

VALLEY ROP COURSE OUTLINE

COURSE TITLE: Agriculture Welding

VALLEY ROP #: AG-4030-Weld
CDE #: 2328

CBEDS TITLE: Agriculture Mechanics
CBEDS #: 4030

CTE SECTOR: Agriculture & Natural Resources
CTE PATHWAY: Agriculture Mechanics

JOB TITLES:

Welders, Cutters and Welder Fitters	51-4121.06	Carpenter	47-2031.00
Farm Equipment Mechanic	49-3041.00	Electrician	47-2111.00
Occupational Health & Safety Specialist	29-9011.00	Machinist	51-4041.00
Bus & Truck Mechanics & Diesel Engine Technician Specialist	49-3031.00	Plumber	47-2152.02

COURSE DESCRIPTION:

Agricultural Welding Fabrication provides an opportunity for students to advance their understanding of welding technology. This course integrates mathematics and scientific principles to applied processes in the specialized field of metal fabrication. The course operates within an extensive laboratory to provide practical applications and advanced instruction in foundry principles in welding as follows: 1) OFW, 2) OFC, 3) SMAW, and 4) GMAW. This advanced program follows the Model Curriculum Standards and Program Frameworks for Agriculture Specialization in Agriculture Mechanics and Metal Fabrication as outlined by CDE. The development of leadership and employability skills are emphasized throughout the course.

DATE APPROVED: May 2003
REVISED DATE(S): December 2008 / March 2009/
Nov 2009

HOURS: 180 year

CREDITS: 10 per year

PREREQUISITE: Completion of Ag Mechanics III, with a grade of "C" or better or with permission from the instructor.

GRADE LEVEL: 11-12

ARTICULATION(S): None

TEXTBOOKS: Welding: Principles and Applications, 4th Edition, by Larry Jeffus
Agricultural Mechanics: Fundamentals & Applications, 4th Edition, by Ray Herren and Elmer Cooper

COURSE COMPETENCIES:

Upon completion of this course, the student will:

- Strengthen skills in all welding applications.
- Provide skills in welding construction.
- Provide students with knowledge of proper safety practices in a shop environment.
- Familiarize students with career opportunities in the welding/fabrication industry as well as in post secondary educational institutions.
- Provide opportunities for leadership development.
- Strengthen academic skills.

INSTRUCTIONAL METHODS:

- Hands-on applications of construction
- Lecture
- Teacher led discussion
- PowerPoint presentations for individualized study
- Problem solving activities

EVALUATION METHODS:

Assessment opportunities, which allow continuous evaluation of students' progress, will be embedded throughout the course and should be a learning experience. All students will be expected to achieve mastery of all topics; often, demonstrations of mastery will occur in a public forum. The following strategies, which include both formal and informal assessment techniques will include, but are not limited to:

- Written assignments
- Written tests
- Lesson Quizzes
- Design and construction of projects

COURSE OUTLINE:

Unit of Instruction	Estimated Hours	Standards
Shop Orientation	10	
<ul style="list-style-type: none">• Review Course Outline• Discuss welding shop safety procedure• Demonstrate oxy-acetylene equipment• Demonstration electric arc equipment• Discuss shop clean-up procedures		
Shop Safety	10	
<ul style="list-style-type: none">• Terminology• Safe Use of Equipment• Student Practice and Demonstration		
Gas Metal Arc—MIG Welding Review	10	
<ul style="list-style-type: none">• Equipment and techniques for types of metals• Positions• Joints• Wire Types for particular applications		
Measurements	5	
<ul style="list-style-type: none">• Terminology• Reading a ruler• Area, perimeter, and circumference calculations• Understanding fraction		
Computer Technology Application	10	
<ul style="list-style-type: none">• CAD Applications• Welding Digital Readouts• Welding Formulations		
Welding Metallurgy and Scientific Applications	20	
<ul style="list-style-type: none">• Temperature• Phase change to metals• Crystallization• Cooling rate effects• Metal structure• Effects of Carbon on metal• Heat treatment•		
Special Related Welding Processes	20	
<ul style="list-style-type: none">• Arc-Air Carbon Arc Cutting• Plasma Arc Cutting• Pipe Welding Fundamentals• Oxygen-Acetylene Frame Cutting• Hard Facing• Frame Squaring		

