

Construction Technology

COURSE OUTLINE

1. Course Title: Advanced 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 expands upon concepts introduced in Construction Technology Year 2 and enhances students skills necessary to pursue a career in construction. This course covers roof framing, roofing applications, exterior finishing, basic stair layout, electrical safety and residential electrical services, introduction to HVAC, drain, waste, and vent systems; plastic pipe fittings; arc and gas welding, and work vehicle maintenance.. Models to full sized partitions are constructed in the shop. Projects at actual job sites may be included.

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. Identify the type and use of various building materials.
10. Learn basic roof framing and roofing applications and techniques.
11. Learn basic exterior finishing.
12. Learn basic stair layout.
13. Learn basic electric safety and residential electrical services.
14. Introduction to HVAC.
15. Introduction to Drain, Waste, and Vent Systems (DMV).
16. Introduction to Plastic Pipe and Copper Pipe and Fittings.

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, Construction Core, Construction Technology

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 	<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>tasks.</p> <ol style="list-style-type: none"> 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>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 - Review</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>	12.5	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. Roof Framing</p> <p>A. Students correctly use the terms associated with roof framing.</p> <p>B. Students will identify the roof framing members used in gable and hip roofs.</p> <p>C. Students will identify the methods used to calculate the length of a rafter.</p> <p>D. Students will identify the various types of trusses used in roof framing.</p> <p>E. Students will use a rafter framing square, speed square, and calculator in laying out a roof.</p> <p>F. Students will identify various types of sheathing</p>	32.5	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>used in roof construction.</p> <p>G. Students will frame a gable roof with vent openings.</p> <p>H. Students will frame a roof opening.</p> <p>I. Students will erect a gable roof using trusses.</p> <p>J. Students will estimate the materials used in framing and sheathing a roof.</p>			
<p>III. Roofing Applications</p> <p>A. Students will identify the materials and methods used in roofing.</p> <p>B. Students will explain the safety requirements for roof jobs.</p> <p>C. Students will install fiberglass shingles on gable and hip roofs.</p> <p>D. Students will close up a valley using fiberglass shingles.</p> <p>E. Students will explain how to make various roof projections watertight when using fiberglass shingles.</p> <p>F. Students will complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.</p> <p>G. Students will lay out, cut, and install a cricket or saddle.</p> <p>H. Students will install wood shingles and shakes on roofs.</p> <p>I. Students will describe how to close up a valley using wood shingles and shakes.</p> <p>J. Students will explain how to make a roof projections watertight when using wood shakes and shingles.</p> <p>K. Students will complete the cuts and install the main and hip ridge caps using wood shakes/shingles.</p> <p>L. Students will demonstrate the techniques for installing other selected types of roofing materials.</p>	20	Residential & Commercial Construction Pathway D2.0, 2.1, 2.2	<p>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.</p>	<p>M. 7; NS; 1.2, 1.3, 1.6, 1.7, ELA 9- 10; R; 2.1; W; 1.1, 1.2,</p>
<p>IV. Exterior Finishing</p> <p>A. Students will describe the purpose of wall insulation and flashing.</p> <p>B. Students will install selected common cornices.</p> <p>C. Students will demonstrate lap and panel siding estimating methods.</p> <p>D. Students will describe the types and applications of common wood siding.</p> <p>E. Students will describe fiber-cement siding and its uses.</p> <p>F. Students will describe the types and styles of</p>	30	Residential & Commercial Construction Pathway D7.0, 7.3	<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;</p>	<p>M. 7; NS; 1.2, 1.3, 1.6, 1.7, 2.2; AF; 1.2; MG; 1.2, 2.4; MR; 1.1, 1.2, 2.1, 3.1, 3.3</p> <p>ELA 9-</p>

