

Construction Technology

COURSE OUTLINE

1. **Course Title:** Construction Technology
2. **CBEDS Title:** Introduction to Construction
3. **CBEDS Number:** 5501
4. **Job Titles:**

- Carpenters
- Concrete Laborers
- Construction Managers
- Drywall installers
- Electricians
- Roofers

5. Course Description:

This course will introduce and train students in the basic skills necessary to pursue a career in construction. This course covers foundations, flooring, framing, plumbing, electrical, sheet rock, windows, doors, cabinetry, blue print reading, use of hand tools, and construction math. Models to full sized partitions are constructed in the shop. Projects at actual job sites are included. Upon completion of this course, students will have the opportunity to apply for summer work with several industry partners.

Student Outcomes and Objectives:

Students will:

1. Develop technical and job skills related to careers in the construction industry.
2. Develop teamwork and problem solving skills necessary in the construction industry
3. Develop and use proper safe work practices in accordance with OSHA standards for the construction industry.
4. Learn and apply measurement and math applications associated with construction.
5. Recognize the various phases associated with simple residential and commercial construction.
6. Identify and use correctly a wide variety of hand and power tools associated with the construction industry.
7. Understand current construction industry trends and become familiar with standards for quality construction and trends in building technology.
8. Demonstrate proper techniques associated with residential and commercial construction.
9. Demonstrate skills in basic site layout, preparation, and leveling.
10. Learn basic concrete and masonry construction techniques.
11. Learn basic floor systems.
12. Learn basic wall and ceiling framing.

Integrated throughout the course are career preparation standards, which include basic academic skills, communication, interpersonal skills, problem solving, workplace safety, technology, and employment literacy.

Pathway

Recommended Sequence	Courses
Introductory	Applied Technology or Construction Foundations
Skill Building	Construction Technology
Advanced Skill	Advanced Construction Technology or Cabinetry and Furniture Making or Construction Technology Coop

6. Hours: *Students receive up to 180 hours of classroom instruction.*

7. Prerequisites: Applied Technology or Construction Foundations

8. Date (of creation/revision): July 2011

9. Course Outline

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Upon successful completion of this course, students will be able to demonstrate the following skills necessary for entry-level employment.				
Instructional Units and Competencies	Course Hours	Model Curr. Standards	CA Academic Content Standards	CAHSEE
<p>I. CAREER PREPARATION</p> <p>A. Career Planning and Management.</p> <ol style="list-style-type: none"> 1. Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers. <ol style="list-style-type: none"> a. Students will identify skills needed for job success b. Students will identify the education and experience required for moving along a career ladder. 2. Understand the scope of career opportunities and know the requirements for education, training, and licensure. <ol style="list-style-type: none"> a. Students will describe how to find a job. b. Students will select two jobs in the field and map out a timeline for completing education and/or licensing requirements. 3. Know the main strategies for self-promotion in the hiring process, such as completing job applications, resume writing, interviewing skills, and preparing a portfolio. <ol style="list-style-type: none"> a. Students will write and use word processing software to create a resume, cover letters, thank you letters, and job applications. b. Students will participate in mock job interviews. 4. <i>Develop a career plan that is designed to reflect career interests, pathways, and postsecondary options.</i> <ol style="list-style-type: none"> a. <i>Students will conduct a self—assessment and explain how professional qualifications affect career choices.</i> 5. <i>Understand the role and function of professional organizations, industry associations, and organized labor in a productive society.</i> <ol style="list-style-type: none"> a. <i>Contact two professional organization and identify the steps to become a member.</i> 6. <i>Understand the past, present and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning.</i> <ol style="list-style-type: none"> a. <i>Students will describe careers in the business industry sector.</i> b. <i>Students will identify work-related cultural differences to prepare for a global workplace.</i> <p>B. Technology.</p> <ol style="list-style-type: none"> 1. Understand past, present and future technological advances as they relate to a chosen pathway and on selected segments of the economy. 2. Understand the use of technological resources to gain access to, manipulate, and produce information, products and services. 3. Use appropriate technology in the chosen career pathway. <p>C. Problem solving and Critical Thinking.</p> <ol style="list-style-type: none"> 1. Understand the systematic problem-solving models that incorporate input, process, outcome and feedback components, and apply appropriate problem-solving strategies and critical thinking to work-related issues and tasks. 	<p>10</p> <p>Additional hours are integrated throughout the course.</p>	<p>Transportation Industry Sector, Model Curriculum Standards</p> <p>3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0</p>	<p><u>Language Arts</u> (8) R 1.3, 2.6 W1.3, 2.5, LC 1.4,1.5 1.6 LS1.2, 1.3, (9/10) R2.1,2.3,2 W2.5 LC1.4 LS 1.1, 2.3 (11/12) R2.3 W2.5 LC1.2 <u>Math</u> (7) NS1.2, 1.7 MR 1.1,1.3 2.7,2.8, 3.1</p>	<p>Lang. Arts R 8.2.1 (9/10) R 2.1, 2.3 W2.5 Math (7) NS 1.2, 1.3, 1.7 MR 1.1, 2.1, 3.1</p>

