

# Construction Technology 3

## Course Outline

### **DESCRIPTION:**

Construction Technology 3 is the advanced capstone course in the Residential and Commercial Construction pathway and it provides students with advanced technical and practical knowledge for an entry level job in the building industry provides . Topics include an introduction to cement foundation design, drywall, electrical, plumbing, insulation as well as interior and exterior design. Students will also acquire career preparation skills for the residential construction industry, critical thinking and leadership skills. Activities in this course include hands-on projects and work-based learning that connect students to industry and the local community. A student must successfully complete Construction Technology 1 and Construction Technology 2 for pathway completion and articulation.

### **INFORMATION:**

PRE-REQUISITE:	Construction Technology 2
LENGTH:	One Year
SECTOR:	Building & Construction Trades
PATHWAY:	Residential and Commercial Construction
ARTICULATED:	No
UC A-G APPROVAL:	No

### **O\*NET SOC CODES:**

47-2031.01	Construction Carpenter
47-2031.02	Carpenter, Rough
47-3012.00	Carpenter, Helper

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

- C. Demonstrate interviewing techniques in seeking employment, using appropriate tone, body language and professional dress and grooming standards.
- 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

- 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

- 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. Careers in Construction

- A. List personal characteristics valued in the construction industry.
- B. Research careers within the construction trade.
- C. Describe specific job classifications and corresponding responsibilities.
- D. Research training and certification requirements.
- E. Detail entry-level wages.
- F. Identify formal and informal training and apprenticeship programs.
- G. List the trade associations and trades unions within the construction industry.

<b>7. Construction Site Safety</b>
<ul style="list-style-type: none"><li>A. Describe and apply construction site safety rules.</li><li>B. Follow safety precautions for OSHA Fatal Four.</li><li>C. Properly use, maintain, and store construction tools and equipment.</li><li>D. Adhere to rules for preventing electric shock and managing electrical hazards.</li><li>E. Demonstrate safety procedures for handling common hazards on worksites including noise, hazardous substances, and chemicals.</li><li>F. Demonstrate knowledge of Cal OSHA job site safety training and procedures.</li><li>G. Simulate workplace conditions.</li></ul>
<b>8. Concrete and Foundation Design</b>
<ul style="list-style-type: none"><li>A. Read and interpret safety codes and guidelines for safe use of scaffolds and mortar mixer.</li><li>B. Demonstrate proper use and care of hand tools and masonry supplies such as reinforcing bars.</li><li>C. Pour concrete slab using proper finishing techniques.</li><li>D. Examine the many uses of concrete.</li><li>E. Read and interpret building code requirements and blueprints.</li><li>F. Develop a materials list and a cost estimate as per blueprint.</li></ul>
<b>9. Roofing</b>
<ul style="list-style-type: none"><li>A. Differentiate between rafters and trusses.</li><li>B. Read and interpret blueprints and building codes.</li><li>C. Identify and install roof covering materials.</li><li>D. Determine ventilation requirements and locations.</li><li>E. Identify common, hip, valley, and jack rafters and their uses.</li><li>F. Calculate correct overhang, mark and cut.</li></ul>
<b>10. Drywall</b>
<ul style="list-style-type: none"><li>A. Understand codes and ratings for installation of drywall.</li><li>B. Cut and measure drywall accurately.</li><li>C. Tape, mud and prep for finishes.</li><li>D. Install corner beads.</li></ul>
<b>11. Painting and Finishes</b>
<ul style="list-style-type: none"><li>A. Identify the Air Quality Regulations as they apply to solvents in coatings.</li></ul>

- B. Identify proper disposal of paints.
- C. Utilize proper safety equipment and masking techniques.
- D. Distinguish the difference between interior and exterior paints.

## 12. Flooring

- A. Identify types and application of finish flooring materials.
- B. Compare and contrast types of finish flooring materials.
- C. Practice safe removal techniques for floorings such as ceramic, asphalt, tile, hardwoods, linoleum, and carpet.
- D. Identify installation methods for flooring such as ceramic, asphalt, tile, hardwoods, linoleum, and carpet.
- E. Measure, cut, set and finish both vertical and floor tile.

## 13. Insulation / Heating, Ventilation and Air Conditioning (HVAC)

- A. Describe rating values, types of insulation and their uses.
- B. Identify appropriate types of insulation for various applications in the design of a building.
- C. Describe problems caused by moisture penetrating the insulation.
- D. Explain the impact of heating and air-conditioning on residential space.
- E. Summarize concerns related to poor indoor air quality.
- F. Compare and contrast the benefits of air-filtration, air-handling, and ventilation systems.

## 14. Electrical

- A. Describe an electrical current and the difference between AC and DC current.
- B. Explain secure grounding using GFCI requirements and uses.
- C. Identify electrical design concepts.
- D. Practice safety procedures when working with or around electrical sources.
- E. Identify and explain installation of switches and outlet boxes.
- F. Identify the various sources of electrical power and how it is distributed.

## 15. Plumbing

- A. Identify proper handling techniques and storage of combustible and/or flammable materials commonly used in plumbing.
- B. Identify tools for gauging slope.
- C. Calculate the proper slope for drain, waste and vent (DMV) piping.
- D. Identify common hazards and safety issues related to plumbing.

