

## VALLEY ROP COURSE OUTLINE

<b>COURSE TITLE:</b>	<b>Ag Mechanics/Construction 3</b>
<b>VALLEY ROP #:</b>	AG-4030-Mech3
<b>CDE #:</b>	3849
<b>CBEDS TITLE:</b>	Agriculture Mechanics
<b>CBEDS #:</b>	4030
<b>CTE SECTOR:</b>	Agriculture & Natural Resources
<b>CTE PATHWAY:</b>	Agriculture Mechanics
<b>JOB TITLES:</b>	Welders, Cutters and Welder Fitters      51-4121.06

### **COURSE DESCRIPTION:**

This advanced course will teach students specialized skills for the construction, maintenance, repair and service of agricultural equipment. This class will teach the student to fabricate and adapt various pieces of farm machinery by cutting, forming, and welding different types of metals. Examples of equipment include: tractors, trailers, harvesters, tilling equipment and trucks. The student will also learn the principles and theories of hydraulic systems. The course integrates math, and physical applications to applied principles within the every day work world. The course curriculum is build around the California Department of Education Career Preparation Standards, Agriculture Model Curriculum Guide, Tech Prep Career Path Standards, and industry standards.

<b>DATE APPROVED:</b>	August 2001
<b>REVISED DATE(S):</b>	March 2009/ Oct 2009
<b>HOURS:</b>	360 Hours
<b>CREDITS:</b>	10
<b>PREREQUISITES:</b>	None
<b>GRADE LEVEL:</b>	11-12
<b>ARTICULATION(S):</b>	Reedley College Course L14, 2 college credits

## **COURSE COMPETENCIES:**

Upon completion of this course, the student will:

- Familiarize students with career opportunities relevant to the broad industry of welding and fabrication.
- Enable students to utilize appropriate trade terminology.
- To provide students the basic shop skills as applied in the workplace.
- To provide students with the knowledge of job-seeking and employability skills.
- To enable students to complete a career portfolio.
- To provide opportunities for leadership development.
- To strengthen a student's academic skills through demonstration of applied vocational training, primarily in mathematics and physical science disciplines.
- To enable students to qualify for college units through an articulation agreement with Reedley College thus preparing students for postsecondary education.
- To enable students to practice and implement critical thinking skills through the use of computer technology, individual and group projects, and workplace simulation activities.
- To enable students to participate in relevant FFA competitions to assess classroom skills and theory.

## **INSTRUCTIONAL METHODS:**

- Lecture
- Laboratory
- Demonstration
- Multi-Media Aids
- Technology Instruction
- Cooperative Group Learning
- Discussion
- Guest Speakers
- Field Trips
- Portfolio Projects

## **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:

- Tests
- Lab work
- Projects

## COURSE OUTLINE:

Unit of Instruction	Estimated Hours	Standards
<b>Classroom Orientation</b>	<b>4</b>	CPS.4, 6, 1
<ul style="list-style-type: none"><li>• Class Procedures</li><li>• Attendance</li><li>• Grading</li><li>• Paperwork</li><li>• 2+2 with Reedley College</li><li>• ROP Certificate of Completion</li></ul>		
<b>Career Development</b>	<b>6</b>	CPS.6 Tech Prep Adv. Spec. Ag.Mech.Metal Fab.#B
<ul style="list-style-type: none"><li>• Opportunities in agriculture related careers</li><li>• Self-Appraisal</li><li>• Goal Setting</li><li>• Work Values</li><li>• Career Paths</li><li>• Professional Organizations</li></ul>		
<b>Employability</b>	<b>20</b>	CPS.6 Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #B
<ul style="list-style-type: none"><li>• Job Search Techniques</li><li>• Employment Resources</li><li>• Payroll Terminology</li><li>• Employment Benefits</li><li>• Job Portfolio<ul style="list-style-type: none"><li>○ Resume</li><li>○ Applications</li><li>○ Letter of Applications</li><li>○ Letter of Recommendation</li><li>○ Employability Self Assessment</li><li>○ Writing Sample</li><li>○ Work Sample</li></ul></li><li>• Interviewing<ul style="list-style-type: none"><li>○ Skills</li><li>○ Follow-up and thank you letter</li><li>○ Time Management</li><li>○ Setting Priorities</li></ul></li></ul>		
<b>Leadership</b>	<b>20</b>	CPS.4,6,3 Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #A
<ul style="list-style-type: none"><li>• Communication Skills</li><li>• Critical Thinking Skills</li><li>• Problem Solving</li><li>• ROP Merit Award</li><li>• Student Organization (FFA)</li></ul>		

