

WELDING TECHNOLOGY

INDUSTRY SECTOR | Manufacturing and Product Development
PATHWAY | Welding and Materials Joining

COURSE ESSENTIAL QUESTION:

COURSE DESCRIPTION:

This course introduces students to various welding techniques. This course provides the knowledge and hands on skills in joining metal. Related areas covered are personal tool and equipment safety, theory of welding processes, equipment set-up, and corrective actions on identified welding problems, operation of welding equipment, beginning welding techniques, and blueprint reading. Hands on activities include: Plasma Arc Cutting (PAC), Oxy-Acetylene Cutting (OAC), and building weld pads and weld joints in Oxy-Acetylene Welding (OAW), and Shielded Metal Arc Welding (SMAW), Activities are conducted in a teamwork environment. Leadership skills are introduced through participation in SKILLS USA, a student leadership/vocational organization. Integrated throughout the course are Common Core State Standards and Career Technical Education Standards, which include safety, communication, technology, ethics, career planning and other employability skills.

INFORMATION:

- A. **Pre-requisite:** 16 years old or a 11th/12th grader
- B. **Abilities Required:** [Click here to enter text.](#)
- C. **Dress Requirement and Grooming:** Must dress code/Industry Standard
- D. **Students must master 75% of the certificate competencies to receive a certificate.**
- E. **Fee:** [Click here to enter text.](#)
- F. **Course Length:** 180 hours
- G. **Textbook:** [Click here to enter text.](#)
- H. **UC a-g Approved:** No
- I. **Industry Certification:** No
- J. **Sequencing to Include a Capstone:** Not Applicable
- K. **Community College Articulation:** Yes
- L. **Common Core Alignment:** Yes
- M. **Community Classroom:** No
- N. **Career Technical Student Organization:** No
- O. **Work- Based Learning:** No

IDEA/THEME: UNIT 1. SHOP SAFETY

ESSENTIAL QUESTION: *Enter Essential Question*

INSTRUCTIONAL HOURS: 38.00 HOURS

Common Core Unit Objective

Personal safety PPE, Electrical hazards, oxy-acetylene safety, welding gases and fumes, housekeeping

Certificate Competencies

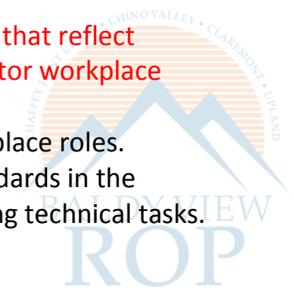
- Critique and utilize shop safety techniques
- Discuss and practice appropriate oxygen-acetylene welding cutting and safety
- Demonstrate ability to properly connect and disconnect welding and cutting equipment.
- Welding safety and practices

Key Assignments

- Oxy-acetylene cutting, welding operations, safety knowledge

Anchor Standards

- 2.0 **Communications:** Acquire and accurately use Manufacturing and Product Design 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.
- 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 Manufacturing and Product Design 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 Manufacturing and Product Design sector workplace environment and community settings. (Direct alignment with SLS 9-10, 11-12.1)
 - 7.2 Explain the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.
- 10.0 **Technical Knowledge and Skills:** Apply essential technical knowledge and skills common to all Pathway Standards in the Manufacturing and Product Design sector, following procedures when carrying out experiments or performing technical tasks.



Pathway Standards

C9.0 Understand how a manufacturing company is organized and the elements of welding production management.

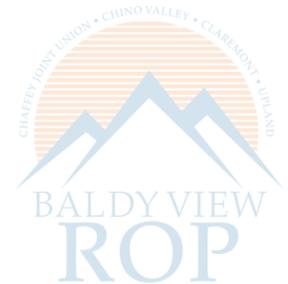
Common Core Standards

RS 11-12.4 Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text.

RESOURCES:

Resources

Resources



IDEA/THEME: UNIT 2. CUTTING METHODS

ESSENTIAL QUESTION: *Enter Essential Question*

INSTRUCTIONAL HOURS: 38.00 HOURS

Common Core Unit Objective

After completing the lesson, the students will be able to demonstrate understanding of welding terminology, material identification, material fit-up, welding processes and electrodes. Students will be able to cut, fit and weld material in various positions.

