



Construction Technology

Course Outline

Course Description

The 519 hour SVCTE Construction Technology course prepares students for entry-level positions in the Construction Industry. Students receive valuable hands on experience in a wide variety of student designed lab projects including pergolas, storage buildings, exterior decks and brick buildings. Campus projects are an integral component. Activities in the past have included a walking bridge, designer storage units, and repair of campus buildings. Industry certifications include OSHA 10 Construction, hand and power tool safety, including repair and maintenance of tools. Students learn to interpret and draw basic building plans. Construction math is emphasized. After successfully completing the SVCTE Construction Technology Course, students are eligible to enroll in the Local Carpenters Pre-Apprenticeship program.

Course Details

Length of Program and Academic Credits Earned:

Year-long 3 hour course = 519 hours total (~261/semester)

30 total units (15/semester):

- 20 non-a–g elective credits (10/semester)
- 10 UC a–g “c” math credits (5/semester)

Pre-Requisites:

- High School Junior or Senior, or 16 years or older
- Successful completion of Algebra and Geometry or Integrated 1 & 2

CTE Classification:

- **Industry Sector:** Building and Construction Trades
- **Industry Pathway:** Residential and Commercial Construction
- **CA Basic Education Data System (CBEDS) Code:** 5507

Work-Based Learning:

- Authentic, experiential projects on campus may be available to students meeting certain criteria

Certifications & State Tests:

- OSHA 10 Construction
- SVCTE Certificate of Completion awarded with a “C” or better average for both semesters.

Community College Articulations

Students completing the Construction Technology course with a grade of “B” or better may be granted college credits at the following community college:

San Jose City College – 3.0 units

More info and application: www.sjcc.edu/academics/departments-divisions/construction-technology

Possible Education & Career Pathways

For more career information: www.onetonline.org

College & Career Pathways:	Career Opportunities	O*NET Codes
<p><u>Post-Secondary:</u> Students with a high school diploma and having successfully completed this course have a number of entry-level career opportunities, as well as continuing their education.</p>	<ul style="list-style-type: none"> ● Construction Carpenters ● Construction Laborers ● Sales Representatives, Services, All Other ● Roofers ● Drywall and Ceiling Tile Installers ● Helpers--Carpenters 	<p>47-2031.01</p> <p>47-2061.00</p> <p>41-3099.00</p> <p>47-2181.00</p> <p>47-2081.00</p> <p>47-3012.00</p>
<p><u>Continuing Education: Including Community College, Training Programs, Certifications, etc:</u></p> <ul style="list-style-type: none"> ● Apprenticeship Program ● AA or AS in Construction Management, Alternative Energy, Civil Engineering 	<ul style="list-style-type: none"> ● Construction and Building Inspectors ● Construction Managers ● First-Line Supervisors of Construction Trades/ Extraction Workers 	<p>47-4011.00</p> <p>11-9021.00</p> <p>47-1011.00</p>

<u>University Majors & Degrees:</u> <ul style="list-style-type: none"> ● BA or BS in Construction Management, Civil Engineering, Alternative Energy, Architecture, Landscape Architecture 	<ul style="list-style-type: none"> ● Wind Energy Project Managers 11-9199.10 ● Civil Engineers 17-2051.00 ● Architectural Drafters 17-3011.01 ● Landscape Architects 17-1012.00
<u>Post-Baccalaureate Degrees</u> <ul style="list-style-type: none"> ● Masters or Doctorate in Architecture, Civil Engineering, Alternative Energy, Landscape Architecture 	<ul style="list-style-type: none"> ● Wind Energy Project Managers 11-9199.10 ● Civil Engineers 17-2051.00 ● Architectural Drafters 17-3011.01 ● Landscape Architect 17-1012.00

Ongoing Unit: Career Readiness & Professionalism 54 Hours

Students will develop personal and professional skills in the classroom that will transfer to the workplace.

- Time management and organization
- Interpersonal skills
- Work with a variety of technology
- Creative thinking and problem solving
- Industry certifications
- Career planning through post secondary education
- Job search skills including: resume, job applications and effective interview skills
- Professional and industry standard dress codes

Standards Alignments:
CCSS: WS 11-12.4, 11-12.5, 11-12.6, WHSST 11-12.4, 11-12.5; LS 11-12.6

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Students will participate in mock interviews with industry professionals, peers and instructors to increase their communication, interpersonal and employability skill-set.</p> <p>Assessment: rubric, observation of role playing, peer and self- assessment</p>	2.0, 4.0, 11.0	
<p>✓ Key Assignment: Students will prepare a virtual portfolio including cover letter and resume through workshop, self and peer editing, teacher instruction and demonstration.</p> <p>Assessment: rubric, observation, peer and self- assessment</p>	3.0, 4.0, 11.5	

