

Curriculum Map: Introduction to Building Construction 2022/23

Course: BLDG CONST Sub-topic: Uncategorized

Grade(s): 9 to 12

Course Description: A building construction course designed as a hands-on experience in carpentry and building techniques. The areas covered include; theory, safety, uses of hand and power tools, layout and measurement tools and construction methods.

Unit: 1. Intro to Building Construction

Timeline: Week 1 to 3

Unit Description: This unit is designed to teach students all about the tools and machinery that exists in the classroom. A special emphasis is place on safety both in the classroom as well as in the workplace. Students will learn about fire safety, machine safety, and safe working habits. Students will also learn how to use all of the machinery pertaining to the course in a safe and productive manner. In addition, measurement for construction (using a standard ruler) will also be introduced.

Unit Essential Questions:

1. How do various areas of technology influence the economy, the environment, and society?
2. What knowledge and skills are essential for humans to make sound decisions about creating, using, and modifying technologies?

Unit Big Ideas:

1. Each area of technology has a set of characteristics that separates it from others: however, many areas overlap in order to meet human needs and wants.
2. Technology is created, used and modified by humans.

Unit Materials: Class Rules Doc.

General Safety Quiz.

Parent/Student Safety Form.

Safety Quizzes for all power tools.

Shop map/diagram (locate fire extinguishers, fire exits, and first aid)

Blank Ruler Doc.

Various measurement quizzes.

Unit Assignments:

1. Sign and submit parent/student safety form.
2. General safety quiz.
3. Safety quizzes for all power tools.
4. Blank ruler quiz.

Unit Key Terminology & Definitions : **Technology:** the application of scientific knowledge for practical purposes, especially in industry

System: a set of principles or procedures according to which something is done; an organized scheme or method.

Manufacturing: the making of articles on a large scale using machinery; industrial production.

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

[3.4.10.A2 \(Advanced\)](#) Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

[3.4.10.B1 \(Advanced\)](#) Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.

[3.4.10.B4 \(Advanced\)](#) Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.

[3.4.10.C1 \(Advanced\)](#) Apply the components of the technological design process.

[3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.

[3.4.10.D1 \(Advanced\)](#) Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.

[3.4.10.D2 \(Advanced\)](#) Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

(* standards consolidated from Topic level)

Topic: 1.1 Shop and Workplace Safety

Minutes for Topic: 88

Core Lesson Description: Students will be able to describe and demonstrate safe practices related to working in a shop environment.

Core Lesson Student Learning Objectives:

1. Students will be able to identify all fire escape routes.
2. Students will be able to locate all fire extinguishers.
3. Students will be able to describe general safe shop practices and behaviors.

Core Lesson Essential Questions:

1. How and where will we exit the shop in the event of an emergency evacuation?
2. How does the behavior of one individual affect the overall safety of the classroom?

Core Lesson Big Ideas:

1. Safety is the most important thing in a shop or workplace setting.
2. Most accidents are caused by complacency.
3. Individual attitudes and behaviors affect the overall safety of all people in the room.

Core Lesson Materials:

1. Shop area map and general safety handout/quiz.

Core Lesson Key Terminology & Definitions: Complacency: When a person becomes comfortable to the point that they are unaware of certain dangers.

Core Lesson Notes:

1. Hand out the general safety map and quiz.
2. As a class, mark the location of every fire exit and fire extinguisher.
3. As a class, read and answer all of the general safety questions.

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.A2 \(Advanced\)](#) Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
- [3.4.10.D2 \(Advanced\)](#) Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Topic: 1.2 Power Tool Operation and Safety

Minutes for Topic: 440

Core Lesson Description: Students will learn how to safely operate all stationary and portable power tools that will be used throughout the duration of the course.

Core Lesson Student Learning Objectives: 1. Students will describe and demonstrate the safe operation of all power tools.

Core Lesson Essential Questions: 1. Why is the proper operation of power tools so important?
2. What are the general rules of safety for operating any power tool?

Core Lesson Big Ideas: 1. The proper operation of any power tool is important to the overall safety of the entire classroom.
2. The proper operation of any power tool is important to maintain a high quality of craftsmanship.

Core Lesson Materials: 1. Individual power tool safety quizzes.

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.B1 \(Advanced\)](#) Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
- [3.4.10.B4 \(Advanced\)](#) Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.
- [3.4.10.D2 \(Advanced\)](#) Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

Topic:

Topic: 1.3 Measurement for Building Construction

Minutes for Topic: 132

Core Lesson Description: Students will review the skill of reading a standard ruler. Students will then be introduced to specific building construction measuring techniques such as marking lines on incremental centers and measuring slopes using a carpenter's square.

