

Warren County High School

Course Syllabus

A. Course – Structural Systems I

B. Department – CTE

C. Course Description Structural Systems I is a course that will introduce students to basic skills and knowledge related to residential and commercial carpentry. Topics covered include wood/metal/concrete building materials, fasteners, hand and power tools, fabrication based upon construction plans, and framing of platform and post-and-beam structures in both wood and metal. This course gives students an introduction to the skill and knowledge base typically required for apprentice carpenters. Membership in Skills/USA is highly recommended.

D. Grade Term - Semester

E. Grading Scale

<u>Range</u>	
90-100	A
80-89	B
70-79	C
60-69	D

F. Term Dates

- 1st 9 Weeks August 6, 2024 – October 4, 2024
- 2nd 9 Weeks October 14, 2024 – December 19, 2024
- 3rd 9 Weeks January 7, 2025 – March 14, 2025
- 4th 9 Weeks March 24, 2025 – May 23, 2025

G. Textbook(s) Carpentry 3rd edition

H. Other Resources

ICEV

I. Major Assignments

Students will participate in a team build of an actual structure. Not limited to storage buildings, tiny houses, or playhouses

- Parent Teacher Conference
 - November 11th 2024 and January 23rd 2025

J. Field Trips

- a. Any schedule fieldtrip will have a definite educational purpose and will reflect careful planning. Signed permission forms will be obtained when an off campus trip is planned.
- b. *Local building materials store/ lumberyard*
- c. *Local truss manufacturing facility*

K. Standards & Objectives

Safety

- I can Identify safety hazards on a jobsite and demonstrate practices for safe working. Accurately read, interpret, and demonstrate adherence to safety rules, including but not limited to rules pertaining to electrical safety, Occupational Safety and Health Administration (OSHA) guidelines, and state and national code requirements.
- I can be able to distinguish between the rules and explain why certain rules apply.
- I can perform a hazard assessment for a given task such as working on a ladder to install roof framing components.
- I can explain the steps necessary to safely perform the task, outlining steps to take in case of an emergency.
- I can maintain safety records and demonstrate adherence to industry-standard practices regarding general machine safety, tool safety, equipment safety, electrical safety, and fire safety to protect all personnel and equipment. Such as hand and power tools, ladders, scaffolding, and lifting equipment.
- I can complete safety test with 100 percent accuracy.
- I can follow procedures to work safely around materials.
- I can adhere to responsibilities for employees in material safety as outlined by the Hazard Communication Standard (HazCom), such as locating and interpreting material safety data sheets (MSDS). Demonstrate safe procedures to move materials by planning the movement, properly lifting, stacking, and storing materials, and selecting proper materials-handling equipment.

Career Exploration

- I can, referencing data from U.S. Department of Labor and other sources, explain an apprenticeship. Write persuasively to describe the benefits of the apprenticeship approach of on-the-job training paired with related training for individuals seeking construction careers. Use a variety of sources to gather data, cite each source, and briefly describe why the chosen source is reliable.
- I can Research apprenticeships and postsecondary institutions (colleges of applied technology, community colleges, and four-year universities) in Tennessee and other states that offer construction-related programs. Write an informative paper or develop an infographic identifying entry requirements for a specific apprenticeship or postsecondary program of study, and the secondary courses that will prepare students to be successful in the program.

Construction Industry Principles.

- I can investigate and report on the process for determining the zoning regulations of a building site. Describe how zone designation and regulations such as setbacks, ground coverage, and maximum height impact the design, placement, and use of a building on a given site, citing findings from the investigation. Read and interpret zoning ordinances and other regulations impacting a given site (city, county, historic district, subdivision regulations, etc.).
- I can explain inspection procedures used to enforce building codes during the construction of a residential or commercial building, outlining the roles and responsibilities of the building inspector and the contractor and the intervals at which inspections are performed.

Types of Structural Systems

- I can compare and contrast types of structural framing systems, including wood light-frame, structural steel, and reinforced concrete, analyzing the factors influencing the selection of a structural system for given building functions. Using textbooks, online resources, or examples in the community, select three buildings with different framing types and explain why each type was used for the building's function.

Materials and Methods of Light-Frame Wood Construction.

- I can distinguish among the basic types of wood framing systems, such as platform frames, balloon frames, and post-and-beam frames. Create a chart to define and compare the pros and cons of each type, citing examples of when each is used.
- I can analyze the characteristics and uses of various types of wood products used in light frame construction. a. Categorize types of wood as hardwood or softwood. b. Identify differences in woods used in interior and exterior applications. c. Identify grades of lumber, common lumber defects, and differences in treated and untreated lumber. d. Explain the difference between actual and nominal lumber sizes. e. Distinguish among the properties and uses of engineered wood products such as plywood, hardboard, particleboard, oriented strand board, mineral fiberboard, glulam lumber, and wood I-beams. Drawing on resources such as textbooks and wood product retailers' catalogs, examine actual wood product samples and create a written description of each, identifying the type and grade of the product, noticing and naming any defects, and explaining common uses of the product.

Tools & Equipment

- I can accurately identify hand and power tools used in carpentry, describing the safe use and maintenance of each. Hand tools include levels, squares, planes, clamps, and hand saws. Power tools include power saws, drill presses, routers, laminate trimmers, portable power planes, power metal shears, and pneumatic and cordless nailers and staplers. For each of Page 4 the systems covered in this course, identify and select the proper tools

and accessories, critique the readiness of the tools, use the tools to accomplish the desired tasks, and then return the tools and accessories to their proper storage.

