

AC1.g.11.h: Prepare the site layout utilizing common surveying equipment and/or create a site plan.

AC1.g.12.h: Analyze the phases of residential and commercial construction.

AC1.e.15.h: Solve common residential construction problems such as framing, plumbing and electrical, by using the official codes adopted by the state and local building standards commission.

AC1.g: Demonstrate the variety of building phases, systems and techniques used in architecture and construction.

AC1.g.4.e: List the many different professions required to complete a construction project.

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Learning Targets:

I can...

- measure linear distances with accuracy using a scale, ruler or tape and report the measurement using an appropriate level of precision.
- layout, frame and construct a masonry footing
- correctly identify the necessary components of a masonry footing and foundation system
- lay multiple courses of concrete block to construct a house foundation
- calculate, layout, frame and pour flat concrete work typical of a floor, patio, etc.

Unit # 4: Framing and Finish Carpentry

Major Topics:

1. History
2. Floor Systems
3. Wall Systems
4. Roof Systems
 - a. Traditional
 - b. Trussed
 - c. Roof types: shingle, metal, wood, etc
5. Finish Carpentry
6. Millwork
7. Careers

Standards:

Wisconsin Technology and Engineering Standards

AC1.g.10.h: Demonstrate proficiency in the practical application of the processes and materials (e.g., structural, electrical, mechanical, finish) appropriate to architectural design and construction.

AC1.e.15.h: Solve common residential construction problems such as framing, plumbing and electrical, by using the official codes adopted by the state and local building standards commission sales.

AC1.g: Demonstrate the variety of building phases, systems and techniques used in architecture and construction.

AC1.g.12.h: Analyze the phases of residential and commercial construction.

AC1.h: Demonstrate the impact of financial, technical, environmental, political, societal and

labor trends on the past and future of the construction industry.

AC1.h.1.e: Recognize that all structures are constructed to meet the needs and wants of society.

AC1.h.2.e: Recognize that structures can only be constructed with available resources.

AC1.h.10.h: Develop financial plans for construction projects.

AC1.c: Demonstrate the safe and appropriate use of hand tools common to the residential and commercial construction industry.

AC1.c.1.e: Identify and explain the use of simple hand tools such as hammers, screwdrivers, hand saws, etc.

AC1.c.:2.e: Identify where to obtain and store simple hand tools.

AC1.c.3.m: Demonstrate proficiency in the use of simple hand tools such as hammers, screwdrivers, hand saws, planes, sandpaper, nail sets, tin shears, framing squares, utility knives, chalk lines, etc.

AC1.c.4.m: Demonstrate proficiency in obtaining and storing simple hand tools.

AC1.c.5.h: Demonstrate and use the common hand tools of the trade safely and properly.

AC1.c.6.h: Maintain and care for hand tools used in residential and commercial construction.

AC1.d: Demonstrate the safe and appropriate use of portable power tools that are common to the residential construction industry and are appropriate to the individual student's level.

AC1.d.1.e: Discuss that all tools must be properly cared for.

AC1.d.2.m: Demonstrate the safe and proper use of power tools.

AC1.d.3.m: Demonstrate the safe and proper use of pneumatic tools.

AC1.d.4.m: Demonstrate proficiency in the proper care of all tools used in a class or lab.

AC1.d.5.h: Demonstrate the use of portable power tools, such as circular saws, table saws, saber saws, drills, planers and sanders, safely and properly.

AC1.d.6.h: Demonstrate the use of portable pneumatic tools, such as rough framing nail guns, interior finishing and brad nail guns, hammers, impact wrenches, drills and compressors, safely and appropriately.

AC1.d.7.h: Maintain and care for portable power tools and portable pneumatic tools.

AC1.e.15.h: Solve common residential construction problems such as framing, plumbing and electrical, by using the official codes adopted by the state and local building standards commission.

AC1.g: Demonstrate the variety of building phases, systems and techniques used in architecture and construction.

AC1.g.10.h: Demonstrate proficiency in the practical application of the processes and materials (e.g., structural, electrical, mechanical, finish) appropriate to architectural design and construction.

AC1.g.4.e: List the many different professions required to complete a construction project.

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Learning Targets:

I can:

- measure linear distances with accuracy using a scale, ruler or tape and report the measurement using an appropriate level of precision.
- construct a typical floor system from a plan/blueprint consisting of joists and decking materials to code.
- construct a typical wall system including proper stud type and location, window/door openings and top and bottom plates from a blueprint to standard building code with wood or steel.
- contrast a traditional wood framed structure with steel or masonry
- perform finish carpentry techniques using a variety of hand and power tools

Unit # 5: Electrical and Communication Systems

Major Topics:

1. Electrical code and inspection
2. Service panels
3. Roughing a branch circuit
4. Switches, receptacles and specialty
5. Distribution of electrical power

Standards:

Wisconsin Technology and Engineering Standards

AC1.f.5.h: Demonstrate the safe use of electrical connection methods and electrical wiring procedures.

