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 erect0 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