<p><b>Agricultural and Industrial Safety</b></p> <ul style="list-style-type: none"> <li>• OSHA</li> <li>• Accident Prevention</li> <li>• Chemical Safety</li> <li>• Equipment Safety</li> <li>• Personal Safety</li> <li>• Welding Safety</li> <li>• Handling Emergencies</li> </ul>	<p><b>20</b></p>	<p>CPS.5 Specialization in Ag Mechanics #A,B</p> <p>Tech Prep Adv. Spec. Ag Mech.Metal Fab #C</p>
<p><b>Communication Skills</b></p> <ul style="list-style-type: none"> <li>• Principles of Effective Communication</li> <li>• Oral and Written Communication</li> <li>• Following Instructions</li> <li>• Listening</li> <li>• Request Clarification or Additional Information</li> </ul>	<p><b>10</b></p>	<p>CPS.6</p>
<p><b>Interpersonal Skills</b></p> <ul style="list-style-type: none"> <li>• Conflict Resolution</li> <li>• Negotiation</li> <li>• Cooperative Work Groups</li> <li>• Cultural Diversity</li> </ul>	<p><b>4</b></p>	<p>CPS.2</p>
<p><b>Personal Skills</b></p> <ul style="list-style-type: none"> <li>• Cooperative</li> <li>• Sensitive to others</li> <li>• Respectful of others</li> <li>• Self-confidence, integrity</li> <li>• Grooming</li> </ul>	<p><b>4</b></p>	<p>CPS.1</p>
<p><b>Thinking and Problem Solving Skills</b></p> <ul style="list-style-type: none"> <li>• Time Management <ul style="list-style-type: none"> <li>○ Meeting Deadlines</li> </ul> </li> <li>• Setting Priorities</li> </ul>	<p><b>4</b></p>	<p>CPS.3</p>
<p><b>Technology</b></p> <ul style="list-style-type: none"> <li>• Technology applications/systems</li> <li>• Future Trends</li> </ul>	<p><b>8</b></p>	<p>CPS.7</p>
<p><b>Measurement and Mathematics</b></p> <ul style="list-style-type: none"> <li>• Measurement tools and devices</li> <li>• Sketching and plan reading</li> <li>• Material selection</li> <li>• Order and Billing</li> <li>• Fasteners</li> </ul>	<p><b>20</b></p>	<p>Specialization in Ag Mechanics #C,D</p>

<p><b>SMAW Welding (ARC)</b></p> <ul style="list-style-type: none"> <li>• Equipment selection</li> <li>• Electrode selection</li> <li>• Joint location and position</li> <li>• Practical assignments</li> </ul>	<b>20</b>	<p>Specialization in Ag Mech. #G</p> <p>Advanced Specialization Ag Mechanics #B Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #E</p>
<p><b>Oxyfuel Welding and Cutting</b></p> <ul style="list-style-type: none"> <li>• Equipment selection</li> <li>• Setting up the torch</li> <li>• Cutting</li> <li>• Practical assignments</li> </ul>	<b>20</b>	<p>Specialization in Ag Mech. #F</p> <p>Advanced Spec. Ag Mech. #A</p> <p>Tech Prep Adv. Spec. Ag. Mech. Metal Fab.#D</p>
<p><b>Mig Welding</b></p> <ul style="list-style-type: none"> <li>• Equipment and selection</li> <li>• Welding Techniques</li> <li>• Troubleshooting and maintenance</li> <li>• Practical assignments</li> </ul>	<b>20</b>	<p>Advanced Spec. Ag Mech. #G</p> <p>Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #1</p>
<p><b>TIG Welding</b></p> <ul style="list-style-type: none"> <li>• Equipment and selection</li> <li>• Welding techniques and demonstrations</li> </ul>	<b>20</b>	<p>Adv. Spec.Ag Mech. #H</p> <p>Tech Prep Adv. Spec. Ag. Mech. Metal Fab#J</p>
<p><b>Specialty Cutting Processes</b></p> <ul style="list-style-type: none"> <li>• Air arc cutting and gouging</li> <li>• Plasma cutting</li> </ul>	<b>10</b>	<p>Adv. Spec. Ag Mech. #I</p> <p>Tech Prep Adv. Spec. Ag Mech.Metal Fab #F</p>
<p><b>Hand and Power Tools</b></p> <ul style="list-style-type: none"> <li>• Drills and drill presses</li> <li>• Grinders (portable and stationary)</li> <li>• Shears and saws</li> <li>• Hydraulic Shear</li> <li>• Hand tool usage and maintenance</li> <li>• Sharpening hand tools</li> </ul>	<b>10</b>	<p>Spec. Ag Mech #A,B,E</p> <p>Adv.Spec.Ag Mech. #E,N</p> <p>Tech Prep Adv.Spec. Ag Mech.Metal Fab.#G</p>

