

INTRODUCTION TO CONSTRUCTION

Introduction to Construction is a course that will offer hands-on activities and real world experiences related to the skills essential in residential, commercial and civil building construction. Students will be introduced to the history and traditions of construction trades. They will also learn and apply knowledge of the care and safe use of hand and power tools as related to each trade. In addition, students are introduced to blueprint reading, applied math, basic tools and equipment usage, and safety. Students will demonstrate building construction techniques, including concrete and masonry, framing, electrical, plumbing, dry walling, HVAC, and painting as developed locally in accordance with available space and technologies. Students learn how architectural ideas are converted into projects and how projects are managed during a construction project in this course. Students study construction technology topics such as preparing a site, doing earthwork, setting footings and foundations, building the superstructure, enclosing the structure, installing systems, finishing the structure, and completing the site. Students also investigate topics related to the purchasing and maintenance of structures, special purpose facilities, green construction and construction careers.

- DOE Code: 4792
- Recommended Grade Level: Grade 9-12
- Recommended Prerequisites: None
- Credits: 1 credit per semester, maximum of 2 credit
- Counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

Content Standards

Domain – Safety and Tool Use

Core Standard 1 Students incorporate construction site and tool safety to maintain a safe worksite.

Standards

- ICON-1.1 Comply with all applicable Occupational Safety and Health Administration (OSHA) rules and regulations
- ICON-1.2 Identify and locate the Material Safety Data Sheets (MSDS) and follow the procedures as necessary
- ICON-1.3 Identify and use safety equipment while in a construction environment
- ICON-1.4 Demonstrate knowledge of rules and regulations regarding the safe use of hand and power tools
- ICON-1.5 Demonstrate knowledge of the care and maintenance of hand and power tools.
- ICON-1.6 Choose the appropriate tool to use in different construction tasks.
- ICON-1.7 Identify and interpret health, safety, and welfare standards as dictated by local, state, or federal agencies, in relation to shop/work site safety

Domain – Careers in Construction

Core Standard 2 Students evaluate the education, training, and certification needed for careers in construction.

Standards

- ICON-2.1 Identify construction trade occupations and the roles and responsibilities of each craft

- ICON-2.2 Identify construction management occupations and the roles and responsibilities of each
- ICON-2.3 Identify design and engineering occupations and the roles and responsibilities of each
- ICON-2.4 Conduct a job search and identify advanced-training opportunities
- ICON-2.5 Demonstrate knowledge of the job opportunities that are available to entry level employees
- ICON-2.6 Demonstrate knowledge of the post-secondary training opportunities that are available
- ICON-2.7 Demonstrate knowledge of the industry licenses and certifications available

Domain – Introduction to Construction

Core Standard 3 – Students appraise the development of different areas construction for background knowledge.

Standards

- ICON-3.1 Identify and describe the different structure types
- ICON -3.2 Explain the history of carpentry, masonry, plumbing, and electrical
- ICON-3.3 Demonstrate an understanding of the relationship between construction and the environment
- ICON-3.4 Describe the development of construction technology, its impact on the built environment and the impact of growth on the construction industry
- ICON-3.5 Describe the benefits of the construction industry on health and safety, communication, transportation, and the economy
- ICON-3.6 Evaluate the importance of community planning
- ICON-3.7 Identify and describe the elements of planning a community and procedures necessary to change/maintain the infrastructure of a community

Domain 4 – Blueprint Reading and Drawing

Core Standard 4 Students interpret and develop working drawings for construction projects.

Standards

- ICON-4.1 Evaluate a structure and determine if it would be considered residential/light, commercial, or Industrial/Civil based on its features
- ICON-4.2 Identify the components of various kinds of structures foundations, Interior walls, Exterior walls, Roofs, Flooring systems
- ICON-4.3 Compare different types of drawings used by architects and engineers in a set of working drawings
- ICON-4.4 Recognize and identify basic blueprint terms, components, and symbols
- ICON-4.5 Interpret and use drawing dimensions
- ICON-4.6 Create a set of basic drawings for a structure

Domain – Math in Construction

Core Standard 5 Students integrate appropriate mathematic skills to solve job-related problems in construction.

Standards

- ICON-5.1 Solve job-related problems by adding, subtracting, multiplying, and dividing numbers, using fractions, decimals, and whole numbers
- ICON-5.2 Demonstrate the ability to estimate materials required for construction project

- ICON-5.3 Solve job-related problems, using handbooks, charts, and tables
- ICON-5.4 Utilize estimation techniques to formulate a bid for a construction job
- ICON-5.5 Solve problems for volume, weight, area, circumference, and perimeter measurements for rectangles, squares, and cylinders
- ICON-5.6 Convert measurements from the English to the metric system and from the metric to the English system
- ICON-5.7 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet, and inches
- ICON-5.8 Determine ratios and proportions
- ICON-5.9 Read a ruler and a tape measure
- ICON-5.10 Change hours and minutes to decimals, fractions, and mixed numbers
- ICON-5.11 Use geometry concepts to calculate truss designs

Domain – Construction Business

Core Standard 6 Students assess management processes to understand construction business and finance for a project.

Standards

- ICON-6.1 Model the organizational chart of a typical construction company
- ICON-6.2 Classify the steps in the bidding process
- ICON-6.3 Examine the finance process for different construction projects
- ICON-6.4 Identify the components of a construction contract
- ICON-6.5 Identify financial responsibilities of a construction company
- ICON-6.6 List and describe the procedures for initiating a building project

Domain – Specifications and Codes

Core Standard 7 Students interpret and apply specification and code information from a variety of architectural and construction working drawings.