## 16. Project Planning – Authentic Playhouse Structure Construction

- A. Provide a layout of a given project.
- B. Draw and interpret plans.
- C. Allocate tasks and work collaboratively with team members.
- D. Select the appropriate material for a given project.
- E. Calculate material costs.
- F. Prepare a project bid.
- G. Apply construction skills to complete a project.

## 17. Portfolio Design

- A. Develop personal marketing and computer skills by refining your digital portfolio for post-secondary and employment acceptance.
- B. Compile best samples of original works and documents for a variety of purposes, which shows a progression in the acquisition of knowledge and/or skills.
- C. Demonstrate knowledge of competencies through journaling or summary of selected works or documents.
- D. Revise professional resume and cover letter to align with skills and objective statements of the relevant industry.
- E. Dress professionally and practice interviewing techniques using portfolio materials.
- F. Assemble industry and employability documents (resume, cover letter, certifications, recommendation letters, etc.).
- G. Create a “leave behind” book or folder.
- H. Display portfolio materials during a fair, community event, competition, or professional panel review.
- I. Evaluate and utilize feedback to improve 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, B, D 2D 3A-D, H 6A-E 17A-I	1 2 3 4 7 10 11	2 3 4 10		LS 11-12.6 SLS 11-12.2 WS 11-12.6 WS 11-12.7
2. In teams, students will access slides created in construction technology 1 and 2 to create a poster of safety rules for the construction site and present to classmates.	1A-F 2D 3A, D 5A-F 7A-G	1 2 4 5 6 8 9 10 11	2 4 6 9 10	A4.0 D4.0	LS 11-12.6 RSIT 11-12.2 RLST 11-12.4 WS 11-12.6 WS 11-12.7 CC 3 SEP 8
3. Students will make a small square or rectangle so they can learn how to properly mix concrete, distribute weight evenly, while learning the texture and the feeling of a correctly mixed concrete. Further, students will prepare a foundation and site for their shed prototype.	1A, B, C, E, F 2D 3A 5A, B, D, E 7A-E, G 8A-F	1 2 5 10 11 12	2 5 6 9 10	A3.0 D2.0 D4.0 D5.0	LS 11-12.6 RSIT 11-12.2 RLST 11-12.4 CC3 CC6 SEP 1, 3, 4, 5, 8

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
4. In teams, students will build an actual playhouse structure and a variety of projects.	1A-F 2D 3A, D 5A, B, D, E 7A-E, G 8A-F 9A-F 10A-D 16A-G	1 2 4 5 8 9 11 12	2 5 6 7 9 10	A3.0 D3.0 D4.0 D6.0 D7.0 D8.0 D9.0	RLST 11-12.2 RLST 11-12.4 RSIT 11-12.2 SLS 11-12.1 SLS 11-12.1b GSRT 8 CC3 CC6 SEP 2, 3, 4, 5, 6, 8
5. Students will tape and prep a surface, and apply a finish for an actual playhouse structure	1A-F 2D 3A 4B 5A-E, G 7A-E, G 11	1 2 5 6 7 9 12	2 5 6 7 9 10	A3.0 A9.0 D7.0 D8.0 D9.0	SLS 11-12.1 SLS 11-12.1b RSIT 11-12.2 RLST 11-12.4 CC3 CC6 SEP 1, 2, 3, 4, 5, 6, 8
6. Students will cut tile with an industrial tile cutter.	1A-F 2D 3A, D 5A-E, G 12A-E	1 2 5 6 9 12	2 6 7 9 10	A3.0 D7.0 D9.0	RSIT 11-12.2 RLST 11-12.4 CC3 CC6 SEP 1, 3, 4, 5, 8
7. Students will watch a webinar or video presentation and create a google slide presentation on how post-COVID-19 affected pollution and housing.	2D 3A 13A-F	1 2 4 5 11	2 4 5 6 8	A3.0 D1.0 D9.0	LS 11-12.6 SLS 11-12.1 SLS 11-12.1b WS 11-12.6 WS 11-12.7

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
		12	10		
8. Students will describe how to install a switch (accompanied by pictures) and present safety procedures and protection on the subject of avoiding electrical hazards.	2D 3A 5A-E, G 7A-E, G 14A-F	1 2 4 5 9 11 12	2 4 5 6 7 10	A3.0 D11.0	LS 11-12.6 SLS 11-12.1 SLS 11-12.1b WS 11-12.6 WS 11-12.7 ETS 1B SEP 1,2,3,4
9. Research uses and hazards of pipes, tools, or materials commonly used in plumbing and present to class.	2D 3A 4B 15A-D	1 2 4 5 9 11 12	2 4 5 6 7 10	A3.0 D10.0	SLS 11-12.1 SLS 11-12.1b SEP 1,2,3,4

## 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

**A3.0:** Interpret and apply information to develop a bill of materials, estimate the cost of materials, and develop a plan of procedures to complete a project.

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

**A5.0:** Identify wood products and materials used in the furniture and cabinetmaking industry and describe their characteristics and uses.

**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.