



# Regional Occupational Program

## Welding and Metal Fabrication 2

### 2025-2026

#### COURSE DESCRIPTION

This course is designed to train students for entry-level positions in welding and metal fabrication in relationship to the industry sectors of Agriculture and Natural Resources, Manufacturing and Product Development, and Transportation. Building upon the Welding and Metal Fabrication Occupations I course, students will continue in-depth instruction in the following welding processes: shielded metal arc, oxy-fuel, gas metal arc, flux cored arc, and gas tungsten. Students will learn how to use different tools and equipment designed for metal fabrication with practical applications in each industry related area. The course is based on established American Welding Society (AWS) Guidelines for an entry-level welder. Representative topics include the interpretation and layout of welded and assembled-part prints, cutting, mechanical bonding, joining, cohesive bonding, adhesive bonding, and mechanical fastening.

#### Course Information

Course Length: 1 Year  
 Prerequisite: None  
 Course Level: Capstone  
 UC: No  
 Articulated: No  
 Industry Cert.: No  
 Industry Sector: Manufacturing and Product Development  
 Pathway: Welding and Materials Joining  
 CALPADS: 8231

#### O\*Net SOC Codes

47-2211 Sheet Metal Workers  
 51-4121 Welders, Cutters, Solderers, and Brazers

#### Legend

CTE - PS CTE Pathway Standards  
 CRP Career Ready Practices  
 CTE - AS CTE Anchor Standards  
 CCSS Common Core State Standards  
 ISTE International Society for Technology in Education

*Includes updates from 24/25 Manufacturing Advisory  
[Advisory Minutes](#)*

## Welding and Metal Fabrication 2

### Course Orientation

- a. Discuss objectives for this course, including competencies, teacher expectations, classroom policies, and procedures.
- b. Identify and discuss the acquisition of transferable skills (communication, collaboration, creativity, and critical thinking) and their importance to being college and career ready and for future personal and professional success.
- c. Review objectives, competencies, and course syllabus.
- d. Discuss student and teacher expectations, including behavior, class rules, appropriate dress, pre-course knowledge, and grading policies, including enrollment and attendance requirements and procedures, and classroom/school safety and disaster procedures.
- e. Discuss next steps in course sequence related to the career pathway, the need for reinforcement of basic skills, transferrable skills, and postsecondary and career options.
- f. Discuss the Big Six: Career Ready Essentials and the Standards for Career Ready Practice as they relate to this course, all aspects of the industry sector, and being college and career ready.

### Big Six: Career Ready Essentials

1. Effective Communication	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ol style="list-style-type: none"> <li>a. <b>Demonstrate effective verbal communication and conflict resolution skills.</b></li> <li>b. <b>Use the writing process to develop written communication with the appropriate tone, organization, and format for the identified audience.</b></li> <li>c. Explain the effect of interpersonal skills on one's ability to communicate effectively and develop relationships.</li> <li>d. Describe the impact of ineffective communication on business relationships.</li> <li>e. Analyze the impact of vocabulary, body language, and tone on verbal communication.</li> <li>f. Demonstrate active listening skills.</li> <li>g. Accurately interpret industry-specific written communication.</li> <li>h. Model responsible and effective use of various communication technologies.</li> <li>i. Identify valid and reliable digital reference and resource materials.</li> <li>j. Gather information from multiple digital sources to compare and contrast, synthesize, and summarize.</li> <li>k. Identify and use appropriate communication and collaboration technologies.</li> <li>l. Utilize technology to problem solve, accomplish tasks, and to produce or publish products.</li> </ol>		<u>1</u> <u>2</u> <u>11</u>	<u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>SLS</u> <u>11-12.2</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u>  <u>WS</u> <u>11-12.7</u> <u>11-12.6</u>	<u>1b,c</u> <u>2c</u> <u>3b,c</u>  <u>5c</u> <u>6b,c,d</u>
2. Collaboration, Creativity, and Critical Thinking	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<ol style="list-style-type: none"> <li>a. <b>Demonstrate critical thinking skills for a variety of purposes and in different settings.</b></li> <li>b. <b>Collaborate to reach consensus on an identical objective through the sharing of knowledge, tasks, and learning.</b></li> <li>c. Discuss the importance of the critical thinking process to real-world applications.</li> </ol>		<u>2</u> <u>4</u> <u>5</u> <u>7</u>	<u>2</u> <u>3</u> <u>4</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>	<u>1c</u> <u>3c,d</u> <u>4a-d</u> <u>5c,d</u>