<p>2. Use and apply critical thinking and decision making skills to make informed decisions, solve problems, and achieve balance in the multiple roles of personal, home, work and community life.</p> <p>D. Health and Safety.</p> <ol style="list-style-type: none"> 1. Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities. 2. Understand critical elements of health and safety practices related to a variety of business environments. <p>E. Responsibility & Flexibility.</p> <ol style="list-style-type: none"> 1. Understand the qualities and behaviors that constitute a positive and professional work demeanor. 2. Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles and how individual actions can affect the larger community. 3. Understand the need to adapt to varied roles and responsibilities. <p>F. Ethics and Legal Responsibilities</p> <ol style="list-style-type: none"> 1. Know the major local, district, state, and federal regulatory agencies and entities that affect the industry and how they enforce laws and regulations. 2. Understand the concept and application of ethical and legal behavior consistent with workplace standards. <ol style="list-style-type: none"> a. <i>Contact a business and obtain a copy of their rules for employment.</i> b. <i>Role play difference ethical scenarios.</i> 3. Understand the role of personal integrity and ethical behavior in the workplace. <p>G. Leadership and Teamwork.</p> <ol style="list-style-type: none"> 1. Understand the characteristics and benefits of teamwork, leadership, citizenship in the school, community, and workplace settings for effective performance and attainment of goals. 2. Understand the ways in which professional associations, such as Skills USA, CITEA and competitive career contribute to promote employability. 3. Know multiple approaches to personal conflict resolution and understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others. 				
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Instructional Units and Competencies	Hours	Industry Standards.	CA Academic Standards.	CAHSEE
<p>I. Basic Safety</p> <p>A. Students will explain the idea of a safety culture and its importance to the construction crafts.</p> <p>B. Students will identify causes of accidents and the impact of accident costs.</p> <p>C. Students will explain the role of OSHA in job-site safety.</p> <p>D. Students will explain OSHA’s General Duty Clause and 1926 CFR Subpart C.</p> <p>E. Students will recognize hazard recognition and risk assessment techniques.</p> <p>F. Students will explain fall protection, ladder, stair, and scaffold procedures and requirements.</p> <p>G. Students will identify struck-by hazards and demonstrate safe working procedures and requirements.</p> <p>H. Students will identify caught-in-between hazards and demonstrate safe working procedures and requirements.</p> <p>I. Students will define safe work procedures to use around electrical hazards.</p> <p>J. Students will demonstrate the use and care of appropriate personal protective equipment (PPE).</p> <p>K. Students will explain the importance of hazard communications (HazCom) and Material Safety Data sheets (MSDSs).</p> <p>L. Students will identify other construction hazards on the job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.</p>	22.5	Residential & Commercial Construction Pathway D5.0	ELA 9-10; R; 2.6; W; 1.7, 1.8, 2.6; WO; 1.4; LS; 1.3, 1.4, 1.6- 1.9, 2.2	ELA 9-10; R; 2.1, 2.2, 2.3, 2.5; W; 1.1-1.6, 1.9; WO; 1.1, 1.2, 1.3, 1.5
<p>II. Site Layout – Distance measurement and Leveling</p> <p>A. Students will describe the major responsibilities of the carpenter relative to site layout.</p> <p>B. Students will convert measurements stated in feet and inches to equivalent measurements stated in decimal feet, and vice versa.</p> <p>C. Students will use and properly maintain tools and equipment associated with taping.</p> <p>D. Students will use manual or electronic equipment and procedures to make distance measurements and perform site layout tasks.</p> <p>E. Students will determine approximate distances by pacing.</p>	10	Residential & Commercial Construction Pathway D1.0, 1.2	M. 7; AF; 1.3, 1.4; MG; 3.5; MR; 1.3, 2.2, 2.5, 2.6, 2.8, 3.2 M. 9-12; Alg; 8.0 & 16.0; Geo.; 3.0, 8.0-12.0, 17.0, 21.0	M. 7; NS; 1.2, 1.3, 1.6, 1.7, 2.2; AF; 1.1, 1.2, 2.1, 2.2; MG; 1.1, 1.2, 2.1-2.4; MR; 1.1, 1.2, 2.1, 2.4, 3.1, 3.3