Core Lesson Student Learning Objectives: 1. Students will correctly label a blank ruler in 1/16" increments.
2. Students will lay out a wall plate on 16" and/or 24" centers.
3. Students will lay out a stair tread given a rise, run, and overall height.

Core Lesson Essential Questions: 1. How do accurate measurements save time and money?
2. How can you measure angles with a square?

Core Lesson Big Ideas: The ability to use accurate measuring techniques is vital to one's success in the Building Construction field.

Core Lesson Materials: 1. Blank ruler quiz.
2. Tape measures.

3. Carpenter's squares.
4. Enough scrap lumber to work with.

- Core Lesson Key Terminology & Definitions:**
1. Measurements on Center: In a conventional stick frame building most things (walls, joists, rafters, etc.) are laid out on centers. A wall with 16" centers means that the studs measure 16" from center to center.
 2. Carpenter square or Framing square: A type of square used by carpenters that has many uses including laying out materials with angles like stairs and rafters.

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.C1 \(Advanced\)](#) Apply the components of the technological design process.
- [3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.
- [3.4.10.D1 \(Advanced\)](#) Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.

Unit: 2. Basic Construction Techniques

Timeline: Week 3 to 5

Unit Description: Students will learn basic skills and techniques used in building construction. The unit begins with basic layout and then moves to more advanced layout of rafters and stairs. Various methods of framing (timber frame, stick frame, etc.) are discussed as well as various methods of finishing both exterior and interior (roofing, siding, wall covering, trim, flooring, etc.)

Unit Essential Questions: How have technological developments impacted devices, processes, and systems for the way we live?

Unit Big Ideas: A technological world requires that humans develop capabilities to solve technological challenges and improve products for the way we live.

Unit Materials: Tape Measures, Framing Squares, Pencils, 2x4s, Various pictures or presentations of types of framing and finishing.

- Unit Assignments:**
1. Layout a stud wall with window openings and headers.
 2. Layout and cut a rafter.
 3. Layout and cut a stair tread.
 4. Describe various types of framing.
 5. Describe various type of exterior and interior finishes.

Unit Key Terminology & Definitions :

Invention: The act of creating something. Typically a process or device.

Innovation: A new method, product, idea, etc.

Diagnose: To figure out what is wrong by examination of symptoms.

Troubleshoot: To trace and correct faults in a system.

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.A1 \(Advanced\)](#) Illustrate how the development of technologies is often driven by profit and an economic market.
- [3.4.10.A2 \(Advanced\)](#) Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
- [3.4.10.A3 \(Advanced\)](#) Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
- [3.4.10.B1 \(Advanced\)](#) Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
- [3.4.10.B2 \(Advanced\)](#) Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.
- [3.4.10.B3 \(Advanced\)](#) Compare and contrast how a number of different factors, such as advertising, the strength of the economy, the goals of a company and the latest fads, contribute to shaping the design of and demand for various technologies.
- [3.4.10.B4 \(Advanced\)](#) Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.
- [3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.
- [3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

(* standards consolidated from Topic level)

Topic: 2.1 Layout on Centers

Minutes for Topic: 88

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.A2 \(Advanced\)](#) Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
- [3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.
- [3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

Topic: 2.2 Rafter and Stair Layout

Minutes for Topic: 132

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.A2 \(Advanced\)](#) Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
- [3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.
- [3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

Topic: 2.3 Framing Methods

Minutes for Topic: 220

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.A1 \(Advanced\)](#) Illustrate how the development of technologies is often driven by profit and an economic market.
- [3.4.10.A3 \(Advanced\)](#) Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
- [3.4.10.B1 \(Advanced\)](#) Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.

- [3.4.10.B2 \(Advanced\)](#) Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.
- [3.4.10.B3 \(Advanced\)](#) Compare and contrast how a number of different factors, such as advertising, the strength of the economy, the goals of a company and the latest fads, contribute to shaping the design of and demand for various technologies.
- [3.4.10.B4 \(Advanced\)](#) Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.