<ul style="list-style-type: none"> <li>d. Evaluate the impact of creative thinking on problem solving and innovation in real-world applications.</li> <li>e. Compile work that demonstrates the process used to (elaborate, refine, analyze) evaluate original ideas and maximize creative efforts.</li> <li>f. Apply divergent and convergent thinking to the development of an original idea or solution.</li> <li>g. Examine real-world limits to adopting ideas.</li> <li>h. Demonstrate creative thinking (preparation, insight, evaluation, elaboration, and communication) to create a new idea or concept.</li> <li>i. Assume shared responsibility for collaborative work, and value the individual contributions made by each team member.</li> <li>j. Evaluate evidence, arguments, claims, and beliefs to identify connections.</li> <li>k. Identify bias, prejudice, propaganda, self-deception, distortion, and misinformation.</li> <li>l. Produce intellectual, informational, or material products that serve an authentic purpose.</li> <li>m. Work effectively and respectfully with those from diverse backgrounds or cultures.</li> <li>n. Demonstrate respect, trust, commitment, and the ability to compromise in collaborative projects.</li> </ul>		<u>9</u> <u>10</u> <u>11</u>	<u>5</u> <u>7</u> <u>8</u> <u>9</u> <u>11</u>	<u>SLS</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u> <u>11-12.2</u>  <u>WS</u> <u>11-12.7</u> <u>11-12.6</u>	<u>6c</u> <u>7b,c,d</u>
<b>3. Leaders and Teams: Roles and Responsibilities</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Determine the individual and team members' roles and responsibilities.</b></li> <li>b. <b>Demonstrate leadership skills and qualities (i.e., reliability, negotiation skills, initiative, positive reinforcement, recognition of others' efforts, problem-solving skills, conflict resolution, and delegation).</b></li> <li>c. Explain the importance of technical, social, and communication skills to team success.</li> <li>d. Compare and contrast leadership styles and their effectiveness in various situations.</li> <li>e. Organize and delegate responsibilities in a team setting to encourage ideas, perspectives, and contributions from all team members.</li> <li>f. Develop a strong sense of team identity by brainstorming solutions, volunteering, assisting others, practicing respect and courtesy, and taking initiative.</li> <li>g. Examine situations in which a follower becomes the leader.</li> <li>h. Describe twenty-first-century skills required across all occupations.</li> <li>i. Identify and discuss the characteristics of a successful team (i.e., leadership, cooperation, and effective decision-making).</li> <li>j. Leverage social and cultural differences to increase innovation and quality of work.</li> </ul>		<u>7</u> <u>8</u> <u>9</u>	<u>3</u> <u>7</u> <u>8</u> <u>9</u> <u>11</u>	<u>SLS</u> <u>11-12.2</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u>  <u>WS</u> <u>11-12.6</u>	<u>7a,c</u>
<b>4. Legal, Ethical, and Environmental Considerations</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Demonstrate industry specific ethical and legal practices.</b></li> <li>b. <b>Identify eco-friendly industry specific practices and resources.</b></li> <li>c. Identify local, state, and federal regulatory agencies, entities, laws, and regulations.</li> </ul>		<u>5</u> <u>7</u> <u>8</u>	<u>3</u> <u>5</u> <u>7</u>	<u>WS</u> <u>11-12.6</u> <u>11-12.7</u>	<u>2a,b</u> <u>3a,b</u> <u>5c</u>