<p><b>Metalworking</b></p> <ul style="list-style-type: none"> <li>• Layout for holes, cuts and angles</li> <li>• Procedures for various metal shapes</li> </ul>	<p><b>10</b></p>	<p>Spec. Ag Mech. #H</p> <p>Adv. Spec. Ag Mech. #D,F Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #H,Q</p>
<p><b>Academic Application</b></p> <ul style="list-style-type: none"> <li>• Practical cooling rates and treatment</li> <li>• Alloy steels</li> <li>• Affects of heating/cooling applications</li> </ul>	<p><b>10</b></p>	<p>Adv. Spec. Ag Mech #J,O,P</p> <p>Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #K,P</p>
<p><b>Project Planning</b></p> <ul style="list-style-type: none"> <li>• Project design</li> <li>• Field sketches and drawings</li> <li>• Drawings</li> <li>• CAD and its applications</li> </ul>	<p><b>110</b></p>	<p>Spec. in Ag. Mech. #A-H</p> <p>Adv. Spec. Ag Mech. #L,M Tech Prep Adv. Spec. Ag.Mech.Metal Fab. #M,N</p>
<p><b>Welding Exercises</b></p> <ul style="list-style-type: none"> <li>• Assigned computer work</li> <li>• Project fabrication</li> </ul>	<p><b>10</b></p>	
<p><b><u>Total Hours</u></b></p>	<p><b><u>360</u></b></p>	

## **COURSE COMPETENCIES:**

The student will:

- Follow outlined classroom procedures.
- Compare various careers in the agriculture industry.
- Identify how the functions of the agriculture industry serve as a basis for a career.
- Analyze their completed ROP student assessment evaluation for areas of strength and areas of needed improvement.
- Set short and long term occupational goals.
- Demonstrate work values consistent with employment success within the industry.
- Demonstrate employability skills necessary to gain and maintain employment.
- Investigate job search techniques, including where to look for a job, how to find leads and various application procedures.
- Write a resume and cover letter, complete a job application form, obtain a letter of recommendation, and participate in an employability self assessment evaluation process.
- Complete a writing sample (research paper).
- Complete work samples for the portfolio.
- Participate in a job interview.
- Demonstrate effective problem-solving and critical thinking skills through participation in practical application problems relevant to the trade.
- Demonstrate the ability to identify problems and take the initiative to solve them.
- Identify the goals of the FFA and the structure of the organization.
- Demonstrate safe working habits and describe the safety operation and rules necessary to maintain a safe working environment.
- Explain the purpose of OSHA to ensure safety within the industry.
- Maintain a clean work area.
- Describe how communication skills are important in the broad industry of agriculture.
- Demonstrate the ability to effectively communicate with co-workers and supervisors orally and through written communication.
- Demonstrate effective principles of communication.
- Give an oral presentation(s).
- Listen and follow instructions accurately.
- Request clarification or additional information as needed.
- Demonstrate effective conflict resolution skills when placed in difficult situations.
- Demonstrate negotiation skills when working with a controversial topic or situation.
- Demonstrate the ability to work as a productive team member.
- Work in teams (companies) effectively to achieve positive results.
- Demonstrate the ability to work with a variety of individuals from various ethnic and cultural backgrounds.
- Demonstrate personal skills that include the ability to be friendly, courteous sensitive to others' feelings, cooperative and tactful when working with co-workers and supervisors.
- Demonstrate self-confidence and integrity.
- Demonstrate appropriate grooming and hygiene.
- Work efficiently to complete tasks within given time limits.
- Demonstrate the ability to set priorities with work assignments.
- Identify various types of fabrication technology.
- Demonstrate understanding the role of computers, technology and emerging trends in the fabrication industry.

- Accurately measure objects and elements with a tape measure, ruler, square, and dial caliper.
- Calculate and solve problems associated with linear measurement, area measurement, steel weight charts and bills of materials.
- Identify and demonstrate appropriate selection and use of fasteners for a given application.
- Demonstrate skills in the SMAW (arc) process to include:
  - Proper selection, setup and use of equipment
  - Proper rod selection for a given application
  - Welding in the four positions (flat, horizontal, vertical, overhead)
  - Welding the recognized joints
  - Welding pipe
- Demonstrate skills in the oxy-fuel process to include:
  - Proper selection, setup and use of equipment
  - Welding mild steel in the flat and horizontal positions
  - Welding pipe
  - Brazing techniques
- Demonstrate skills in the Metallic Inert Gas (MIG) process to include:
  - Proper selection, setup and use of equipment
  - Selection of the correct process for a given application
  - Welding in the four positions (flat, horizontal, vertical, overhead)
  - Welding the recognized joints
  - Welding pipe
  - Troubleshooting and solving problem associated with this process
- Demonstrate skill in the Tungsten Inert Gas (TIG) process to include:
  - When the TIG process is used
  - The materials that are commonly welded using the TIG process
- Demonstrate specialty cutting skills and techniques to include:
  - Proper selection, setup and use of oxy-fuel equipment
  - Proper setup and use of the plasma arc process
  - Proper setup and use of the arc-air cutting/gouging process
- Identify the commonly used layout and procedures for developing various shapes and their sizes in the industry.
- Demonstrate techniques in maintaining hand tools and power equipment.
- Identify the commonly used layout and procedures for developing various shapes and their sizes in the industry.
- Demonstrate understanding of cooling rates and their treatment.
- Identify the affects of heating/cooling applications.
- Design, layout, determine costs, order parts, and construct a metal fabrication project.
- Demonstrate proficiency in computer technology relevant to assigned projects.

## **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.