<p>✓ Key Assignment: Students will research and develop a PowerPoint presentation on industry dress standards, expectations, personal responsibility and safe working practices to their instructor and peers.</p> <p>Assessment: rubric, grading form sheet, interactive notebook, student documentation</p>	3.1, 3.3, 3.6, 3.8, 4.0	
<p>✓ Key Assignment: Students will discuss through research, industry dress standards and expectations as well as personal responsibility and safe working practices and articulate their findings to instructor and peers using a presentation software such as PowerPoint.</p> <p>Assessment: oral presentation, coaching, peer/self evaluation</p>	5.0, 6.1, 8.0, 11.0	D 1.1
<p>✓ Key Assignment: Students will explore post secondary education for certifications and industry required degrees while reflecting on their career path with journal entries and use of a career path graphic organizer.</p> <p>Assessment: observation, questioning, discussions</p>	2.0, 3.0, 4.0, 8.2, 10.1, 10.4, 10.4, 11.0	

Ongoing Unit: Work Site Safety	55 Hours
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Job Safety is the key to success within a classroom, as well as in the industry. (This unit is reinforced throughout the entire course.)

- Personal/Group safety
- OSHA safety
- Ergonomic standards
- Personal protective equipment (PPE)

Standards Alignments
CCSS: WS 11-12.2; WS 11-12.9; **RSIT** 11-12.2, 11-12.7; **PE** 12.1
NGSS: PS 1.B, 3.A

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Students, working collaboratively and individually, will engage in a variety of hands-on activities for classroom and worksite preparedness including: power tool safety procedures, ladder safety, electrical shock, lock-out/tag-out, gearing up, PPE equipment, mock worksite techniques, chemical exposure and safety standards resulting in individual OSHA 10 Construction Certification and classroom and worksite preparedness.</p> <p>Assessment: OSHA testing and observation</p>	5.0, 6.0, 7.0, 8.2, 8.3, 10.0	D 1.1

<p>✓ Key Assignment: Students will individually demonstrate to the instructor and their peers proper ergonomic lifting and safety techniques for various items and equipment, such as concrete blocks, heavy equipment, and typical job site materials.</p> <p>Assessment: observation, critique, peer and self assessment, oral questioning</p>	6.0	
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Unit 1: Tool Usage		50Hours
<p>In this unit students learn how to safely operate and repair most major hand/power tools. Accurate measuring skills are a key component.</p> <ul style="list-style-type: none"> ● Tool repair ● Industry math ● Industry vocabulary ● Safety practices <p>Standards Alignments: CCSS: WS 11-12.2; RSIT 11-12.2, 11-12.3, 11-12.7; G-GPE 5, F-TF 1.1, NGSS: SEP 2, 3, 4, 5; ETS 1.A, 1.B</p>		
Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Throughout the school year, as new tools are introduced, students will explore and demonstrate safe usage on a variety of hand/power tools to complete a variety of teacher assigned projects such as creating a picture frame from wood, designing and cutting a wooden jigsaw puzzle and building small wood/steel frame structures.</p> <p>Assessment: safety testing, written worksheets, observation, completed projects</p>	5.0, 6.0, 7.1, 7.4, 7.5, 7.6, 7.7	
<p>✓ Key Assignment: Throughout the year with the guidance of the instructor, students will individually and collaboratively diagnose non working tools, create work orders, research technical manuals, order parts and repair broken classroom tools in order to restore them to their original performance specifications.</p> <p>Assessment: work order documentation, observation, tool demonstration</p>	2.0, 5.0, 6.0, 9.0, 10.0	
<p>✓ Key Assignment: Students will fabricate a variety of products using industry standard tools to practice accurate measurement skills and showcase those skills to peers and instructor through demonstrations.</p> <p>Assessment: quizzes, Skills demonstrations, observations, peer and self assessments</p>	5.0, 6.0, 7.0, 10.0,	
<p>✓ Key Assignment: After instructor demonstration and research on survey equipment, students will work in teams of 2 using survey equipment to analyze rain run-off direction in the driveway area of the student parking lot. They will use the data collected to create</p>	2.0, 4.0, 5.0, 6.0, 10.0	D 4.1, D 4.2

a properly labeled elevation graph showing slope. Assessment: elevation graph, quiz, observation, peer and individual assessment		
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Unit 2: Fastening Systems	30 Hours
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In this unit students will learn and practice fastening materials and techniques. This unit is essential as fastening techniques will be practiced throughout all units within the course.