	<p>F. Students will recognize, use, and properly care for tools and equipment associated with differential leveling.</p> <p>G. Students will use a builder’s level and differential leveling procedures to determine site and building elevations.</p> <p>H. Students will record site layout data and information in field notes using accepted practices.</p> <p>I. Students will check and/or establish 90-degree angles using the 3-4-5 rule.</p>				
III.	<p>Intro to Concrete and Reinforcing Materials</p> <p>A. Students will identify the properties of cement.</p> <p>B. Students will describe the composition of concrete.</p> <p>C. Students will perform volume estimates for concrete quantity requirements.</p> <p>D. Students will identify types of concrete reinforcement materials and describe their uses.</p> <p>E. Students will identify various types of footings and explain their uses.</p> <p>F. Students will identify the parts of various types of forms.</p> <p>G. Students will explain the safety procedures associated with the construction and use of concrete forms.</p> <p>H. Students will erect, plumb, and brace a simple concrete form with reinforcement.</p>	10	Residential & Commercial Construction Pathway D2.0, 2.1, 2.2	ELA 9-10; R; 2,6; W; 1.8, 2.6 WO; 1.3, 1.4; LS; 1.3, 1.4, 1.6- 1.9.	M. 7; NS; 1.2, 1.3, 1.6, 1.7, ELA 9- 10; R; 2.1; W; 1.1, 1.2,
IV.	<p>Handling and Placing Concrete</p> <p>A. Students will recognize the various equipment used to transport and place concrete.</p> <p>B. Students will describe the factors that contribute to the quality of concrete placement.</p> <p>C. Students will demonstrate the correct methods for placing and consolidating concrete into forms.</p> <p>D. Students will demonstrate how to use a screed to strike off and level concrete to the proper grade in a form.</p> <p>E. Students will demonstrate how to use tools for placing, floating, and finishing concrete.</p> <p>F. Students will determine when conditions permit the concrete finishing operation to start.</p> <p>G. Students will name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.</p> <p>H. Students will properly care for and safely use hand and power tools used when working with concrete.</p>	22.5	Residential & Commercial Construction Pathway D3.0, 3.1, 3.2, 3.3	ELA 9-10; R; 2,6; W; 1.8, 2.6 WO; 1.3, 1.4; LS; 1.3, 1.4, 1.6- 1.9.	M. 7; NS; 1.2, 1.3, 1.6, 1.7 ELA 9- 10; R; 2.1; W; 1.1, 1.2

Instructional Units and Competencies	Hours	Industry Standards.	CA Academic Standards.	CAHSEE
<p>V. Intro to Masonry</p> <p>A. History of Masonry.</p> <p>B. Students will describe modern masonry materials and methods.</p> <p>C. Students will explain career ladders and advancement possibilities in masonry work.</p> <p>D. Students will describe the skills, attitudes, and abilities needed to work as a mason.</p> <p>E. Students will state the safety precautions that must be practiced at a work site, including the following:</p> <p style="padding-left: 40px;">i. Safety practices</p> <p style="padding-left: 40px;">ii. Fall-protection procedures</p> <p style="padding-left: 40px;">iii. Forklift-safety operations</p> <p>F. Students will perform the following basic bricklaying procedures:</p> <p style="padding-left: 40px;">i. Mixing of mortar</p> <p style="padding-left: 40px;">ii. Laying a mortar bed</p> <p style="padding-left: 40px;">iii. Laying bricks</p> <p>G. Students will put on eye protection, respiratory protection, and a safety harness.</p> <p>H. Students will use the correct procedures for fueling and starting a gasoline-powered tool.</p>	20	Residential & Commercial Construction Pathway D6.0, 6.1, 6.2	M. 7; AF; 1.3; MG; 3.1; MR; 1.3, 2.5, 2.6, 2.8, 3.2 ELA 9-10; R; 2.6; W; 1.8, 2.6; WO; 1.3, 1.4; LS; 1.3, 1.4, 1.7, 1.8, 2.2.	M. 7; NS; 1.2, 1.3, 2.2; AF; 1.2; MG; 1.2, 2.1, 2.3; MR; 1.1, 1.2, 2.4, 3.1, 3.3. ELA 9-10; R; 2.1; W; 1.1, 1.2.
<p>VI. Masonry Units and Installation Techniques</p> <p>A. Students will describe the most common types of masonry units.</p> <p>B. Students will describe and demonstrate how to set up a wall.</p> <p>C. Students will lay a dry bond.</p> <p>D. Students will spread and furrow a bed joint, and butter masonry units.</p> <p>E. Students will describe the difference types of masonry bonds.</p> <p>F. Students will cut brick and block accurately.</p> <p>G. Students will lay masonry units in a true course.</p>	50	Residential & Commercial Construction Pathway D7.0, 7.1, 7.2, 7.3	ELA 9-10; R; 2.6; W; 1.7, 1.8, 2.6; WO; 1.4; LS; 1.3, 1.4, 1.6-1.9, 2.2; HSS 12; 12.2.1-12.2.8, 12.3.1, 12.3.2, 12.4.2-12.4.4.	ELA 9-10; R; 2.1, 2.2, 2.3, 2.5; W; 1.1-1.6, 1.9, 2.3; WO; 1.1, 1.2, 1.3, 1.5
<p>VII. Floor Systems</p> <p>A. Students will identify the different types of framing systems.</p> <p>B. Students will read and interpret drawings and specifications to determine floor system requirements.</p> <p>C. Students will identify floor and sill framing and support members.</p> <p>D. Students will name the methods used to fasten sills to the foundation.</p> <p>E. Students will select the proper girder/beam size</p>	25	Residential & Commercial Construction Pathway D4.1, 4.2	M. 7; AF; 1.3; MG; 3.1; MR; 1.3, 2.5, 2.6, 2.8, 3.2 M. 9-12; Geo.; 8.0, 11.0 ELA 9-10; W; 1.8;	M. 7; NS; 1.2, 1.3, 1.7, 2.2; MG; 1.2; MR; 1.1, 1.2, 2.1, 2.4, 3.1, 3.3 ELA 9-10; W;