Certificate Competencies

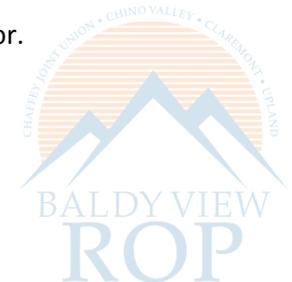
- Identify, review, practice, and demonstrate flame cutting techniques
- Model and practice appropriate flame cutting procedures
- Critique, review, practice, and demonstrate plasma arc cutting techniques
- Describe, review, and practice plasma arc cutting
- Describe how metal length and thickness effects welding techniques
- Demonstrate appropriate safety techniques
- Cutting of templates

Key Assignments

Enter Key Assignments

Anchor Standards

- 2.0 **Communications:** Acquire and accurately use Manufacturing and Product Design sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.
- 10.0 **Technical Knowledge and Skills:** Apply essential technical knowledge and skills common to all pathways in the Manufacturing and Product Design sector, following procedures when carrying out experiments or performing technical tasks. (Direct alignment with WS 11-12.6)
- 10.1 Interpret and explain terminology and practices specific to the Manufacturing and Product Design sector.



Pathway Standards

- C2.0 Understand and demonstrate how materials can be processed through the use of welding tools and equipment.**
 - 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.
- C3.0 Differentiate and apply various types of welding assembly processes.**
 - C3.1 Use welding tools such as OFW, SMAW, GMAW and the equipment and assembly processes appropriate to the design criteria of a specific product that meets the standards of the AWS or similar industry welding standards.
- C6.0 Explore and understand various welding systems that require standard hand and machine tools.**
 - C6.1 Select and use appropriate welding tools, equipment, and inspection devices to manufacture parts or products.

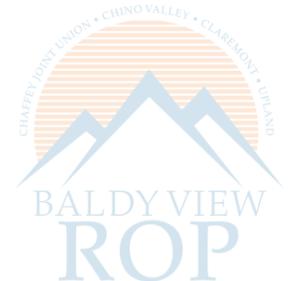
Common Core Standards

- RS 11-12.4 Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text.

RESOURCES:

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IDEA/THEME: UNIT 3. OXY-ACETYLENE WELDING (OAW)

ESSENTIAL QUESTION: *Enter Essential Question*

INSTRUCTIONAL HOURS: 50.00 HOURS

Common Core Unit Objective

After completing the lesson, students will be able to identify and analyze components for the oxy-acetylene process for torch cutting and welding safety required during operation of equipment and material terminology for equipment used.

Certificate Competencies

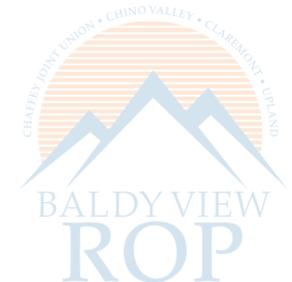
- Identify and model appropriate oxygen-acetylene welding and cutting safety
- Review, practice, and demonstrate basic techniques using oxygen acetylene welding
- Describe, review, practice, and demonstrate brazing techniques

Key Assignments

Enter Key Assignments

Anchor Standards

- 2.0 **Communications:** Acquire and accurately use Manufacturing and Product Design sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.
- 2.2 Identify barriers to accurate and appropriate communication.
- 2.4 Demonstrate elements of written and electronic communication such as accurate spelling, grammar, and format.