- Individual Small Project Construction** **25**
- Drawing and sketching selected project
 - Steel making and standard shapes
 - Steel weight and cost calculations
 - Individual instruction as related to the selected project

- FFA, SOE & Careers** **10**
- FFA
 - Leadership opportunities
 - Competitions
 - Record Keeping
 - SOE (Supervised Occupational Experience
 - Projects
 - Ownership
 - Non-ownership
 - Proficiencies
 - Record Keeping

- Project Design and Fabrication – 4th quarter projects** **45**
- Reading Plans
 - Figuring a Bill of Materials
 - Project Budgeting
 - Ordering Materials
 - Construction

- Careers** **15**
- Career Opportunities in Welding

Total Hours 180

STANDARDS

- CPS.4, 6, 1
- CPS.6 Tech Prep Adv. Spec Ag. Mech. Metal Fab. #B
- CPS.4,6,3 Tech Prep Adv. Spec Ag. Mech. Metal Fab. #A
- CPS.5 Specialization in Ag Mechanics #A,B
- Tech Prep Adv. Spec Ag Mech.Metal Fab #C
- CPS.2 CPS.3
- CPS.7 Specialization in Ag Mechanics #B,C,D
- Specialization in Ag #F #G
- Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #E
- Advanced Spec. Ag Mech. #A #G #H #I #E #N #D #F #J #O #P #L #M #B
- Tech Prep Adv. Spec Ag .Mech.Metal Fab. #I #J, #F #H #Q #G #K #P #D #M #N
- Spec. Ag Mech #A-H

CAREER PREPARATION STANDARDS:

- A. **PERSONAL SKILLS** - Students will understand how personal skill development affects their employability. This skill includes positive attitudes, self-confidence, honesty, responsibility, initiative, self-discipline, personal hygiene, time management, and the capacity for lifelong learning.
1. Demonstrate an understanding of classroom policies and procedures.
 2. Discuss importance of the following personal skills in the business environment:
 - a. positive attitude
 - b. self-confidence
 - c. honesty
 - d. perseverance
 - e. self-management/work ethic
 - f. pride in product/work
 - g. dependability
 3. Identify acceptable work attire.
 4. Establish goals for self-improvement and further education/training.
 5. Prioritize tasks and meet deadlines.
 6. Understand the importance of initiative and leadership.
 7. Understand the importance of lifelong learning in a world of constantly changing technology.
- B. **INTERPERSONAL SKILLS** - Students will understand key concepts on group dynamics, conflict resolution, and negotiation. This skill includes the ability to work cooperatively, accept supervision, assume leadership roles, and show respect for others. This standard includes an understanding of sexual harassment laws and an appreciation of cultural diversity in the workplace.
1. Identify and discuss behaviors of an effective team.
 2. Explain the central importance of mutual respect in the workplace relations.
 3. Discuss and demonstrate strategies for conflict resolution and negotiation, and explain their importance within the business environment.
 4. Understand laws that apply to sexual harassment in the workplace, and identify tactics for handling harassment situations.
 5. Work cooperatively, share responsibilities, accept supervision and assume leadership roles.
 6. Demonstrate cooperative working relationships and proper etiquette across gender and cultural groups.
- C. **THINKING AND PROBLEM-SOLVING SKILLS** - Students will exhibit critical and creative thinking skills, logical reasoning, and problem-solving. These skills include applying basic skills in order to calculate, estimate, measure; identify, locate, and organize information/data; interpret and follow directions from manuals, labels, and other sources; analyze and evaluate information and solutions.
1. Recognize the importance of good academic skills and implement a plan for self-improvement as needed.
 2. Read, write, and give directions.
 3. Exhibit critical and creative thinking skills and logical reasoning skills, and employ these skills for problem solving.
 - a. Work as a team member in solving problems.
 - b. Diagnose the problem, its urgency, and its causes.
 - c. Identify alternatives and their consequences.
 - d. Explore possible solutions.
 - e. Compare/contrast the advantages and disadvantages of alternatives.

