

MISSION TRAIL REGIONAL OCCUPATIONAL PROGRAMS

1. COURSE TITLE: Agricultural Construction and Maintenance

2. CBEDS TITLE: Industrial Welding/Metal Fabrication

3. CBEDS NUMBER: 4030

4. JOB TITLES:

Maintenance Technician	638.281-026
Electronic Helper	829.887-014
Equipment Installer	829.381-022
Metal Fabricator	619.380-022
Machine Operator	619.885-070
Tack Welder	810.884-038
Welder Fitter	819.381-022
Fit Up Man	819.781-010
Hand Flame Cutter	816.884-014
Welder Apprentice	812.884-010
Repair Welder	812.884-022
Welding Machine Operator	810.782-026

5. COURSE DESCRIPTION:

Students learn to read blueprints, interpret welding symbols, cut metal and weld metal. Welding training is offered in: Shielded Metal Arc Welding (Stick), Mig, Tig, and oxy/gas. Metal cutting training includes Oxy/Gas and Plasma Arc cutting.

6. HOURS: 675

7. PREREQUISITES: None

8. REVISION DATE: October 2003

Revised: 5/01/08

9. CDE RECERTIFICATION: January 12, 2004

9. COURSE OUTLINE:

a. CONTENT AREA SKILLS:

Instruction will include:	Student will be able to:	CL	CC	CP
<p>1. Job Search Skills (Portfolio)</p>	<ul style="list-style-type: none"> • Write a resume, cover letter, thank you note. • Know how to interview for a job. • Know how to assemble a Job Search Portfolio 	30	10	
<p>2. Perform mathematical operations related to construction.</p>	<ul style="list-style-type: none"> • Add, subtract, multiply and divide whole numbers. • Add, subtract, multiply and divide fractions. • Determine angles using simple geometric constructions • Convert fractions to decimal and decimals to fractions. • *Setup and solve problems related to determining the cost of materials 	30	5	
<p>3. Safety</p> <p>Some of these issues are Learned concurrently along with technical skill subject areas.</p>	<ul style="list-style-type: none"> • Identify safety hazards • Proper use fire safety equipment • Identify class of fire and types of fire extinguishers • Practice basic shop safety • Practice welding safety • Practice power tool safety • Practice hand tool safety • Describe safety lock down procedures used in industry • Use the materials Safety Data Sheets (MSDS) • Use personal protective equipment and clothing. 	35	20	
<p>4. First Aid</p>	<ul style="list-style-type: none"> • Assess the need for first aid. • Call emergency numbers • Use pressure to control bleeding • Treat patient for shock. • Treat for burns. • *Perform cardio pulmonary resuscitation. • *Perform mouth-to-mouth resuscitation. 	15	5	
<p>5. Measure & Layout</p>	<ul style="list-style-type: none"> • Read a ruler to the 1/16th of an inch • Use a decimal equivalency table. • Identify various measuring and layout tools. • Interpret the meaning of the different lines in a simple working drawing. 	25	20	

	<ul style="list-style-type: none"> • Make a simple scale drawing to determine material requirements joint angles and length of diagonals for a proposed project. • Use dividers and calipers. • Measure sheet metal using a standard wire gauge. • Measure an angle using a protractor. • Use bluing to mark sheet metal. • Use chalk and scribe to mark sheet metal for cutting. • Interpret blueprint symbols, cutting planes and views. 			
6. Perform metal work	<ul style="list-style-type: none"> • Identify metal working hand tools. • Cut metal using the hacksaw, cold chisel and file. • Bend sheet metal using a hand brake. • Bend steel cold. • Heat and bend steel. • Shape metal using power grinding equipment. • Drill holes using the drill press and hand drill. • Cut metal using the metal cutting band saw. • Cut sheet metal with the tin snips. • Cut metal using the iron worker • Heat-treat metal. 	20	15	
7. Metallurgy	<ul style="list-style-type: none"> • Identify types of welding joints. • List steel shapes available in the metal industry. • Read a pipe schedule. • Use warpage control techniques in welding. • List five welding processes. • Know changes in the steel when heated and cooled. 	10	10	
SECTION B Welding Processes				
1. Oxyacetylene Welding	<ul style="list-style-type: none"> • Setup oxy-acetylene welding equipment. • Light and adjust the flame to Neutral flame. • Weld steel in the flat, vertical, horizontal and overhead position. • Braze weld mild steel • Apply hard facing material to thin metals. • Braze weld cast iron. 	40	5	