<p>vinly and metal siding.</p> <p>G. Students will describe the types and applications of stucco and masonry veneer finishes.</p> <p>H. Students will describe the types and application of special exterior finish systems.</p> <p>I. Students will install three types of siding commonly used in the area.</p>			<p>W; 1.8; WO; 1.4; LS; 1.3, 1.4, 1.7, 1.8, 2.2;</p> <p>S. 9-12; Physics; 5a, d, h</p>	<p>10; R; 2.1, 2.2, 2.3, 2.5; W; 1.1, 1.2; WO; 1.3</p>
<p>V. Basic Stair Layout</p> <p>A. Students will identify the various types of stairs.</p> <p>B. Students will identify the various parts of stairs.</p> <p>C. Students will identify the materials used in the construction on stairs.</p> <p>D. Students will interpret construction drawings of stairs.</p> <p>E. Students will calculate the total rise, number and size of treads required for a stairway.</p> <p>F. Students will lay out and cut stringers, risers, and treads.</p> <p>G. Students will build a small stair unit with a temporary handrail.</p>	12.5	<p>Residential & Commercial Construction Pathway D6.0, 6.1, 6.2</p>	<p>M. 7; AF; 1.3; MG; 3.1; MR; 1.3, 2.5, 2.6, 2.8, 3.2</p> <p>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.</p>	<p>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.</p> <p>ELA 9- 10; R; 2.1; W; 1.1, 1.2.</p>
<p>VI. Electrical Safety</p> <p>A. Students will recognize safe working practices in the construction environment.</p> <p>B. Students will explain the purpose of OSHA and how it promotes safety on the job.</p> <p>C. Students will identify electrical hazards and how to avoid or minimize them in the workplace.</p> <p>D. Students will explain safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems.</p> <p>E. Students will develop a task plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.</p>	10	<p>Residential & Commercial Construction Pathway D6.3</p>	<p>M. 7; AF; 1.3; MG; 3.1, 3.5; MR; 1.3, 2.2, 2.5, 2.6, 2.8, 3.2</p> <p>M. 9-12; Alg. 1; 8.0, 16.0; Geo.; 3.0, 8.0, 10.0, 11.0, 12.0, 16.0, 17.0, 21.0</p>	<p>M. 7; NS; 1.2, 1.3, 1.6, 1.7, 2.2; AF; 1.2 MG; 1.2, 2.1- 2.4; MR; 1.1, 1.2, 2.4, 3.1, 3.3</p>
<p>VII. Residential Electrical Services</p> <p>A. Students will explain the role of the National Electrical Code® in residential wiring and describe how to determine electric service requirements for dwellings.</p> <p>B. Students will explain the grounding requirements of a residential electric service.</p> <p>C. Students will calculate and select service-entrance equipment.</p>	15	<p>Residential & Commercial Construction Pathway D6.3</p>	<p>M. 7; AF; 1.3; MG; 3.1, 3.5; MR; 1.3, 2.2, 2.5, 2.6, 2.8, 3.2</p> <p>M. 9-12; Geo.; 3.0,</p>	<p>M. 7; NS; 1.2, 1.3, 1.6, 1.7, 2.2; AF; 1.2 MG; 1.2, 2.1- 2.4; MR; 1.1, 1.2, 2.4, 3.1,</p>

<ul style="list-style-type: none"> D. Students will select the proper wiring methods for various types of residences. E. Students will compute branch circuit loads and explain their installation requirements. F. Students will explain the types and purposes of equipment grounding conductors. G. Students will explain the purpose of ground fault circuit interrupters and tell where they must be installed. H. Students will size outlet boxes and select the proper type for different wiring methods. I. Students will describe rules for installing electric space heating and HVAC equipment. J. Students will describe the installation rules for electrical systems around swimming pools, spas, and hot tubs. K. Students will explain how wiring devices are selected and installed. L. Students will describe the installation and control of lighting fixtures. 			8.0, 10.0, 11.0, 12.0, 16.0, 17.0	3.3
<p>VIII. Introduction to HVAC</p> <ul style="list-style-type: none"> A. Safety B. Tools & materials C. Properties of concrete, testing & curing D. Constructing forms E. Placing & finishing concrete 	7.5	Residential & Commercial Construction Pathway D6.2	M. 7; AF; 1.3; MG; 3.1, 3.5; MR; 1.3, 2.2, 2.5, 2.6, 2.8, 3.2	M. 7; NS; 1.2, 1.3, 1.6, 1.7, 2.2; AF; 1.2 MG; 1.2, 2.1-2.4; MR; 1.1, 1.2, 2.4, 3.1, 3.3
<p>IX. Introduction to Drain, Waste, and Vent (DWV) systems</p> <ul style="list-style-type: none"> A. Students will be able to explain how waste moves from a fixture through the drain system to the environment. B. Students will identify the major components of a drainage system and describe their functions. C. Students will identify the various types of drain, waste, and vent (SWV) fittings and describe their applications. D. Students will identify significant code and health issues, violations, and consequences related to DWV systems. 	10			ELA 9-10; R; 2.2, 2.3, 2.5
<p>X. Plastic Pipe and Fittings</p> <ul style="list-style-type: none"> A. Students will identify types of materials and schedules of plastic piping. B. Students will identify proper and improper applications of plastic piping. C. Students will identify types of fittings and valves used with plastic piping. D. Students will identify and determine the kinds of hangars and supports needed for plastic 	10			

<p> piping.</p> <p>E. Students will identify the various techniques used in hanging and supporting plastic piping.</p> <p>F. Students will explain and demonstrate proper procedures for the handling, storage, and protection of plastic pipes.</p>				
<p>XI. Copper Pipe and Fittings</p> <p>A. Students will identify the types of materials and schedules used with copper piping.</p> <p>B. Students will identify the material properties, storage, and handling requirements of copper piping.</p> <p>C. Students will identify the types of fittings and valves used with copper piping.</p> <p>D. Students will identify the techniques used in hanging and supporting copper piping.</p> <p>E. Students will properly measure, ream, cut, and join copper piping.</p> <p>F. Students will identify the hazards and safety precautions associated with copper piping.</p>	10			

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.