- Industry vocabulary
- Types of fasteners
- Material estimation

Standards Alignments:
CCSS: WS 11-12.2; **RSIT** 11-12.2, 11-12.3, 11-12.7
NGSS: PS 2.A; CC 3, 4, 6, 7

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Students will work in teams for a friendly class competition referred to as the “Fasteners Competition”. Each team will be given fasteners and 2x4 lumber in order to demonstrate the student's ability to fasten lumber in a variety of methods (glue, nails, screws, metal brackets). They will calculate spacing, length and size of fasteners to predict and test the best outcome performance for each. Each team will demonstrate their fastener holds by applying pressure. Teams will reflect upon their process and performance in a reflective written journal entry.</p> <p>Assessment: oral presentation , observation, student conference, peer and self assessment, journal entry</p>	2.0, 5.0, 8.0, 10.0	D 3.1, D 4.0

Unit 3: Materials and Estimation	55 hours
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In this unit students will learn materials estimation for lumber, fasteners and concrete, as well as identify types of building materials used. Safe handling procedures are stressed.

● Industry vocabulary	● Lumber grading	● Materials handling procedures
● Types of lumber	● Engineered lumber	● Identify adhesives

Standards Alignments:

CCSS: WS 11-12.2; RSIT 11-12.2, 11-12.3, 11-12.7; A-CED 1, 4
NGSS: SEP 3, 4, 5; PS 2.A; CC 3, 4, 6, 7

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Throughout the course, students will engage in a variety of projects which require them to calculate specific quantities, costs of materials and supplies including current tax rate and dimensional cut lists. They will write their estimates including sketches and parts lists, then orally defend their choices and calculations to their instructor and peers.</p> <p>Assessment: oral questioning, student conference, observation, lists, quizzes, think -write-pair-share</p>	2.0, 4.0, 5.0, 6.0, 9.0, 10.0	D 2.1, D 2.2, D 2.3, D 3.1, D 3.2, D 3.3, D 9.2
<p>✓ Key Assignment: Individually and collaboratively, students will research materials costs of various types of building materials used, as well as identify hand and power tools needed for given tasks. They will be required to research costs on line and by calling lumber stores/suppliers to compare material costs. The students will create a spreadsheet highlighting the varied costs being charged for similar materials.</p> <p>Assessment: cost list, comparisons, pair share</p>	2.0, 4.0, 5.0, 10.1, 10.4	D 1.2, D 2.3, D 5.4
<p>✓ Key Assignment: Students will identify various types of lumber, adhesives and fasteners used in the construction industry and keep a binder or notebook with the various types labeled and described. Students will use this self-created resource to make materials choices throughout the class.</p> <p>Assessment: journaling, notebook check, self reflection, critique</p>	5.0, 6.0, 10.0	D 1.1, D 2.1, D 2.3, D 3.3, D 5.4

Unit 4: Foundation Systems		30 Hours
<p>SVCTE students learn the fundamentals of soil preparation, concrete forming, concrete qualities, and bricklaying.</p>		
<ul style="list-style-type: none"> • Materials properties and usage • Industry vocabulary • Cubic and area calculations 	<ul style="list-style-type: none"> • Concrete reinforcing standards • Types of foundation systems • Squaring practices 	<ul style="list-style-type: none"> • Surveying, leveling, grading • Pythagoras formula
<p>Standards Alignments: CCSS: WS 11-12.2; RSIT 11-12.2, 11-12.3, 11-12.7; A-CED 1, 4; G-GMD 5; G-GPE-5; G-SRT 8 NGSS: SEP 3, 4, 5; PS 2.A; CC 3, 4, 6, 7</p>		
Key Assignments	CTE Anchor	CTE Pathway

	Standards	Standards
<p>✓ Key Assignment: Students will work individually to create a small concrete block to specific cubic dimensions. They will investigate the formula for proportional values of concrete, measure and mix the calculated ingredients, calculate the volume of the cube and submit their cube to a crush test to industry specifications.</p> <p>Assessment: quizzes, skills demonstrations, observations, peer and self assessments</p>	2.0, 5.0, 6.0, 8.0, 10.0, 11.1	D 5.0
<p>✓ Key Assignment: Working collaboratively and individually students will create a hand drawn print of a brick wall calculating size, weight and quantities of blocks needed. Students will demonstrate their ability to calculate a level, plumb and square block and brick wall.</p> <p>Assessment: observation, debriefing, oral questioning, skills demonstration, calculations check</p>	2.0, 5.0, 10.0, 11.1	D 2.1, D 2.2 D 2.3, D 5.3, D 5.4, D 5.5
<p>✓ Key Assignment: Given dimensions of a shape, students will use a chalk line to create given shape on the shop floor. Students will work in teams of 2 to verify right angles using the pythagorean theorem. After verification of given shape calculations by instructor, students will create their own shapes using chalk lines and verify all 90 degree angles through written documentation and oral defense to peers and instructor.</p> <p>Assessment: worksheet, quiz, observation, peer and individual critique, calculations check</p>	2.0, 5.0, 6.0, 9.0, 10.0, 11.1	D 2.2

Unit 5: Floor Framing	35 Hours
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In this unit students will design, draw, calculate and build varying floor systems.