AC1.f.1.e: Discuss how electricity is useful but dangerous.

AC1.f.3.m: Explain electrical safety standards and proper wiring methods.

AC1.f: Demonstrate the value and necessity of practicing occupational safety in the construction industry facility and job site.

AC1.f.1.e: Discuss how electricity is useful but dangerous.

AC1.f.2.e: Recognize that all work environments are places where accidents and injuries can occur.

AC1.f.3.m: Explain electrical safety standards and proper wiring methods.

AC1.f.4.m: Recognize the potential accidents and injuries that may occur in a given work

environment.

AC1.f.5.h: Demonstrate the safe use of electrical connection methods and electrical wiring procedures.

AC1.g.12.h: Analyze the phases of residential and commercial construction.

AC1.h: Demonstrate the impact of financial, technical, environmental, political, societal and labor trends on the past and future of the construction industry.

AC1.h.1.e: Recognize that all structures are constructed to meet the needs and wants of society.

AC1.h.2.e: Recognize that structures can only be constructed with available resources.

AC1.h.10.h: Develop financial plans for construction projects.

AC1.g.4.e: List the many different professions required to complete a construction project.

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Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

Learning Targets:

I can:

- summarize the process for generating and distribution of electrical power
- install various types of cables, boxes, switches, and receptacles
- outline the steps for the installation of power in a residential structure
- rough-in a branch circuit
- explain the operation and installation of a service panel box
- correctly identify electrical wires based on color
- install a basic home automation and communication service

Unit # 6: Plumbing

Major Topics:

1. Water supply piping systems and installation
2. Moving liquids and gasses throughout a plumbing system
3. Drain-waste-vent systems
4. Septic and sewer systems
5. Plumbing code and inspection

Standards:

Wisconsin Technology and Engineering Standards

AC1.g.12.h: Analyze the phases of residential and commercial construction.

AC1.h: Demonstrate the impact of financial, technical, environmental, political, societal and labor trends on the past and future of the construction industry.

AC1.h.1.e: Recognize that all structures are constructed to meet the needs and wants of society.

AC1.h.2.e: Recognize that structures can only be constructed with available resources.

AC1.h.10.h: Develop financial plans for construction projects.

AC1.g.4.e: List the many different professions required to complete a construction project.

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CCSS.ELA-Literacy.SL.9-10.4

Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

Learning Targets:

I can:

- identify and install multiple piping systems that move liquids and gasses
- distinguish between sanitary sewers and storm sewers
- join copper and plastic pipe and fittings
- outfit supply and drain systems
- summarize the plumbing inspection process
- distinguish between sanitary and storm sewers

Unit # 7: Mechanicals

Major Topics:

1. Heating
2. Ventilating
3. Air Conditioning
4. Energy and efficiency considerations

Standards:

Wisconsin Technology and Engineering Standards

AC1.h.12.h: Identify the skills and building techniques that are utilized to construct energy efficient, safe, healthy and comfortable structures
AC1.h.3.e: Recognize that construction impacts the environment.
AC1.h.4.e: Discuss the importance of energy efficiency.
AC1.h.5.m: Describe historically that construction began to meet the basic need of shelter.
AC1.h.6.m: Identify that structures are planned and constructed based on financial constraints.
AC1.h.7.m: Distinguish how construction can impact the environment both positively and negatively.
AC1.h.8.m: Identify the importance of energy efficient, safe, comfortable and healthy structures.
AC1.h.9.h: Explain significant historical trends in the construction industry.
AC1.g.12.h: Analyze the phases of residential and commercial construction.
AC1.h: Demonstrate the impact of financial, technical, environmental, political, societal and labor trends on the past and future of the construction industry.
AC1.h.1.e: Recognize that all structures are constructed to meet the needs and wants of society.
AC1.h.2.e: Recognize that structures can only be constructed with available resources.
AC1.h.10.h: Develop financial plans for construction projects.
AC1.g.4.e: List the many different professions required to complete a construction project.

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Learning Targets:

I can:

- identify and diagnose the function of the major components of an HVAC system
- discuss and analyze at least five energy sources
- describe three types of heating units
- identify basic components of duct systems and how they are installed
- explain the operation of thermostats and zone controls
- analyze a structure for proper insulation and energy efficiency