Standards

- ICON-7.1 Demonstrate knowledge of reading and interpreting plans, elevations, schedules, sections, and details contained in basic construction drawings as related to site layout, floors and walls
- ICON-7.2 Demonstrate the ability to estimate materials for use in site layout, floors and walls
- ICON-7.3 Describe the process of applying for building permits and variances
- ICON-7.4 Demonstrate an understanding of zoning requirements
- ICON-7.5 Demonstrate appropriate selection, handling, storage, and proper use of construction materials
- ICON-7.6 Evaluate different material types and their applications to choose appropriate materials for the job
- ICON-7.7 Identify and describe specifications in a set of working drawings
- ICON-7.8 Compare zoning and building codes in different parts of the country
- ICON-7.9 Identify the process needed to obtain a building permit
- ICON-7.10 Show the management of a construction project

Domain – The Site

Core Standard 8 Students apply and adapt concepts related to job site preparation and project layout.

Standards

- ICON-8.1 Determine zoning requirements for different projects in different locations
- ICON-8.2 Demonstrate layout procedures of a site as determined by working drawings
- ICON-8.3 Layout and mark building location and elevation using survey equipment
- ICON-8.4 Compare building codes for different sites and for different structures
- ICON-8.5 Outline the excavation of a site
- ICON-8.6 Assess the process of cleaning and maintaining the site
- ICON-8.7 Determine earthwork needed for different construction projects

Domain – Foundations

Core Standard 9 Students apply and adapt foundation building techniques for construction projects.

Standards

- ICON-9.1 Students evaluate quantities and strength of concrete and masonry materials
- ICON-9.2 Determine boundary lines for a project's foundation
- ICON-9.3 Choose the appropriate foundation for the construction project
- ICON-9.4 Select the footings needed for a structure
- ICON-9.5 Critique different methods for building foundations
- ICON-9.6 Demonstrate foundation building techniques

Domain – Floor and Wall Framing

Core Standard 10 Students determine the processes and sequencing to floor and wall framing that meet minimum local, state, or federal industry standards.

Standards

- ICON-10.1 Apply and adapt concept knowledge of building structure, materials, detail structural members, and methods of construction
- ICON-10.2 Choose appropriate floor and wall construction methods for the project
- ICON-10.3 Demonstrate the process of floor framing construction on a foundation
- ICON-10.4 Use the correct types of fastening methods for attaching framing members
- ICON-10.5 Identify and describe the loads on a floor frame
- ICON-10.6 Illustrate the method of applying floor sheathing
- ICON-10.7 Analyze methods for framing walls for different structures in accordance to safety codes
- ICON-10.8 Examine the ability of framing members in a wall to carry loads and transfer to the foundation
- ICON-10.9 Demonstrate the process for layout and assembly of wall framing
- ICON-10.10 Summarize the proper methods to erect and attach walls

Domain – Roof Framing and Finishing

Core Standard 11 Students identify and adapt concepts of roofing layout, slopes, pitches, materials estimation, used in residential home construction.

Standards

- ICON-11.1 Differentiate between roof types based on their aesthetics, use, and framing
- ICON-11.2 Apply and adapt concept procedures for installation of roof sheathing systems

- ICON-11.3 Identify concepts of engineered roofing materials
- ICON-11.4 Implement correct procedures for use of framing square, quick square, and rafter tables
- ICON-11.5 Identify and explain different types of roofing systems and applications
- ICON-11.6 Describe the general process that is used to install roof trusses
- ICON-11.7 Apply and adapt concepts for roof venting, and flashing materials, and installations
- ICON-11.8 Calculate, layout, and build basic roof rafters and trusses to be installed
- ICON-11.9 Identify and describe the parts of a roof system
- ICON-11.10 Describe the balance of forces that a roof truss is engineered to withstand and the precautions that need to be taken to preserve their structural integrity

Domain – Mechanical Systems

Core Standard 12 Students create simple electrical, plumbing, and HVAC system found in standard residential construction

Standards

- ICON-12.1 Describe the three phases of a plumbing project: underground rough-in, above ground rough-in, and finish
- ICON-12.2 Describe the advantages and disadvantages of various pipe materials used in plumbing systems
- ICON-12.3 Demonstrate a basic understanding of plumbing systems in a structure
- ICON-12.4 Identify and describe the electrical systems in a structure
- ICON-12.5 Demonstrate basic electrical rough-in and installation of common outlets, conduit, and boxes in accordance to national and local codes
- ICON-12.5 Identify and explain the characteristics, uses, and installation techniques for brick pavers
- ICON-12.6 Adapt and apply masonry skills related to a construction project
- ICON-12.7 Analyze the observable changes in masonry products due to weather, ratios of materials, and location

Domain – Interior and Exterior Finishes

Core Standard 13 Students apply and adapt finishing techniques for Interior and exterior systems according to codes and specifications.

Standards

- ICON-13.1 Distinguish between common interior wall materials and the finishes applied
- ICON-13.2 Apply and adapt installation procedures and materials for selection of wood and non-wood products
- ICON-13.3 Identify and adapt interior door types and styles, installation procedures, and finish techniques
- ICON -13.4 Identify and apply concepts for the installation of exterior doors, windows, and siding
- ICON -13.5 Identify and adapt concepts and procedures for installing different types of trim used in exterior and interior finish systems