<ul style="list-style-type: none"> <li>d. Identify discrimination based on race, nationality, religion, gender, age, disability, or sexual orientation.</li> <li>e. Summarize the ethical and legal implications of workplace discrimination and harassment.</li> <li>f. Explain the concept of corporate citizenship.</li> <li>g. Examine an employer's role in protecting the health and welfare of employees, the community, and the environment.</li> <li>h. Analyze current environmental laws and regulations and their impact on industry.</li> <li>i. Compare and contrast both society's and industry's impact on the environment.</li> </ul>		<u>12</u>	<u>8</u> <u>9</u> <u>11</u>	<u>SLS</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u> <u>11-12.2</u>	<u>6c</u>
<b>5. Personal Growth and Career Planning</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Demonstrate continued personal development and growth.</b></li> <li>b. <b>Develop and manage a personal growth and career plan.</b></li> <li>c. Explain the relationship between sound financial habits and financial security.</li> <li>d. Create and manage a personal financial plan.</li> <li>e. Demonstrate initiative in achieving personal and professional goals.</li> <li>f. Apply time management strategies to meet deadlines.</li> <li>g. Demonstrate a growth mindset through flexibility and a positive attitude.</li> <li>h. Select and demonstrate appropriate job-search and retention techniques.</li> <li>i. Demonstrate strategies to prepare for employment.</li> <li>j. Demonstrate interpersonal skills appropriate for the workplace.</li> <li>k. Elaborate on the importance of perseverance to personal and professional success.</li> <li>l. Discover personal career interests, aptitudes, and skills.</li> </ul>		<u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>6</u>	<u>2</u> <u>3</u> <u>4</u> <u>7</u> <u>8</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>SLS</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u> <u>11-12.2</u>  <u>WS</u> <u>11-12.6</u>	<u>1a</u> <u>3a,c</u> <u>4d</u> <u>6a,d</u> <u>7b</u>
<b>6. Workplace Safety and Personal Wellness</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Demonstrate proper industry specific safe work practices to prevent injury or illness.</b></li> <li>b. <b>Assess the potential impact of goal setting on personal and professional success.</b></li> <li>c. Describe the role of security and emergency procedures in workplace safety.</li> <li>d. Describe the effect of preventative measures on emergencies in the workplace.</li> <li>e. Identify and describe the causes, prevention, and treatment of common accidents.</li> <li>f. Identify local, state, and federal agencies that regulate workplace safety.</li> <li>g. Explain the role of the California Occupational Safety and Health Administration (Cal-OSHA) and the Environmental Protection Agency (EPA).</li> <li>h. Discuss the basics of system operations.</li> <li>i. Demonstrate the proper use of personal protective equipment (PPE).</li> <li>j. Explain the purpose of and accurately interpret a Safety Data Sheet (SDS).</li> <li>k. Identify hazardous materials and chemicals.</li> <li>l. Demonstrate proper procedures to respond to work-related accidents and injuries.</li> <li>m. Describe how ergonomics, housekeeping, and maintenance are related to accidents and injuries.</li> </ul>		<u>2</u> <u>5</u> <u>6</u> <u>8</u> <u>12</u>	<u>2</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>10</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>WS</u> <u>11-12.7</u> <u>11-12.6</u>  <u>SLS</u> <u>9-10</u> <u>11-12.1</u> <u>11-12.1d</u>	<u>1a,d</u> <u>2a,d</u> <u>5b</u>

n. Demonstrate cyber ethics, cyber safety, and cybersecurity.					
o. Assess the potential impact of preventative physical and mental health measures on workplace safety.					