- f. Determine appropriate action(s).
 - g. Implement action(s).
 - h. Evaluate results of action(s) taken.
- D. COMMUNICATION SKILLS** - Students will understand principles of effective communication. This standard includes effective oral and written communication, listening skills, following and giving directions, requesting and giving information, asking questions.
1. Use communication concepts in application of skills, techniques, and operations.
 - a) Prepare written material.
 - b) Analyze written material.
 2. Understand and implement written instructions, from technical manuals, written communications, and reference books.
 3. Present a positive image through verbal and nonverbal communication, and understand the power of body language in communication.
 4. Demonstrate active listening through oral and written feedback.
 5. Give and receive feedback.
 6. Demonstrate assertive communications (both oral and written).
 7. Demonstrate proper etiquette in workplace communications, including an awareness of requisites for international communications (languages, customs, time zones, currency and exchange rates).
 8. Demonstrate writing/editing skills as follows:
 - a) Write, proofread, and edit work.
 - b) Use correct grammar, punctuation, capitalization, vocabulary, and spelling.
 - c) Select and use appropriate forms of technology for communication.
 9. Exhibit a proficiency in the use of reference books.
 10. Research, compose, and orally present information for a variety of business situations utilizing appropriate technology.
- E. OCCUPATIONAL SAFETY** - Students will understand occupational safety issues, including the avoidance of physical hazards in the work environment. This includes the safe operation of equipment, proper handling of hazardous materials, appropriate attire and safety accessories, avoidance of physical injuries, interpretation of warning and hazard signs and terminology, and following and understanding safety-related directions.
1. Discuss and implement good safety practices, including the following (if applicable to course):
 - a. personal
 - b. lab
 - c. fire
 - d. electrical
 - e. equipment
 - f. tools
 - g. interpretation of Material Safety Data Sheets (MSDSs)
 - h. Environmental Protection Agency (EPA)
 - i. Occupational Safety and Health Administration (OSHA)
 - j. American Red Cross Standards (ARC)
 - k. Networking Safety Standards
 2. Apply sound ergonomic principles in organizing one's work space.
- F. EMPLOYMENT LITERACY** - Students will understand career paths and strategies for obtaining employment within their chosen field. This includes

traditional job preparation skills, such as resumes, application forms, cover letters, sources of employment information, and interviewing skills, but also includes an overview of the industry and an understanding of labor market trends.

1. Explore career opportunities and projected trends; investigate required education, training and experience; and develop an individual education plan.
 2. Identify steps for setting goals and writing personal goals and objectives.
 3. Examine aptitudes related to career options; relate personal characteristics and interests to educational and occupational opportunities.
 4. Develop a career portfolio, including the following documents:
 - a. job application
 - b. resume(s)
 - c. appropriate cover and follow-up correspondence
 5. Identify and demonstrate effective interviewing techniques.
- G. **TECHNOLOGY LITERACY** - Students will understand and adapt to changing technology by identifying, learning, and applying new skills to improve job performance. Students should understand the role of technology in their chosen field and should be able to use all appropriate technology. Students should also feel confident in their ability to learn new technology by generalizing from what they know, adapting skills to new situations, and identifying and using sources of information and of further learning.
1. Demonstrate the ability to use personal computers for loading and retrieving data, information gathering, measurements, and writing.
 2. Identify the characteristics and explain the importance of adapting to changes, being flexible, and evaluating goals when working in the industry.
 3. Understand the importance of lifelong learning in adapting to changing technology.
- H. **IMPORTANCE OF ETHICS** – Students will understand proper ethics in the workplace.
1. Discuss social and ethical responsibilities in the industry.
 2. Demonstrate ethical choices in workplace situations.