

Construction Technology 1

COURSE OUTLINE

DESCRIPTION:

Construction Technology provides an overview of the construction industry and introduces students to accurate measurements, construction tools, technical drawings and green technology. Emphasis is placed on the safe use of hand and power tools and the proper selection of materials to create a project. It is designed to provide students with technical knowledge and practical experience in the carpentry and building industry. Students will also acquire communication, critical thinking, leadership and professional skills for the workplace. Activities in this course include project-based and work-based learning activities that connect students to industry and the local community. Students must successfully complete Construction Technology 1 and Construction Technology 2 for pathway completion and/or articulation.

INFORMATION:

PRE-REQUISITE: None

LENGTH: One Year

SECTOR: Building & Construction Trades

PATHWAY: Residential and Commercial Construction

ARTICULATED: Yes (after completion of Construction Tech. 2)

UC A-G APPROVAL: Yes: College-Preparatory Elective (G) – Interdisciplinary Requirement

O*NET SOC CODES:

47-2031.01 Construction Carpenter

47-2031.02 Carpenter, Rough

47-3012.00 Carpenter, Helper

49-9071.00 General Maintenance Mechanic

Orientation
<ul style="list-style-type: none"> A. Introduce the course and facilities. B. Discuss the syllabus and major objectives. C. Explain applicable classroom management procedures, and any operational guidelines. D. Review instructor/student expectations. E. Explain attendance requirements and procedures. F. Review grading and student evaluation procedures. G. Discuss the work-based learning aspect of the program, if applicable. H. Discuss the “next steps” related to additional education, training, and employment. I. Review classroom safety, emergency and disaster procedures.
1. Communication Skills
<ul style="list-style-type: none"> A. Demonstrate positive verbal communication skills using appropriate vocabulary, demeanor, and vocal tone in the classroom and/or worksite. B. Read and interpret written information and directions. C. Practice various forms of written communication appropriate to the occupation. D. Practice positive body language skills. E. Practice professional verbal skills for resolving a conflict. F. Demonstrate active listening skills including techniques for checking for understanding, and for obtaining clarification of directions.
2. Interpersonal Skills
<ul style="list-style-type: none"> A. Demonstrate positive teamwork skills by contributing to a group effort. B. Practice the importance of diversity awareness and sensitivity in the workplace. C. Define sexual harassment in the workplace and identify the employee’s role and responsibility. D. Practice participation skills. E. Identify different personality types and demonstrate flexibility and adaptability working with diverse individuals. F. Practice business and social etiquette skills appropriate to the occupation. G. Evaluate and discuss the role of business and personal ethics in decision making based on various job-related scenarios. H. Demonstrate the use of time management skills.
3. Employability Skills
<ul style="list-style-type: none"> A. Demonstrate appropriate attendance and punctuality practices for the classroom (and worksite, if applicable). B. Prepare a resume, cover letter, and job application. C. Demonstrate interviewing techniques in seeking employment, using appropriate tone, body language and professional dress and grooming standards.

<ul style="list-style-type: none"> D. Identify strategies for employment retention. E. Identify and analyze sources of job information, including electronic sources and the impact of social networking on employability. F. Identify the need for continuing education, professional development, and professional growth in chosen field. G. Identify appropriate procedures for leaving a job. H. Review company policies and current trends in employee compatibility screening, drug screening, and background checks.
4. Leadership
<ul style="list-style-type: none"> A. Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders. B. Work with peers to promote divergent and creative perspectives. C. Demonstrate how to organize and structure work, individually and in teams, for effective performance and the attainment of goals. D. Explain multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace. E. Employ ethical behaviors and actions that positively influence others. F. Analyze the short-term and long-term effects a leader's actions and attitudes can have on productivity, morale, and organizational culture.
5. Personal and Occupational Safety
<ul style="list-style-type: none"> A. Demonstrate procedures to be followed in case of emergencies. B. Describe and discuss the procedure for reporting a work-related hazard or injury (worker's comp), including ways to report a potential safety hazard to a supervisor. C. Identify and discuss cyber ethics, cyber safety, and cyber security. D. Apply personal safety practices to and from the job. E. Recognize the effects of substance abuse in the workplace. F. Explain the importance of CAL-OSHA in the industry.
6. Overview of Construction Industry
<ul style="list-style-type: none"> A. Determine labor trends in the past and future of the construction industry. B. Recognize the impact of significant historic financial and economic events on the construction industry. C. Identify technological and environmental trends in this industry. D. Identify pre-construction activities. E. Explain the role of contractors and sub-contractors. F. Discuss the role labor unions play in the construction industry. G. Examine changes in the industry post-COVID.
7. Construction Site Safety
<ul style="list-style-type: none"> A. Describe the importance of safety and safe habits.