## Welding and Metal Fabrication 2 Units of Instruction

7. Blueprint Reading and Layout	CTE-PS	CRP	CTE- AS	CCSS	ISTE
<p><b>a. Interpret and demonstrate the planning and layout operations used in the welding processes.</b></p> <p>b. Interpret scaled welding blueprints; gather design and materials information; perform calculations; and use the detail to plan, lay out, and produce parts or finished products.</p> <p>c. Analyze welding symbols on drawings, specifications, and welding procedure specifications</p> <p>d. Distinguish layout and construction techniques based on blueprints and sketches.</p> <p>e. Critique the design parameters across welding processes to produce a welded part or product.</p> <p>f. Interpret enlarged and reduced scale on a blueprint.</p> <p>g. Identify various welding codes.</p>	<a href="#">C1.0</a> <a href="#">C1.2</a> <a href="#">C1.3</a> <a href="#">C1.4</a>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<a href="#">LS</a> <a href="#">9-10</a> <a href="#">11-12.6</a>  <a href="#">WS</a> <a href="#">11-12.7</a>	
8. Metal Fabrication and Machining	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<p><b>a. Understand and demonstrate how materials can be processed through the use of welding tools, equipment and machining processes.</b></p> <p>b. Shape, expand and shrink metal by hand using mechanical processes.</p> <p>c. Perform the following operations: drilling, counter sinking, spot facing, and tapping.</p> <p>d. Compare and contrast the physical qualities of various industrial materials and how these qualities affect the ability of the materials to be processed to produce useful welded or machined parts and products.</p> <p>e. Analyze and identify the steps to check for distortion, joint misalignment, and poor fit-up before and after assembly.</p> <p>f. Evaluate and know how to troubleshoot performance problems of welding techniques.</p> <p>g. Measure work with precision instruments.</p> <p>h. Set up machines to perform turning, boring, threading, and facing operations.</p>	<a href="#">C2.0</a> <a href="#">C2.4</a> <a href="#">C5.4</a> <a href="#">C5.6</a>	<u>1</u> <u>2</u> <u>5</u> <u>10</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<a href="#">LS</a> <a href="#">9-10</a> <a href="#">11-12.6</a>  <a href="#">WS</a> <a href="#">11-12.7</a>	
9. Metallurgy	CTE - PS	CRP	CTE - AS	CCSS	ISTE
<p><b>a. Understand different methods of heat-treating materials, finishing processes and the difference between various types of finishing materials used in the manufacture of parts and products.</b></p> <p>b. Employ and explain the steps to be taken, and the choices to be made, in finishing specific parts or products.</p> <p>c. Distinguish physical properties of various types of metals and the significance of each.</p>	<a href="#">C4.0</a> <a href="#">C4.1</a> <a href="#">C4.2</a> <a href="#">C4.3</a>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<a href="#">LS</a> <a href="#">9-10</a> <a href="#">11-12.6</a>  <a href="#">WS</a> <a href="#">11-12.7</a>	

<ul style="list-style-type: none"> <li>d. Distinguish various filler metals.</li> <li>e. Assess how to select an appropriate finishing process to meet the design criteria of a specific product.</li> <li>f. Understand the use of tooling and fixtures to prevent metal distortion.</li> </ul>					
<b>10. OXY-Fuel Cutting</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Understand the principles of oxy-fuel cutting.</b></li> <li>b. Demonstrate the assembly of oxy-fuel cutting equipment.</li> <li>c. Demonstrate the correct and safe adjustment of oxy-fuel work pressure.</li> <li>d. Demonstrate free hand cutting.</li> <li>e. Demonstrate beveling.</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.2</u> <u>C2.3</u>	<u>2</u> <u>5</u> <u>6</u> <u>11</u>	<u>2</u> <u>5</u> <u>6</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>RSTS</u> <u>9-10</u> <u>11-12.4</u>  <u>WS</u> <u>11-12.7</u>	
<b>11. Plasma Arc Cutting</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Explain and demonstrate safety measures and procedures as they apply to plasma arc cutting.</b></li> <li>b. Identify various gases used in plasma arc cutting.</li> <li>c. Use direct and alternating current in plasma arc cutting.</li> <li>d. Distinguish various ferrous, non-ferrous, and alloy steels that may be cut by plasma arc cutting.</li> <li>e. Understand regulators and working pressures.</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.2</u>	<u>1</u> <u>2</u> <u>5</u> <u>6</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>6</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>RSTS</u> <u>9-10</u> <u>11-12.4</u>  <u>WS</u> <u>11-12.7</u>	
<b>12. Shielded Metal Arc Welding</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Operate various arc-welding machines.</b></li> <li>b. Distinguish electrode classification and size.</li> <li>c. Select and understand use of various fillers.</li> <li>d. Select correct current and polarity.</li> <li>e. Demonstrate the correct electrode angle, striking and maintaining an arc, and the correct arc length.</li> <li>f. Build up metal surface with one or more layers of weld deposit.</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.3</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>WS</u> <u>11-12.7</u>	
<b>13. OXY- Fuel/OXY-Acetylene Welding</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Safely set up for various types of regulators, welding tips and work pressures.</b></li> <li>b. Select and use various welding torch tips.</li> <li>c. Demonstrate the safe use of gas and cylinders.</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.3</u>	<u>1</u> <u>2</u> <u>5</u>	<u>1</u> <u>2</u> <u>5</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>	