- Materials identification and estimation
- Leveling instruments and standards
- Lumber grading
- Design/drawing
- Time management
- Industry vocabulary

Standards Alignments:
CCSS: WS 11-12.2; 11-12.5, 11-12.6; **RSIT** 11-12.2, 11-12.3, 11-12.7; **G-GMD** 5; **G-GPE** 5; **G-SRT** 8; **A-CED** 1, 4
NGSS: SEP 3, 4, 5; **ETS** 1.A, 1.B, 1.C; **PS** 2.A; **CC** 3, 4, 6, 7

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Students will individually research spantables and lumber qualities, as well as calculate cost and weight of a pre-designed simple deck. Collaboratively, the students will</p>	2.0, 4.1, 4.2, 4.3, 4.6	D 1.1, D 1.2, D 2.3

<p>build a deck to industry standard building practices by utilizing accurate measurement skills and correct tool selection/usage. (Students will repeat this assignment for various projects throughout the year)</p> <p>Assessment: quizzes, skills demonstrations, observations, peer and self assessments, critique, gallery walk, calculations check</p>		
<p>✓ Key Assignment: Individually, students will design, label and mechanically render 2D and 3D exterior deck plans to scale with correct proportion calculations using technical drawing techniques and drawing tools (T-square, drafting pencil, engineer scale).</p> <p>Assessment: skills demonstrations, analogy prompts, completed drawings, gallery walk, critique</p>	2.0, 5.0, 6.0, 7.0, 10.0,	D 2.3, D 6.3, D 6.4
<p>✓ Key Assignment: Students, in collaborative teams will measure, layout and assemble a teacher prescribed floor plan using engineered building materials according to drawing specifications and industry standards. They will use the pythagorean formula to accurately create right angles for the floor system. Students will also determine a work schedule and propose a time chart to instructor. Throughout the project, students will demonstrate safety practices and proper tools usage.</p> <p>Assessment: time chart, quiz, misconception check, completed projects</p>	2.0, 5.0, 6.0, 7.0, 9.0, 10.0	D 1.1, D 1.2 D 2.3, D 4.1 D 6.2, D 6.3, D 6.4, D 9.2
<p>✓ Key Assignment: Students in collaborative teams will identify and fasten proper subfloor materials to complete the previously built floor framing project.</p> <p>Assessment: quiz, misconception check, completed projects</p>	2.0, 10.0, 11.1	

Unit 6: Wall framing		50 Hours
<p>In this unit students will design, draw, calculate and build varying wall systems.</p> <ul style="list-style-type: none"> <li style="display: inline-block; width: 30%;">● Industry vocabulary <li style="display: inline-block; width: 30%;">● Materials estimation <li style="display: inline-block; width: 30%;">● Leveling and squaring practices <li style="display: inline-block; width: 30%;">● Building practices <li style="display: inline-block; width: 30%;">● Fastening techniques <li style="display: inline-block; width: 30%;">● Metal stud framing <li style="display: inline-block; width: 30%;">● Design and layout standards <li style="display: inline-block; width: 30%;">● Procedures and protocols <li style="display: inline-block; width: 30%;">● Common materials used <li style="display: inline-block; width: 30%;">● Closing in standards and practices <p>Standards Alignments: CCSS: WS 11-12.2; 11-12.5, 11-12.6; RSIT 11-12.2, 11-12.3, 11-12.7; A-CED 1, 4; G-GMD 5; G-GPE 5; G-SRT 8.0 NGSS: SEP 3, 4, 5; PS 2.A; ETS 1.A, 1.B, 1.C; CC 3, 4, 6, 7</p>		
Key Assignments	CTE Anchor Standards	CTE Pathway Standards