- B. Identify basic safety rules of construction jobsite and building.
- C. Maintain a clean and safe work area.
- D. Properly wear Personal Protective Equipment (PPE).
- E. Recognize hazards, accidents and mistakes likely to lead to injuries.
- F. Properly move and position materials.
- G. Discuss the electrical hazards of working with construction equipment.
- H. Demonstrate safe use, care and storage of a variety of construction tools.
- I. Pass a test on tool safety.

8. Hand Tools

- A. Demonstrate the proper and safe use of measuring instruments, including measuring tapes, levels, and squares, and architect's scale.
- B. Correctly identify, safely use and properly care for various hand tools including hammers, pry-bars/CATS paw, saws, clamps, chalk line, plumb bob, screwdrivers, pliers, and drill bits.
- C. Describe how to store and transport hand tools.
- D. Discuss the importance of investing in quality tools (cost vs. quality).

9. Stationary and Portable Power Tools

- A. Differentiate power tools from hand tools.
- B. Describe the special safety precautions necessary for using power tools.
- C. Correctly identify various power tools such as portable power saw, portable electric drill, reciprocating saw, portable power sander, stationary radial arm saw, stationary table saw, stationary drill press, pneumatic nailer, and pneumatic stapler.
- D. Demonstrate proper use, storage and maintenance of power tools and explain the hazards associated with modifications.
- E. Discuss the importance of investing in quality tools (cost vs. quality).

10. Construction Math

- A. Measure accurately using a tape measure and/or a carpenter's rule up to increments of sixteenths.
- B. Use 3-4-5 method to layout interior partitions and to the perimeter of a building slab.
- C. Accurately compute linear, square and board feet.
- D. Practice reading and taking measurements in standard units and decimals.
- E. Add, subtract, multiply, and divide fractions.
- F. Convert between fractions, decimals, and percent.
- G. Accurately use a decimal equivalent table/chart.
- H. Estimate materials and costs needed to complete a specific task.

11. Introduction to Blueprint Drawings

- A. Read and interpret plans and blueprint drawings.
- B. Read and interpret written specifications.
- C. Identify types of lines, symbols and details.
- D. Identify abbreviations used on blueprints.

12. Materials: Nails, Fasteners, Adhesives

- A. Distinguish different types of nails and their uses.
- B. Distinguish different types of screws and their uses.
- C. Identify staples and their uses.
- D. Distinguish types of adhesives and their appropriate and safe use.
- E. Discuss requirements of galvanized fasteners for pressure treated materials.
- F. Explain the effects of moisture to galvanized and pressure treated materials.

13. Wood

- A. Identify engineered wood products and other alternatives and understand their uses.
- B. Distinguish grades of woods.
- C. Correctly read grading stamps on wood.
- D. Discuss the manufacturing and grading of plywood.
- E. Identify soft woods and their characteristics.
- F. Identify hard woods and their characteristics.
- G. Recognize imperfections in wood and describe their effects.
- H. Describe the advantages and disadvantages of treating wood e.g. protection from termites, moisture, and fire.
- I. Describe the causes and effects of shrinkage.
- J. Demonstrate proper care and handling of wood on job sites.
- K. Identify standard inch lumber sizes.
- L. Locate grades of wood identified in the structural requirements of the blueprints.