Pathway Standards

- C1.0 Interpret and demonstrate the planning and layout operations used in the welding processes.**
 - C1.1 Use current information technology ideation and design process systems in the manufacturing of welded parts and products.
- C2.0 Understand and demonstrate how materials can be processed through the use of welding tools and equipment.
- C3.0 Differentiate and apply various types of welding and assembly processes.**
 - C3.1 Use welding tools such as OFW, SMAW, GMAW, forge, and furnace and the equipment and assembly processes appropriate to the design criteria of a specific product that meets the standards of the AWS or similar industry welding standards.
- C5.0 Understand and defend the purposes and processes of inspection and quality control in welding manufacturing processes.**
 - C5.1 Identify and explain weld imperfections and their causes.
 - C5.4 Analyze and identify the steps to check for distortion, joint misalignment, and poor fit-up before and after welding.
- C6.0 Explore and understand various welding systems that require standard hand and machine tools.**
 - C6.1 Select and use appropriate welding tools, equipment, and inspection devices to manufacture parts or products.
- C8.0 Understand various joining or combining processes, including welding processes used in manufacturing, maintenance, and repair.**
 - C8.1 Recognize the importance of base metal preparation and joint fit-up and alignment.
- C9.0 Understand how a manufacturing company is organized and the elements of welding production management.**
 - C9.1 Know how scheduling, quality control, accident prevention, and inventory control are used efficiently and appropriately in a welding production management system.

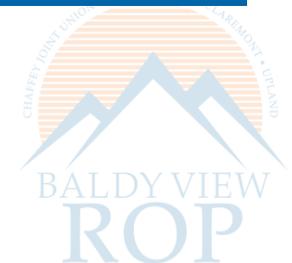
Common Core Standards

- RS 11-12.4 Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text.

RESOURCES:

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IDEA/THEME: UNIT 4. SHIELDED METAL ARC WELDING (SMAW)

ESSENTIAL QUESTION: *Enter Essential Question*

INSTRUCTIONAL HOURS: 50.00 HOURS

Common Core Unit Objective

Students will learn welding procedures, electrode identification, welding in the flat, horizontal, vertical and overhead positions, current setting.

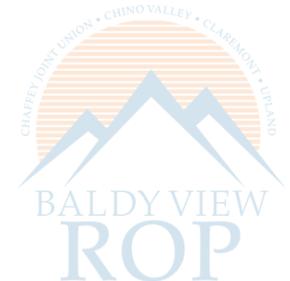
Certificate Competencies

- Describe and demonstrate appropriate shield metal arc welding (SMAW) safety
- Identify the principles of shielded metal arc welding
- Demonstrate correct equipment set-up for shield metal arc welding
- Assess, review, practice, and demonstrate tacking, running bead, and weaves using shielded metal arc welding
- Evaluate, review, practice, and demonstrate position and out-of-position using shielded metal arc welding
- Describe, review, practice, and demonstrate welding common metals using shielded metal arc welding techniques
- Identify, describe, practice, and demonstrate welding in advance positions using shielded metal arc welding
- Describe, practice, and demonstrate welding joints using shielded metal arc welding

Key Assignments

Anchor Standards

- 2.0 Communications: Acquire and accurately use Manufacturing and Product Design sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.



Pathway Standards

- C1.0 Interpret and demonstrate the planning and layout operations used in the welding processes.**
 - C1.1 Use current information technology ideation and design process systems in the manufacturing of welded parts and products.
- C2.0 Understand and demonstrate how materials can be processed through the use of welding tools and equipment.
- C3.0 Differentiate different types of welding assembly processes.
- C5.0 Understand and defend the purposes and processes of inspection and quality control in welding manufacturing processes.**
 - C5.1 Identify and explain weld imperfections and their causes.
 - C5.4 Analyze and identify the steps to check for distortion, joint misalignment, and poor fit-up before and after welding.
- C6.0 Explore and understand various welding systems that require standard hand and machine tools.
 - C6.1 Select and use appropriate welding tools, equipment, and inspection devices to manufacture parts or products.
- C8.0 Understand various joining or combining processes, including welding processes used in manufacturing.
- C9.0 Understand how a manufacturing company is organized and the elements of welding production management.**
 - C9.1 Know how scheduling, quality control, accident prevention, and inventory control are used efficiently and appropriately in a welding production management system.

Common Core Standards

- RS 11-12.4 Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text.

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