Topic: 2.4 Finishing Options

Minutes for Topic: 220

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

- [3.4.10.A1 \(Advanced\)](#) Illustrate how the development of technologies is often driven by profit and an economic market.
- [3.4.10.A2 \(Advanced\)](#) Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
- [3.4.10.A3 \(Advanced\)](#) Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
- [3.4.10.B1 \(Advanced\)](#) Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
- [3.4.10.B2 \(Advanced\)](#) Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.
- [3.4.10.B3 \(Advanced\)](#) Compare and contrast how a number of different factors, such as advertising, the strength of the economy, the goals of a company and the latest fads, contribute to shaping the design of and demand for various technologies.
- [3.4.10.B4 \(Advanced\)](#) Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.

Unit: 3. Planning and Preparation

Timeline: Week 6 to 8

Unit Description: Students learn to put their ideas on paper through the use of two dimensional and three dimensional drawings. Using the mechanical drawings, students will create a project proposal that includes a scope of work and cost estimate based on labor and materials. Students will also learn and practice the main components of project management.

Unit Essential Questions: How would you apply technological design and problem solving methods in the development of inventions and innovations?

Unit Big Ideas: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Unit Materials: 1/4" graph paper, 1/4" isometric paper, project proposal template, cost of materials form, straight edges, pencils, and technical drawing samples.

- Unit Assignments:**
1. Create a two dimensional technical drawing.
 2. Create an isometric technical drawing.
 3. Complete a material list with cost analysis.
 4. Write a project proposal.
 5. Describe the elements of project management.
 6. Write a job description for a project manager.

Unit Key Terminology & Technical Drawings: A precise and detailed drawing of an object, as employed in architecture or engineering.

Definitions :

Isometric Drawings: A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.

Technological Method: 1.) identify a problem, 2.) research the problem, 3.) generate possible solutions, 4.) select the best solution, 5.) create a model, 6.) test the model, 7.) refine and retest the model as needed, and 6.) communicate the final solution.

Project Proposal: A Project Proposal is a written offer from a bidder to the owner, preferably on a prescribed proposal form, to perform the work and to furnish all labor, materials, equipment and/or services for the prices and terms quoted by the bidder.

Scope of Work: (SOW) The area in an agreement where the work to be performed is described.

Project Management: The way in which a person organizes and manages resources that are necessary to complete a project

STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

[3.4.10.C1 \(Advanced\)](#) Apply the components of the technological design process.

[3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.

[3.4.10.C3 \(Advanced\)](#) Illustrate the concept that not all problems are technological and not every problem can be solved using technology.

[3.4.10.D1 \(Advanced\)](#) Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.

[3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

(* standards consolidated from Topic level)

Topic: 3.1 Technical Drawings

Minutes for Topic: 220

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

[3.4.10.C1 \(Advanced\)](#) Apply the components of the technological design process.

[3.4.10.C2 \(Advanced\)](#) Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.

[3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

Topic: 3.2 Material Planning

Minutes for Topic: 88

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

[3.4.10.C1 \(Advanced\)](#) Apply the components of the technological design process.

[3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

Topic: 3.3 Project Proposals

Minutes for Topic: 132

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

[3.4.10.C1 \(Advanced\)](#) Apply the components of the technological design process.

[3.4.10.E7 \(Advanced\)](#) Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

Topic: 3.4 Project Management

Minutes for Topic: 220

STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

3.4.10.C1 (Advanced)	Apply the components of the technological design process.
3.4.10.C3 (Advanced)	Illustrate the concept that not all problems are technological and not every problem can be solved using technology.
3.4.10.D1 (Advanced)	Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.
3.4.10.E7 (Advanced)	Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency.

Unit: 4. Hands on Projects/Experience

Timeline: Week 9 to 17

Unit Description: Unit 4 is the "hands on" part of the course. Once students have demonstrated all of the proficiencies that were presented in the first half of the course they will be given the opportunity to master those skills through the "hands on" experience. We will engage in a variety of small building construction projects (sheds, benches, models, etc.) to reinforce previous learning outcomes.

Unit Essential Questions: What is technological literacy?

Unit Big Ideas: Technological literacy is the ability to use, assess and manage technology around us.

Unit Materials: All drawing/planning materials, all available tools, and material necessary to complete selected projects.

Unit Assignments: Design, Plan, and Construct various projects

Unit Key Terminology & Definitions : **Technological Literacy:** the ability to understand, use, assess, design, and produce technology

21st century skills: Skills, abilities, and learning dispositions that have been identified as being required for success in society and workplaces by educators, business leaders, academics, and governmental agencies.

Topic: 4.1 Project Planning

Topic: 4.2 Project Preparations

Topic: 4.3 Hands on Project Execution