<ul style="list-style-type: none"> <li>d. Identify various gauges and regulators.</li> <li>e. Select and understand the use of various fillers.</li> <li>f. Demonstrate basic welding positions (flat, horizontal, vertical, and overhead).</li> </ul>		<u>6</u> <u>11</u>	<u>6</u> <u>11</u>	<u>RSTS</u> <u>9-10</u> <u>11-12.4</u>  <u>WS</u> <u>11-12.7</u>	
<b>14. Gas Metal Arc Welding (GMAW)</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Demonstrate proper use of GMAW welding equipment.</b></li> <li>b. Distinguish various uses of GMAW equipment.</li> <li>c. Demonstrate basic weld joints.</li> <li>d. Safely use various types of gases and cylinders.</li> <li>e. Demonstrate basic weld positions (flat, horizontal, vertical, and overhead).</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.3</u>	<u>1</u> <u>2</u> <u>5</u> <u>6</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>6</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>RSTS</u> <u>9-10</u> <u>11-12.4</u>  <u>WS</u> <u>11-12.7</u>	
<b>15. Gas Tungsten Arc Welding (GTAW)</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Demonstrate proper use of GTAW welding equipment.</b></li> <li>b. Distinguish various uses of gas GTAW equipment.</li> <li>c. Explain alternating current (AC) and direct current (DC) as they apply to welding.</li> <li>d. Demonstrate basic weld joints.</li> <li>e. Demonstrate weld skills on ferrous and non-ferrous metals.</li> <li>f. Demonstrate basic weld positions (flat, horizontal, vertical, and overhead).</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.3</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>WS</u> <u>11-12.7</u>	
<b>16. Flux Cored Arc Welding</b>	<b>CTE - PS</b>	<b>CRP</b>	<b>CTE - AS</b>	<b>CCSS</b>	<b>ISTE</b>
<ul style="list-style-type: none"> <li>a. <b>Properly use flux cored arc welding.</b></li> <li>b. Explain various uses of flux cored arc welding.</li> <li>c. Explain electrode classification and size.</li> <li>d. Understand dual shield flux-cored wire.</li> <li>e. Demonstrate basic weld joints.</li> <li>f. Demonstrate basic weld positions (flat, horizontal, vertical, and overhead).</li> </ul>	<u>C2.0</u> <u>C2.1</u> <u>C2.3</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>1</u> <u>2</u> <u>5</u> <u>11</u>	<u>LS</u> <u>9-10</u> <u>11-12.6</u>  <u>WS</u> <u>11-12.7</u>	

## **Standards Alignment**

The curricula have been aligned with the CTE Model Curriculum Standards released in 2013. Each industry sector was updated to meet the increased rigor and relevancy requirements of the Common Core State Standards. The curriculum also includes the new Standards for Career Ready Practices.

### Standards for Career Ready Practice

1. *Apply appropriate technical skills and academic knowledge.*
2. *Communicate clearly, effectively, and with reason.*
3. *Develop an education and career plan aligned with 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 literacy.*
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 and global competence.*
10. *Demonstrate creativity and innovation.*
11. *Employ valid and reliable research strategies.*
12. *Understand the environmental, social, and economic impacts of decisions.*

## CTE Anchor Standards—Common Core English Language Arts Alignment

### *Anchor Standard 1: Academics*

Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the industry sector alignment matrix for identification of standards. Note: alignment listed within each sector.

### *Anchor Standard 2: Communications*

Language Standard: Acquire and accurately use 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. LS 9-10, 11-12.6

### *Anchor Standard 3: Career Planning and Management*

Speaking and Listening Standard: 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. SLS 11-12.2

### *Anchor Standard 4: Technology*

Writing Standard: 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.