14. Green Technology

- A. Describe sustainable design principles for green home (including using recycled and sustainable materials, solar, and more).
- B. Demonstrate knowledge of the impact of the California Environmental Quality Act (CEQA) and Environmental Impact Review in construction.
- C. Explain the differences between active and passive systems.
- D. List the advantages and disadvantages of various PV system configurations.
- E. Describe passive solar cooling and ways to incorporate these systems into a residential home.
- F. List the advantages and disadvantages of the various types of solar panels.

15. Portfolio

- A. Create a professional digital portfolio reflecting employability skills in the relevant industry to include an “About Me” page.
- B. Collect original works (in photographs and videos) and documents that demonstrate technical skills and knowledge in the industry.
- C. Demonstrate knowledge of competencies by accompanying each selected document or work with a journal entry or summary.
- D. Write a brief resume and cover letter to be included in a portfolio.
- E. Develop interviewing techniques using portfolio materials.
- F. Display portfolio materials for critique by a professional panel (industry partners and classmates).
- G. Gather feedback and update portfolio.

Key Assignments

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
1. Students will participate in mock interviews that represent current industry practices (e.g., skills demonstrations, resumes, applications, portfolios, personal websites, etc.).	1A-D 2D, F 3A-D, E, H 6A-C 15A-G	1 2 3 4 10 11	2.0 3.0 4.0 10.0		LS 11-12.6 RLST 11-12.2 SLS 11-12.2 WS 11-12.6
2. Discuss historical trends in construction safety practices versus modern day practices. Teams of students will create a presentation (using google slides) of safe work protocols and practices to prevent injury and maintain a clean work area.	1A, B, D 2D 3B, C, D, I 5A-F 7A-I	1 2 4 5 6 8 9 11	2.0 4.0 6.0 7.0 9.0 10.0	A4.0 D1.0 D4.0	LS 11-12.6 SLS 11-12.1 SLS 11-12.1b WS 11-12.6
3. Students will measure and layout in detail, choosing and using tools appropriately, to complete a 2 x 4 project.	1A-F 2D 3A 5A-D 7A-F, H 8A-D	1 2 6	5.0 6.0 9.0 10.0	A4.0 D2.0 D6.0	CC 3 RSIT 11-12.2 RLST 11-12.4 SEP 8
4. Students will complete a dog house by researching and analyzing project information, creating drawings with detailed measurements, determining layout, choosing and using tools appropriately and selecting appropriate fasteners, wood and other materials as needed. Students will call homebuilding stores to price materials and estimate total costs for this project.	1A-F 2D 3A 5A, B, D, E 7A-F, H	1 2 4 5	2.0 4.0 5.0 6.0	A4.0 D1.0 D2.0 D3.0	LS 11-12.6 RSIT 11-12.2 RLST 11-12.4 WS 11-12.6 WS 11-12.7 CC 3, 6

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
	8A-D 9A-E 10A-H 11A-D 12A-F 13A-L	10 11 12	9.0 10.0	D4.0 D6.0 D7.0 D8.0 D9.0	SEP 1, 3, 4, 5, 8
5. In teams, students will calculate their carbon footprint and then determine the footprint of the team. Each team will create a presentation on their carbon footprint and its impact on the environment, how to reduce their footprint and what the consequences of failing to take steps to decrease their footprint.	1A-F 2D 3A, D 5A-E 6A-C 10A-H 11A-D 14A-F	1 2 4 5 7 9 12	2.0 4.0 5.0 6.0 7.0 9.0 10.0	D1.0 D2.0 D3.0 D9.0	LS 11-12.6 RSIT 11-12.2 RLST 11-12.4 SLS 11-12.1 SLS 11-12.1b WS 11-12.6 WS 11-12.7 CC 3, 6 SEP 4, 5, 8

Standards Assessed in this Program

Career Ready Practices

1. Apply appropriate technical skills and academic knowledge.
2. Communicate clearly, effectively, and with reason.
3. Develop an education and career plan aligned to personal goals.
4. Apply technology to enhance productivity.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
6. Practice personal health and understand financial well-being.
7. Act as a responsible citizen in the workplace and the community.
8. Model integrity, ethical leadership, and effective management.
9. Work productively in teams while integrating cultural/global competence.
10. Demonstrate creativity and innovation.
11. Employ valid and reliable research strategies.
12. Understand the environmental, social, and economic impacts of decisions.