2. Oxyacetylene Cutting	<ul style="list-style-type: none"> • Setup oxy-acetylene cutting equipment • Cut metals using the Oxyacetylene cutting equipment. • Make straight cuts on steel. • Make bevel cuts on plate steel. • Cut holes on steel. • Cut and notch steel for assembly by welding. 	25	5	
3. Shielded Metal Arc Welding (SMAW)	<ul style="list-style-type: none"> • Setup SMAW welding machine for welding. • Know arc-welding safety. • Weld in the flat, horizontal, vertical positions • Weld corner, Butt, Lap, Tee and Edge Joints. • Know welding rod classifications. • Use hard face welding rods. • Weld stainless steel. • Weld cast iron. • *Weld standing on a ladder. • *Weld in the overhead position. 	80	10	
4. Gas Metal Arc (MIG)	<ul style="list-style-type: none"> • Setup MIG • Welding equipment • Adjust the machine for welding. • Weld stainless steel • Weld in the flat horizontal, vertical positions • *Perform out of position welding. 	20	10	
5. Gas Tungsten Arc welding (TIG)	<ul style="list-style-type: none"> • Setup TIG Welding equipment. • Adjust the machine for welding • Weld steel. • Weld stainless steel. • welding aluminum. 	50	10	
6. Plasma Cutting	<ul style="list-style-type: none"> • Setup Plasma cutting equipment for operation. • Adjust equipment for cutting. • Cut mild steel. • Cut aluminum • Cut copper. 	10	5	
7. Spot Welding	<ul style="list-style-type: none"> • Setup Spot welder for operations. • Adjust welder. • Spot-weld mild steel. • Spot-weld stainless steel. 	5	5	
8. Carbon Arc Cutting	<ul style="list-style-type: none"> • Setup Carbon Arc equipment. • Adjust welding machine for Carbon Arc. 	5		

	<ul style="list-style-type: none"> • Remove welds. • Gut grooves on steel. • Cut steel. 			
SECTION C				
AG Construction				
1. AC Electrical	<ul style="list-style-type: none"> • Test circuits and electrical devices using a volt-ohm-ammeter. • Wire 110 v convenience outlets and switches. • Install 240 v service outlets. • Install magnetic starter for single phase • Electric motors. • Install a 3-phase electric motor. 	15		
2. Concrete Work	<ul style="list-style-type: none"> • Select materials for concrete. • Determine proper mix. • Build concrete forms. • Pour a small pad or foundation. • Finish concrete. • Attach structure to concrete surfaces. 	10		
3. Conveyers	<ul style="list-style-type: none"> • Identify basic conveyer types • List five types of support structures and their use. • Replace conveyer belt. • Lace mechanical belts. • Align roller conveyer beds. • Adjust belt take up. 	15		

4. Couplings and gears	<ul style="list-style-type: none"> • Identify bearings and various types of gears. • Identify various types of power couplings. • Determine gear ratios for speed reductions. • Replace damaged chain drive gears. • Lubricate gearboxes and speed reducers. • Inspect parts for wear. • Adjust variable speed drives. • Adjust V belt tension. • Align couplings. 	20	5	
5. Bearings and seals. bearings for wear.	<ul style="list-style-type: none"> • Identify types of bearing and seals • Inspect bearings for wear. • Inspect packings and seals for wear. • Inspect balls rollers and races for ware. • Press bearings off and on shafts. 	15		
6. Paint	<ul style="list-style-type: none"> • Use sand blasting equipment to remove paint and rust • Clean and prepare weld joints for painting. • Apply primer and paint by hand. • Spray paint with a spray gun. 	10		
7. Forklift Operations	<ul style="list-style-type: none"> • Practice forklift safety. • Demonstrate safe operation of a forklift. • Move and lift pallets • Pre-operation inspection 	20	5	