<p>✓ Key Assignment: Students will create their own “story pole” which will contain all the measurements (to 1/16th” accuracy) needed to identify the lengths of headers, studs, trimmers and cripples in wall systems.</p> <p>Assessment: Observation, teacher conference, completed project</p>	5.0, 7.0, 10.0,	D 1.2, D 2.1
<p>✓ Key Assignment: Students will work in groups to estimate needed materials and costs to create a cut list for one wall of a 4-wall system using their own “story pole” to accurately and efficiently measure headers, studs, trimmers and cripples. Students will collaboratively design, draw and identify all components by name and purpose. After each team completes their wall, four teams will collaboratively assemble a building on the previously constructed floor</p> <p>Assessment: cost list, estimation sheet, quiz, observation, gallery walk, peer and self assessment, critique, completed projects</p>	2.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0,	D 1.1, D 1.2, D 2.1, D 2.2, D 2.3, D 3.1, D 3.2, D 3.3, D 6.5, D 6.6, D 6.9
<p>✓ Key Assignment: Using a level and plumb bob, students will plumb, level and brace each previously built wall section. Students collaboratively use a level and plumb bob to straighten misaligned wall systems; using temporary bracing techniques to hold in place.</p> <p>Assessment: observation, rubrics, peer and self assessment</p>	2.0, 5.0, 9.0, 10.0	D 6.7, D 6.8
<p>✓ Key Assignment: Using previously built walls, students will work independently to determine window placement based on aesthetics and functionality. Students will choose which window to install, perform installation and waterproof to industry standards.</p> <p>Assessment: Oral questioning, observation, rubric, critique, peer and self assessment</p>	2.0, 5.0, 10.0	D 6.9, D 8.6, D 8.7, D 8.8, D 8.11, D 9.2

Unit 7: Roof/ Ceiling Framing	40 Hours
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In this unit, students will identify roof styles, calculate rafter lengths, cut and install roof rafters on varying style roof systems.

- Rafter length calculations
- Material estimations
- Span calculations
- Ventilation
- Industry vocabulary
- Heat/cold transfer

Standards Alignments:
CCSS: WS 11-12.2; RSIT 11-12.2, 11-12.3, 11-12.7; A-CED 1, 4; G-GMD 5; G-GPE 5; G-SRT 8
NGSS: SEP 3, 4, 5; ETS 1.A, 1.B, 1.C; CC 3, 4, 6, 7

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Using a roof pitch chart as reference, students will determine the roof slope by using the run/rise ratio and pythagorean theorem.</p>	5.0, 10.0	D 2.1, D 2.2, D 2.3

Assessment: observation, oral questioning, exit card, calculations check		
<p>✓ Key Assignment: Given the specifications for a theoretical roof, students will individually create a spreadsheet to capture all materials, dimensions, weight and costs associated with building the waterproof roof. In addition, students will create a blueprint of the given roof at ¼" = 1' scale using all industry standard symbols.</p> <p>Assessment: observation, oral questioning, exit card</p>	5.0, 10.0	D 2.3
<p>✓ Key Assignment: Students will engage in all aspects of the design and build of a roof for a class built structure including proper ventilation. They will work in collaborative teams to create a spreadsheet to capture all materials, dimensions, weight and costs associated with building the waterproof roof. In addition, students will create a blueprint of the given roof at ¼" = 1' scale using all industry standard symbols. Students will propose their roof to the instructor and defend their choices. Students will cut and install rafters within 1/16" inch accuracy, using safe ladder practices and industry standard procedures.</p> <p>Assessment: student conference, oral questioning, observation, quiz, peer and self assessment</p>	2.0, 5.0, 6.0, 7.0, 8.0, 10.0	D 2.2, D 6.1, D 6.10, D 6.11, D 6.12, D 6.13, D 6.14, D 6.15, D 6.16

Unit 8: Green Technology	30 Hours
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In this unit, students will gain knowledge of Green Technology, including: building practices, building materials, insulation (R value) technology, conservation methods, industry standards and career pathways.

- Research "R values" by region
- Careers in industry
- Industry certifications
- Building code standards
- Environmental concerns

Standards Alignments:

CCSS: WS 11-12.2; RSIT 11-12.2, 11-12.3, 11-12.7

NGSS: ETS 1.A, 1.B, 1.C, 2.A, 2.B

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Students will research various alternative energy sources and consider the pros/cons and local environmental impact of their chosen topic. They will summarize their findings in written or pictorial format and defend their choices.</p> <p>Assessment: observation, discussion, peer collaboration</p>	2.0, 4.0, 5.0, 6.0, 7.0, 8.0,	D 9.0
<p>✓ Key Assignment: Students will Research R-values for cold/hot climates and using a map of the United States, color code their findings.</p>	2.0, 4.0, 5.0, 6.0, 7.0, 8.0,	D 9.2, D 9.4

Assessment: oral questions, group chart, quiz		
<p>✓ Key Assignment: Students will research industry certifications needed to work in the Green Technology industry and locate a variety of local colleges and courses that offer programs in their desired path.</p> <p>Assessment: oral presentations, peer and self assessment, teacher conference, discussion</p>	2.0, 4.0, 5.0, 6.0, 7.0, 8.0,	D 9.6

Unit 9: Symbols, Schematics and Drawings	90 Hours
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Students will explore building drawings to determine dimensions, symbols, layout of floors, walls, and roof framing components.