Anchor Standards

2.0 Communications

- Acquire and use accurately sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management

- Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology

- Use existing and emerging technology, to investigate, research, and produce products and services, including new information, as required in the sector workplace environment.

5.0 Problem Solving and Critical Thinking

- Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques.

6.0 Health and Safety

- Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the sector workplace environment.

7.0 Responsibility and Flexibility

- Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the sector workplace environment and community settings.

8.0 Ethics and Legal Responsibilities

- Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork

- Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution.

10.0 Technical Knowledge and Skills

- Apply essential technical knowledge and skills common to all pathways in the sector following procedures when carrying out experiments or performing technical tasks.

Pathway Standards

Building and Construction Trades- Cabinetry, Millwork, and Woodworking Pathway

A4.0: Demonstrate proper selection and use of woodworking tools.

A9.0: Understand finishes and when to apply paint, stains, sealers, varnishes, and catalyzed finishes, including water and oil-based finishes.

Building and Construction Trades- Residential and Commercial Construction Pathway

D1.0: Recognize the impact of financial, technical, environmental, and labor trends on the past and future of the construction industry.

D2.0: Apply the appropriate mathematical calculations used in the construction trades.

D3.0: Interpret and apply information from technical drawings, schedules, and specifications used in the construction trades.

D4.0: Demonstrate techniques for proper site preparation.

D5.0: Demonstrate foundation layout techniques to include setting forms, placing reinforcements, and placing concrete according to construction drawings, specifications, and building codes.

D6.0: Demonstrate carpentry techniques for the construction of a single-family residence.

D7.0: Demonstrate proper installation techniques of interior finish materials and protective finishes.

D8.0: Demonstrate the application of exterior finish materials and protective finishes in building construction.

D9.0: Understand, integrate, and employ sustainable construction practices in the building trades.

D10.0: Demonstrate skills necessary to complete a plumbing system in a single-family residence in accordance with accepted industry standards.

D11.0: Demonstrate skills necessary to complete an electrical system in a single-family residence in accordance with accepted industry standards.

Common Core State Standards

ENGLISH LANGUAGE ARTS

Language Standards

LS 11-12.6: Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the (career and college) readiness level, demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Reading Standards for Literacy in Science and Technical Subjects

RLST 11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RLST 11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

RLST 11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

RLST 11-12.9: Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Reading Standards for Information Text

RSIT 11-12.2: Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

Speaking and Listening Standards

SLS 11-12.1: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others ideas and expressing their own clearly and persuasively.

SLS 11-12.1b: Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

SLS 11-12.1d: Respond thoughtfully to diverse perspectives, synthesize comments, claims and evidence made on all sides of an issue, resolve contradictions when possible, and determine what additional information or research is required to deepen the investigation or complete the work.

SLS 11-12.2: Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions, and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

Writing Standards

WS 11-12.6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments and information.

WS 11-12.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

MATHEMATICS

Geometry – Similarity, Right Triangles and Trigonometry

GSRT 8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

SCIENCE

Crosscutting Concept

CC3: Scale, proportion, and quantity

CC6: Structure and function

Engineering, Technology, and the Applications of Science

ETS 1B: Developing Possible Solutions

Scientific and Engineering Practices

SEP 1: Asking questions (for science) and defining problems (for engineering)

SEP 2: Developing and using models

SEP 3: Planning and carrying out investigations

SEP 4: Analyzing and interpreting data

SEP 5: Using mathematics and computational thinking

SEP 6: Constructing explanations (for science) and designing solutions (for engineering)

SEP 7: Engaging in argument from evidence

SEP 8: Obtaining, evaluating, and communicating information

HISTORY/ SOCIAL SCIENCE

Principles of Economics

PE 12.1: Students understand common economic terms and concepts and economic reasoning.