### *Anchor Standard 5: Problem Solving and Critical Thinking*

Writing Standard: 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, and synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. WS 11-12.7

### *Anchor Standard 6: Health and Safety*

Reading Standards for Science and Technical Subjects: Determine the meaning of symbols, keywords, and other domain-specific words and phrases as they are used in a specific scientific or technical context. RSTS 9-10, 11-12.4

### *Anchor Standard 7: Responsibility and Flexibility*

Speaking and Listening Standard: 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 9-10, 11-12.1

### *Anchor Standard 8: Ethics and Legal Responsibilities*

Speaking and Listening Standard: 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 11-12.1d

### *Anchor Standard 9: Leadership and Teamwork*

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

### *Anchor Standard 10: Technical Knowledge and Skills*

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

### *Anchor Standard 11: Demonstration and Application*

Demonstrate and apply the knowledge and skills contained in the industry-sector anchor standards, pathway standards, and performance indicators in the classroom, laboratory, and workplace settings, and the career technical student organization. Note: no alignment evident for this standard. WS 11-12.6

## CTE Model Curriculum Standards—Industry Sectors and Pathways

### **Manufacturing and Product Development**

#### **C. Welding and Materials Joining Pathway**

- C1.0 *Interpret and demonstrate the planning and layout operations used in the welding processes.*
- C1.2 *Interpret scaled welding blueprints; gather design and materials information; perform calculations; and use the detail to plan, lay out, and produce parts or finished products.*
- C1.3 *Analyze welding symbols on drawings, specifications, and welding procedure specifications.*
- C1.4 *Critique the design parameters across welding processes to produce a welded part or product.*
- C2.0 *Understand and demonstrate how materials can be processed through the use of welding tools and equipment.*
- C2.1 *Introduce joint preparation methods and explain how to identify joint specifications.*
- C2.2 *Use standard and new emerging welding tools and equipment, such as oxygen fuel cutting (OFC), plasma arc cutting (PAC), and carbon arc cutting (CAC) to cut materials for the purpose of completing a finished product that meets the standards of the AWS or a similar industry standard.*
- C2.3 *Use welding tools and equipment such as oxy fuel welding (OFW), shielded metal arc welding (SMAW), gas metal arc welding (GMAW), flux-cored arc welding (FCAW), gas tungsten arc welding (GTAW), forge, and furnace to combine or join manufactured parts and products resulting in a finished product that meets the standards of the AWS or a similar industry standard.*
- C2.4 *Compare and contrast the physical qualities of various industrial materials and how these qualities affect the ability of the materials to be processed to produce useful welded parts and products.*
- C4.0 *Understand finishing processes and the differences between various types of finishing materials used in the manufacture of welded parts and products.*
- C4.1 *Employ and explain the steps to be taken, and the choices to be made, in finishing welded materials.*
- C4.2 *Apply the processes used for finishing welded materials.*
- C4.3 *Assess how to select an appropriate finishing process to meet the design criteria of a specific welded product.*
- C5.4 *Analyze and identify the steps to check for distortion, joint misalignment, and poor fit-up before and after welding.*
- C5.6 *Evaluate and know how to troubleshoot performance problems of welding systems.*

## ISTE Standards for Students

**1. Empowered Learner-** Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, informed by the learning sciences.

*a) Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them, and reflect on the learning process itself to improve learning outcomes.*

*b) Students build networks and customize their learning environments in ways that support the learning process.*

*c) Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways*

*d) Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.*

**2. Digital Citizen-** Students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical.

*a) Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.*

*b) Students engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices.*

*c) Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.*

*d) Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.*

**3. Knowledge Constructor-** Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others.

*a) Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.*

*b) Students evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.*

*c) Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.*

*d) Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.*

**4. Innovative Designer-** Students use a variety of technologies within a design process to identify and solve problems creating new, useful, or imaginative solutions.

*a) Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.*

*b) Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.*

*c) Students develop, test, and refine prototypes as part of a cyclical design process.*

*d) Students exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.*

**5. Computational Thinker-** Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

*a) Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.*

*b) Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.*

*c) Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.*

*d) Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.*

**6. Creative Communicator-** Students communicate clearly and express themselves creatively for a variety of purposes using platforms, tools, styles, formats, and digital media appropriate for their goals.

*a) Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.*

*b) Students create original works or responsibly repurpose or remix digital resources into new creations.*

*c) Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.*

*d) Students publish or present content that customizes the message and medium for their intended audiences.*

**7. Global Collaborator-** Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

*a) Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.*

*b) Students use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.*

*c) Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.*

*d) Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.*