<p>from a list of available girders/beams for a given specific floor load and span data.</p> <p>F. Students will list and recognize different types of floor joists.</p> <p>G. Students will select the proper joist size from a list of available joists for a given specific floor load and span data.</p> <p>H. Students will list and recognize different types of bridging.</p> <p>I. Students will list and recognize different types of flooring materials.</p> <p>J. Students will explain the purposes of subflooring and underlayment.</p> <p>K. Students will match selected fasteners used in floor framing to their correct uses.</p> <p>L. Students will estimate the amount of material needed to frame a floor assembly.</p> <p>M. Students will demonstrate the ability to:</p> <ol style="list-style-type: none"> i. Lay out and construct a floor assembly ii. Install bridging iii. Install joists for a cantilever floor iv. Install a subfloor using butt-joint plywood/OSB panels v. Install a single floor system using tongue-and-groove plywood/OSB panels. 			<p>WO; 1.4; LS; 1.3, 1.4, 1.7, 1.8, 2.2;</p>	<p>1.1, 1.2; WO; 1.3</p>
<p>VIII. Wall and Ceiling Framing</p> <p>A. Students will identify the components of a wall and ceiling layout.</p> <p>B. Students will describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops.</p> <p>C. Students will describe the correct procedure for assembling and erecting an exterior wall.</p> <p>D. Students will identify the common materials and methods used for installing sheathing on walls.</p> <p>E. Students will lay out, assemble, erect, and brace exterior walls for a frame building.</p> <p>F. Students will describe wall framing techniques used in masonry constructions.</p> <p>G. Students will explain the use of metal studs in wall framing.</p> <p>H. Students will describe the correct procedure for laying out ceiling joists.</p> <p>I. Students will cut and install ceiling joists on a wood frame building.</p> <p>J. Students will estimate the materials required to</p>	<p>20</p>	<p>Residential & Commercial Construction Pathway D4.0, 4.3</p>	<p>M. 7; AF; 1.3; MG; 3.1; MR; 1.3, 2.5, 2.6, 2.8, 3.2</p> <p>M. 9-12; Geo.; 3.0, 8.0, 11.0, 12.0, 13.0, 16.0.</p> <p>ELA 9-10; R; 2.6; W; 2.6; WO; 1.4; LS; 1.3, 1.4, 1.7, 1.8, 2.2;</p>	<p>M. 7; NS; 1.2, 1.3, 1.7, 2.2; AF; 1.2; MG; 1.2, 2.1-2.3; MR; 1.1, 1.2, 2.1, 2.4, 3.1, 3.3</p> <p>ELA 9-10; R; 2.1; W; 1.1, 1.2; WO; 1.3</p>

frame walls and ceilings.				
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10. Additional recommended/optional items: Your Role in the Green Environment, NCCER, Pearson Publishing, 2009.

- a. Articulation: None.
- b. Academic credit: None
- c. Instructional strategies:
 - Lecture Discussion
 - Laboratory
 - Projects
 - Industry tours
 - Guest speakers
 - Construction Expo
- d. Instructional materials: Construction Technology, 3rd ed., NCCER, Pearson Publishing, 2009.
- e. Certificates: NCCER Certificates awarded upon successful passing of each unit exam.