NOTE: *=ADVANCED COMPETENCY. MAY REQUIRE EXTRA HOURS.

COURSE OUTLINE:

b) GENERAL WORK PLACE SKILLS

CAREER PERFORMANCE STANDARDS	EXPECTED STUDENT OUTCOMES	HOURS
<p>Instruction will include:</p>	<p>Student will be able to:</p>	
<p>1. Personal Skills</p> <ul style="list-style-type: none"> ▪ Classroom policies & procedures ▪ Ethics <ul style="list-style-type: none"> → Work → Business ▪ Sexual harassment laws ▪ Personal skills, including positive attitude, self-confident, honesty, perseverance & self-discipline ▪ Professional appearance ▪ Time management ▪ Lifelong learning 	<p>1. Understand how personal skill development, including positive attitude, honesty, self-confidence, time management, & other positive traits affect employability.</p> <ul style="list-style-type: none"> ▪ Demonstrate and understand classroom policies & procedures ▪ Define work and business ethics & demonstrate the importance of ethical standards & social responsibilities in the business environment. ▪ Discuss the laws applicable to sexual harassment & discuss tactics for handling harassment situations. ▪ Demonstrate personal skills in class and/or business environment: <ul style="list-style-type: none"> → Positive attitude → Self-confidence → Honesty → Perseverance → Self-discipline ▪ Demonstrate and model personal hygiene and acceptable professional attire ▪ Prioritize tasks and meet deadlines ▪ Explain the importance of lifelong learning 	<p>Integrated in content area skills</p>
<p>2. Interpersonal Skills</p> <ul style="list-style-type: none"> ▪ Group dynamics ▪ Conflict resolution and negotiation ▪ Team work ▪ Etiquette across gender and cultural groups 	<p>2. Understand principles of effective interpersonal skills, including group dynamics, conflict resolution, and negotiation.</p> <ul style="list-style-type: none"> ▪ Identify and explain the key concepts of group dynamics ▪ Discuss and demonstrate the dynamics of conflict resolution and negotiation, and their importance within the business environment ▪ Demonstrate effective teamwork, share responsibilities, accept supervision and assume leadership roles ▪ Demonstrate cooperative working relationships and proper etiquette across gender and cultural groups 	<p>Integrated in content area skills</p>