- Schematics
- Building drawings
- Construction symbols

Standards Alignments:
CCSS: WS 11-12.2; **RSIT** 11-12.2, 11-12.3, 11-12.7;
NGSS: CC 3

Key Assignments	CTE Anchor Standards	CTE Pathway Standards
<p>✓ Key Assignment: Students will work in teams of two to accurately measure the construction technology classroom, including: floor space dimensions windows, doors, furniture, lighting fixtures, tables, chairs, floor and wall cabinets. Using a tape measure/ruler students will draw their own blueprint to scale (¼” to 1 foot) utilizing industry standard symbols and measurements to identify building components and their sizes. Students will display their blueprints for class critique and the class will vote for the most effective presentation.</p> <p>Assessment: gallery walk, student critique, teacher assessment</p>	2.0, 5.0, 9.0, 10.0	D 2.1, D 3.1 D 3.2, D 3.3, D 3.5, D 3.6
<p>✓ Key Assignment: Working in groups, students will receive a teacher supplied drawing of an existing building and determine materials used for all windows, doors and flooring areas of specific rooms, calculate roof angles, thickness of walls and determine quantities of materials used. Students will create charts, lists, and spreadsheets to research mandated specifications. Using chalk lines in the parking lot, students will create a virtual floor plan to specifications.</p> <p>Assessment: critique, student instructor conference, quiz, document individual and collaborative research findings.</p>	2.0, 4.0, 5.0, 9.0,	D 2.1, D 2.3, D 4.1, D 4.2

Instructional Materials

Textbooks:	Electronic Media/Supplemental Print Materials/Online Resources:
<p>Modern Carpentry 12th edition Wagner & Smith - Goodheart-Willcox Publisher ©2016 ISBN 978-1-63126-083-4</p> <p>Print Reading for Construction 6th edition Walter C Brown, Daniel P Dorfmueller - Goodheart Willcox ©2016 ISBN 978-1-60525-802-7</p>	<ul style="list-style-type: none"> ● 3D Home Architect CAD ● Mechanical drawing tools ● The Rafter Book: A modern Handbook for Roof Framers -David Mahin - McIntire Joseph Publishing 1995 ISBN 0-9647784-0-8 ● Craigslist ● Homedepot.com ● fafsa.gov ● OSHA.gov ● skillsusa.org ● strongtie.com

Standards Assessed in this Course

CTE Anchor Standards:

- 1.0 Academics: Academics standards are aligned to pathways; see below.
- 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.

Industry Sector: Building and Construction Trades - Industry Pathway: Residential and Commercial Construction

D 1.0 Recognize the impact of financial, technical, environmental, and labor trends on the past and future of the construction industry.

- D 1.1 Understand significant historical trends in the construction industry.
- D 1.2 Understand the environmental regulations that influence residential and commercial design.
- D 1.3 Demonstrate knowledge of the California Environmental Quality Act (CEQA) and Environmental Impact Review (EIRs) impacts on residential and commercial construction.

D 2.0 Apply the appropriate mathematical calculations used in the construction trades.

- D 2.1 Apply formulas to determine area, volume, lineal, board, and square feet.
- D 2.2 Apply the Pythagorean Theorem to calculate pipe offsets, roof slope, and check for square.
- D 2.3 Estimate the materials needed to complete a specific task.
- D 2.4 Determine the total developed length of the water supply piping system.
- D 2.5 Calculate the residual pressure at the highest outlet per the requirements of the Plumbing Code.
- D 2.6 Calculate the total fixture unit demand from the fixtures indicated on the construction drawings using the tables of the plumbing code.
- D 2.7 Calculate the proper slope for drain, waste and vent (DWV) piping.
- D 2.8 Apply Ohm's Law to calculate resistance, current flow, and voltage in series, parallel, and combination circuits.
- D 2.9 Calculate the load on an electrical system from general lighting and small and large appliances.

D 3.0 Interpret and apply information from technical drawings, schedules, and specifications used in the construction trades.

- D 3.1 Identify the elements used in technical drawings, including types of lines, symbols, details, and views.
- D 3.2 Identify and interpret the elements of technical drawings, including plan, elevation, section, and detail views.
- D 3.3 Interpret technical drawings specifications.
- D 3.4 Identify plumbing, electrical, and mechanical symbols and other abbreviations used in construction drawings.
- D 3.5 Interpret and scale dimensions from a set of plans using an architect's scale.
- D 3.6 Interpret sectional and detail drawings to determine construction details such as corners, rough openings, stairs, and roof systems.
- D 3.7 Understand the sequencing and phases of residential and commercial construction projects.

D 4.0 Demonstrate techniques for proper site preparation.

- D 4.1 Use leveling devices to check for elevation, level, and plumb.
- D 4.2 Demonstrate how to establish grades using survey instruments.
- D 4.3 Install batter boards.