Construction Drawings & Specifications

- I can inspect and interpret a full set of construction drawings and specifications for a construction project including civil, architectural, structural, mechanical, plumbing, electrical, and fire protection drawings and specifications. Read and interpret different drawing types including plan view drawings, elevation view drawings, section drawings, detail drawings, and schedules. Explain the relationship between different types of drawing and the importance of cross-referencing different types of drawings with one another and cross-referencing drawings with specifications. For example, explain how a floor plan, elevation, and detail drawing may all be used to inform the reader about the layout and material of a given building component, such as a cabinet layout or an exterior wall.

Floor Framing Systems

- I can implement geometric principles to square a building layout. For example, in the process of staking the corners of a building, check the layout for squareness by using the 3-4-5 rule based on right triangles and the Pythagorean Theorem.
- I can identify the components which make up a floor frame, analyzing the purpose of and interrelationships among each component and explaining the sequence in which each is constructed.
- I can read and interpret construction drawings to determine floor system requirements, such as the proper girder and joist size for a given span and floor load, and estimate the amount of material needed to frame a floor assembly.
- I can describe the procedures necessary to fasten sills to the foundation and construct a floor assembly. Apply the appropriate tools, equipment, and procedures to build a floor assembly. Work in teams to install girders, lay out and install floor joists, install bridging and blocking, and apply subflooring.

Wall and Ceiling Framing Systems

- I can explain the procedure to lay out a wood frame wall, defining and describing the components such as plates, studs, partitions, door and window openings, bracing, and other components.
- I can read and interpret drawings to determine wall and ceiling frame requirements for a given residential or commercial structure. For example, calculate the length of a stud and estimate the amount of material needed to frame a wall and ceiling assembly.
- I can work in teams to construct a wall frame and ceiling assembly by implementing required safety techniques, tools, and equipment. Accurately measure and lay out the frame; accurately level and plumb the walls.

Roof Framing Systems

- I can define and describe the framing components of gable and hip roofs such as the ridge board, plates, and types of rafters. Create a graphic illustration showing the roles of each component and how they work together in a roof framing system.
- I can read and interpret drawings to determine roof framing requirements, such as calculating the length of a rafter based on the desired pitch and estimating the materials needed to frame and sheath a roof. For example, use a speed square to lay out a common rafter on a piece of lumber.
- I can work in teams to construct a roof frame assembly by implementing required safety techniques, tools, and equipment to accurately measure, lay out, construct, and sheath a roof frame. For example, frame a gable roof with an opening.
- I can compare and contrast different procedures to frame a roof. For example, describe the benefits of using prefabricated trusses in place of framing with rafters on site. Outline the major similarities and differences in each and write persuasively to describe why using either prefabricated trusses or framing with rafters is more beneficial for a specific project.

Introduction to Building Envelope Systems

- I can analyze the components of a building envelope system, including building wrap, insulation, and various types of windows and exterior doors. Describe how the selection and installation of various components affect the energy efficiency of the building, such as the impact of air sealing on energy efficiency. Identify materials and installation strategies used to minimize or prevent air infiltration. For example, explain how the glass type and the proper installation of a window impact the energy efficiency of the building.
- I can describe the procedures necessary to prepare a rough opening and install windows and doors. Apply the appropriate tools, equipment, and procedures to prepare rough openings for proper window and door installation. Properly install a lockset in an exterior door.

Basic Stair Framing Systems

- I can analyze the components of a stair system. Read and interpret construction drawings to determine stair system requirements such as the total rise, number and size of risers, and number and size of treads. Based on stated requirements, estimate the amount of material needed to frame a stair assembly.
- I can apply the appropriate tools, equipment, and procedures to safely build a small stair unit, demonstrating proper procedures for laying out and cutting stringers, risers, and treads.

Business and Project Management

- I can describe strategies used to promote collaboration, trust, and clear communication among internal and external parties on a job site. Practice effective verbal, nonverbal, written, and electronic communication skills for working with colleagues, employers, clients, and other personnel while demonstrating the ability to: listen attentively, speak

courteously and respectfully, resolve obstacles in construction, and respond to criticism. For example, assume the roles of a construction business owner and a potential client, listen to the needs of a potential client, and respond to the potential client by email; explain the services provided by the company and the next steps needed to begin the project. Other role playing could include a construction business owner and a potential subcontractor.

- I can describe the components and purpose of a basic contract document for a residential project. Recognize the relationship and responsibilities of various parties to a contract. Write a basic contract for a construction job, such as a carpenter's contract to complete a deck addition for a residential client.
- I can interpret construction drawings to determine the correct materials, tools, and equipment needed to complete a construction project. Plan and implement the steps needed to complete the project, adhering to inspection procedures and employing safe practices throughout. Draw from print and electronic examples to create a materials list, cost estimation, construction schedule, and inspection checklist for a project, applying the components of the documents to the given project.
- I can log daily activities completed during a construction project over an extended period of time. Document important facts concisely in a daily report as would a project manager on a jobsite, including daily progress, equipment and materials used, personnel involved, and other work-related activities.

Portfolio

- I can update materials from coursework to add to the portfolio started in Fundamentals of Construction. Continually reflect on coursework experiences and revise and refine the career plan generated in the prior course, using technology where appropriate. Include photographs or illustrations and written descriptions of sequential progress in construction projects.