<p>3. Thinking and Problem-Solving Skills</p> <ul style="list-style-type: none"> ▪ Critical and creative thinking skills ▪ Logical reasoning and problem-solving skills ▪ Numerical estimation, measurement, and calculation ▪ Identify, locate, and organize needed information and propose, evaluate, and select alternative solutions 	<p>3. Understand the importance of critical thinking and problem-solving skills in the workplace.</p> <ul style="list-style-type: none"> ▪ Apply critical and creative thinking skills in a work environment and implement a plan of improvement as needed ▪ Demonstrate logical reasoning and problem solving skills in a work environment ▪ Apply numerical estimation, measurement and calculation skills to business applications including the following: <ul style="list-style-type: none"> → Whole number math → Decimals & fractions → Counting & monetary functions → Use of tables & graphs ▪ Recognize problem situations; identify, locate and organize needed information, and propose, evaluate and select from alternate solutions 	<p>Integrated in content area skills</p>
<p>4. Communication Skills</p> <ul style="list-style-type: none"> ▪ Written communications ▪ Verbal and Nonverbal communications ▪ Active and effective listening ▪ Proper etiquette in business communications ▪ Writing and editing skills ▪ Use of reference material and handbooks ▪ Oral presentations 	<p>4. Understand principles of effective communication.</p> <ul style="list-style-type: none"> ▪ Read and implement written instructions, technical manuals, written communication, and reference books ▪ Present a positive image of verbal and nonverbal communication through use of appropriate methods ▪ Demonstrate active and effective listening skills through verbal, nonverbal and written feedback ▪ Demonstrate proper etiquette in business communications, including an awareness of requisite for international communications (languages, customs, and time zones) ▪ Demonstrate the following writing and editing skills: <ul style="list-style-type: none"> → Use correct grammar, punctuation, capitalization, vocabulary and spelling → Write, proofread and edit → Select and use appropriate forms of communication ▪ Exhibit a proficiency in the use of reference materials such as dictionary, thesaurus, telephone directory, almanac, zip code directory, and office handbooks 	<p>Integrated in content area skills</p>
<p>5. Occupational Safety</p> <ul style="list-style-type: none"> ▪ Good safety practices 	<p>5. Understand occupational safety issues, including avoidance of physical hazards</p> <ul style="list-style-type: none"> ▪ Model and implement good safety practices including: <ul style="list-style-type: none"> → Avoidance and reporting of physical hazards in the work environment → Safe operation of equipment → Proper handling of hazardous materials 	<p>Integrated in content area skills</p>

<p>6. Employment Literacy</p> <ul style="list-style-type: none"> ▪ Expand awareness of career opportunities ▪ Set employment goals and objectives ▪ Aptitudes, personal characteristics and interests ▪ Develop portfolio to C-TAP standards ▪ Develop interviewing techniques 	<p>6. Understand career paths and strategies for obtaining employment.</p> <ul style="list-style-type: none"> ▪ Explore career opportunities and develop a career plan ▪ Identify steps for setting goals and writing personal goals and objectives ▪ Examine aptitudes related to career options; relate personal characteristics and interests to educational and occupational opportunities ▪ Develop a portfolio to include the following: <ul style="list-style-type: none"> → Letter of Introduction → Cover letter → Resume → Thank you letter → Job application → Licenses, Certificates and Awards → Transcripts → Letters of Recommendation → Work Samples 	<p>Integrated in content area skills</p>
<p>7. Technology Literacy</p> <ul style="list-style-type: none"> ▪ Apply Industry specific technology ▪ Use Industry specific software ▪ Demonstrate Keyboarding ▪ Accessing information ▪ Lifelong enhancement of technology skills 	<p>7. Understand and adapt to changing technology.</p> <ul style="list-style-type: none"> ▪ Identify and demonstrate use of appropriate technology ▪ Identify and use industry specific software ▪ Demonstrate proficiency in alphanumeric keyboarding ▪ Input and retrieve information ▪ Understand the importance of lifelong learning in adapting to changing technology 	<p>Integrated in content area skills</p>

10. ADDITIONAL RECOMMENDED /OPTIONAL ITEMS

- a. **ARTICULATION:** YES (HARTNELL COLLEGE)
- b. **VOCATIONAL CREDIT:** YES
- c. **ACADEMIC CREDIT:** No
- d. **INSTRUCTIONAL STRATEGIES:**
Lecture, Demonstration, Hands-on Application, Group Work, Community Classroom
- e. **INSTRUCTIONAL MATERIALS:**
Basic Hand Tools, Technical Manuals, Diagnostic Tools, Multi-media, Live and Demonstration Tractors.
- f. **CERTIFICATES:**
Available upon completion of course or completion of a Semester.
- g. **INSTRUCTIONAL MATERIALS:**
Text Book (English & Spanish), Video Tapes, Computer welding software, Mig, Tig, Smaw, Oxy/gas, Spot Welding machines, Plasma and Oxy/Gas cutting equipment and other iron working equipment.
- h. **CERTIFICATES:** YES