- D 4.4 Check site layout for square using the diagonal method.
- D 4.5 Describe excavation and backfill methods.
- D 4.6 Identify different methods and equipment used for compaction.
- D 4.7 Identify types of backfill materials and how they are used.
- D 5.0 Demonstrate foundation layout techniques to include setting forms, placing reinforcements, and placing concrete according to construction drawings, specifications, and building codes.**
- D 5.1 Describe the sequencing procedures for placing large and small slabs.
- D 5.2 Demonstrate how to establish elevations for concrete structures.
- D 5.3 Lay out location and elevation of concrete/masonry structures based on construction drawings.
- D 5.4 Develop a material take-off in accordance with construction drawings and specifications.
- D 5.5 Lay out location for reinforcements, expansion joints, openings, and embedded items based on construction drawings, specifications, and building codes.
- D 5.6 Construct, place, and brace forms for concrete as detailed in construction drawings for footings, slab, and raised floors.
- D 5.7 Place and secure reinforcement as detailed by construction drawings, building codes, and industry standards.
- D 5.8 Place secure embedded hardware as detailed on construction drawings.
- D 5.9 Demonstrate proper removal and care of concrete forms.
- D 5.10 Use appropriate tools and techniques for placing, compacting, screeding, and finishing consolidating concrete in slabs and footings.
- D 6.0 Demonstrate carpentry techniques for the construction of a single-family residence.**
- D 6.1 Properly place a moisture barrier and pest control guard on a foundation.
- D 6.2 Attach a sill plate at top of concrete foundation.
- D 6.3 Lay out, cut, and install joist supports, rim joists, and floor joists as specified on construction plans.
- D 6.4 Install a subfloor.
- D 6.5 Demonstrate wall and plate layout, including rough openings.
- D 6.6 Measure, cut, and assemble wall components using appropriate tools and fasteners.
- D 6.7 Demonstrate the ability to square wall systems and install wall bracing and shear panels according to code.
- D 6.8 Stand, square, plumb, and brace walls.
- D 6.9 Describe the applications and uses of metal stud framing.
- D 6.10 Lay out, cut, and install ceiling joists and common and jack rafters.
- D 6.11 Frame and erect shed and gable roof systems.
- D 6.12 Lay out and install trusses “on-center” with specified hardware.
- D 6.13 Install appropriate blocking, bracing, lookouts, fascia, and drip edge.
- D 6.14 Frame for roof penetrations and attic access.
- D 6.15 Apply roof sheathing and install appropriate flashings.
- D 6.16 Understand different roofing materials and methods of application.



D 7.0 Demonstrate proper installation techniques of interior finish materials and protective finishes.

- D 7.1 Identify types and uses of wall finishing materials.
- D 7.2 Cut, fit, and install gypsum wallboard onto a framed wall using appropriate fasteners.
- D 7.3 Describe the finishes and textures for gypsum wallboard.
- D 7.4 Properly prepare walls to receive protective finishes.
- D 7.5 Apply finishes according to specifications and industry standards.
- D 7.6 Identify types and application of finish flooring materials.
- D 7.7 Install pre-hung interior doors.
- D 7.8 Install interior trim and casework.

D 8.0 Demonstrate the application of exterior finish materials and protective finishes in building construction.

- D 8.1 Describe the installation procedures and techniques of masonry siding materials.
- D 8.3 Install wood, vinyl, and/or manufactured siding.
- D 8.4 Demonstrate preparation techniques for applying exterior paint and stain.
- D 8.5 Apply exterior paint and stain according to specifications.
- D 8.6 Describe various types and uses of doors and windows used in building construction.
- D 8.7 Install pre-hung windows and doors using appropriate flashing and trim.
- D 8.8 Caulk and seal joints to prevent air and moisture infiltration and increase energy efficiency.
- D 8.9 Install vents for efficient attic and crawl space ventilation.
- D 8.10 Install various types of floor, wall, and ceiling thermal insulation.
- D 8.11 Describe mold-prevention techniques.

D 9.0 Understand, integrate, and employ sustainable construction practices in the building trades.

- D 9.1 Identify design and energy solutions for improving building energy efficiency.
- D 9.2 Identify materials used in building construction to increase energy efficiency and sustainability.
- D 9.3 Calculate energy requirements and loads for buildings and structures.
- D 9.4 Demonstrate the application of constructing materials intended to improve building efficiency and sustainability.
- D 9.5 Analyze and evaluate buildings for energy efficiency and performance.
- D 9.6 Develop solutions to improve building energy performance and efficiency.

D 10.0 Demonstrate skills necessary to complete a plumbing system in a single-family residence in accordance with accepted industry standards.

- D 10.1 Demonstrate techniques for cutting, deburring, and joining metallic and nonmetallic water piping.
- D 10.2 Lay out and install hot and cold water piping to fixture locations as indicated on the construction documents.
- D 10.3 Perform pressure test of an installed piping system.
- D 10.4 Install fastened in-place fixture valves and shut-off valves as indicated on construction drawings.
- D 10.5 Install and secure proper drainage piping to fixture locations.

- D 10.6 Determine the proper slope for DWV piping using hand levels, laser levels, and transits.
- D 10.7 Install traps and vents as indicated by construction drawings, specifications, and government codes.
- D 10.8 Install angle stops at water supply stub outs.
- D 10.9 Install plumbing fixtures.
- D 10.10 Connect the water supply to faucets and water closets.
- D 10.11 Connect fixture tailpieces to fixtures and to traps.
- D 10.12 Check for the proper functioning of fixtures.
- D 11.0 Demonstrate skills necessary to complete an electrical system in a single-family residence in accordance with accepted industry standards.**
- D 11.1 Determine whether or not an electrical circuit is “live.”
- D 11.2 Prepare rough framing for the installation of electrical cables and conduit.
- D 11.3 Lay out components to the tolerances indicated on the construction drawings, specifications, and government codes.
- D 11.4 Install typical devices, junction boxes, and panels.
- D 11.5 Install lighting and ceiling fan support boxes according to the National Electrical Code (NEC).
- D 11.6 Install conduit typical of residential construction and pull conductors through conduit as required by the NEC.
- D 11.7 Splice and tap conductors for the installation of fixtures and devices.
- D 11.8 Install low voltage control and communication cables.
- D 11.9 Demonstrate grounding techniques for all electrical boxes, cabinets, and enclosures.
- D 11.10 Terminate electrical connections to receptacles, switches, lighting fixtures, large appliances, and other devices.
- D 11.11 Select receptacles and switches based on load requirements.
- D 11.12 Terminate equipment grounding and neutral conductor at the electrical service.
- D 11.13 Terminate communication and control wiring.

Common Core State Standards:

Language Standards – LS – (Standard Area, Grade Level, Standard #)

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

Reading Standards for Informational Text – RSIT – (Standard Area, Grade Level, Standard #)

- 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.
- RSIT 11-12.3 Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.
- RSIT 11-12.7 Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

Writing Standards – WS – (Standard Area, Grade Level, Standard #)

- WS 11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
- WS 11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- WS 11-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose A3.0 B1.0 C1.0 and audience.
- 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 A3.0, A5.0, A7.0 B3.0, B6.0 arguments or information.

Writing Standards for Literacy in History/Social Studies, Science and Technical Subjects – WHSST – (Standard Area, Grade Level, Standard #)

- WHSST 11-12.4. Produce clear and coherent writing in which the development, organization, and A1.0 style are appropriate tot task, purpose, and audience.
- WHSST 11-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Math Standards – Algebra – Creating Equations – A-CED (Standard Area, Grade Level, Standard #)

- A-CED 1 Create equations and inequalities in one variable including ones with absolute value and use them to solve problems in and out of context, including equations arising from linear functions.
- A-CED 4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in equations. For example, rearrange Ohm’s law $V = IR$ to highlight resistance R .

Math Standards – Geometry – Geometric Measurement and Dimensions – G-GMD (Standard Area, Grade Level, Standard #)

- G-GMD 5 Determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.

Math Standards – Geometry – Expressing Geometric Properties with Equations – G-GPE (Standard Area, Grade Level, Standard #)

- G-GPE 5 Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.

Math Standards – Geometry – Similarity, Right Triangles and Trigonometry – G-SRT (Standard Area, Grade Level, Standard #)

- G-SRT 8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Math Standards – Functions – Trigonometric Functions – F-TF (Standard Area, Grade Level, Standard #)

- F-TF 1.1 Understand the notion of angle and how to measure it, in both degrees and radians. Convert between degrees and radians.

Next Generation Science Standards:

<u>Scientific and Engineering Practices</u>		<u>Disciplinary Core Ideas</u>		<u>Crosscutting Concepts</u>	
SEP 2	Developing and using models	PS 1.B	Structure and Properties of Matter: chemical reactions	CC 3.	Scale, proportion, and quantity
SEP 3	Planning and carrying out investigations	PS 2.A	Motion and Stability: Forces and Interactions	CC 4.	Systems and system models
SEP 4	Analyzing and interpreting data			CC 6.	Structure and function
				CC 7.	Stability and change

SEP 5 Using mathematics and
computational thinking

PS 3.A Definitions of Energy
ETS1.A Defining and Delimiting
Engineering Problems
ETS1.B Developing Possible Solutions
ETS1.C Optimizing the Design Solution