Ganado Unified School District
(Fundamentals of Welding)

PACING Guide SY 2017-2018

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
1st QTR: **NCCER-CONTREN LEARNING SERIES Welding Level One** Module 29101-09 Welding Safety	. **ADVANCED CONSTRUCTION TECHNOLOGIES 46.0400.0 STANDARD 1.0 MAINTAIN A SAFE WORK ENVIROMENT** **1.1** Follow job safety regulations and procedures for handling hazardous materials/chemicals according to OSHA guidelines and SDS (Safety Data Sheets) **1.2** Use appropriate personal protective equipment (PPE) **1.3** Evaluate types of fires and use of appropriate fire extinguishers **1.4** Maintain worksite safety and housekeeping (lighting, safety, etc.), including a safety plan for emergency situations **1.5** Identify first aid procedures **1.6** Demonstrate appropriate procedure for lifting heavy objects **1.7** Follow safe procedures in setting up scaffolding and using ladders **1.8** Demonstrate safe work procedures around electrical hazards **1.9** Use correct procedures for lockout/tagout **1.10** Report safety hazards	How can we keep our shop a safe environment? What is one example of appropriate PPE? Describe the risks and dangers tools and equipment	Students will be able to: • Identify some common hazards in welding. • Explain and identify proper personal protection used in welding. • Describe how to avoid welding fumes. • Explain some of the causes of accidents • Identify and explain uses for material safety data sheets. • Explain safety techniques for storing and handling cylinders. • Explain how to avoid electrical shock when welding.	○ Bonded ○ Electrically grounded ○ Fume plume ○ Immediate danger to life and health (IDLH) ○ Purging gas ○ Ventricular fibrillation

NCCER-CONTREN LEARNING SERIES Welding Level One Module 29102-09 Oxyfuel Cutting	**STANDARD 2.0** **SETUP AND USE CUTTING EQUIPMENT** **2.1 Set up and use oxyfuel equipment** **STANDARD 5.0** **SET UP AND USE OXYFUEL EQUIPMENT** **5.1 Set up oxyfuel equipment to industry standards**		Students will able to: • Identify and explain the use of oxyfuel cutting equipment • Set up oxfuel equipment. • Light and adjust an oxyfuel equipment. • Shut down oxyfuel cutting equipment. • Disassemble oxyfuel equipment. • Change Cylinders • Perform oxyfuel cutting. Straight line and square shapes Piercing and slot cutting Bevels Washing Gouging	○ Backfire ○ Carburizing flame ○ Drag lines ○ Dross ○ Ferrous metals ○ Kerf ○ Neutral flame ○ Oxidizing flame ○ Pierce Soapstone
NCCER-CONTREN LEARNING SERIES Welding Level One Module 29103-09 Plasma Arc Cutting	**STANDARD 2.0** **SET UP AND USE CUTTING EQUIPMENT** **2.2 Set up and use Plasma arc cutting equipment**		Students will be able to: • Explain the plasma arc cutting process • Identify plasma arc equipment. • Prepare and set up plasma arc cutting equipment • Use plasma arc cutting equipment to make various types of cuts Properly store equipment and clean the work area after use	○ Duty cycle ○ Plasma ○ Potential Solenoid valve
2nd QTR: **NCCER-CONTREN**	**STANDARD 2.0** **SET UP AND USE CUTTING EQUIPMENT** **2.3 Set up and use air carbon arc cutting equipment**		Students will be able to: • Identify and explain the air carbon arc cutting (CAC-A) process and equipment • Select and install CAC-A electrodes	○ Carbon-graphite electrode ○ Oxidize Washing

LEARNING SERIES Welding Level One Module 29104-09 Air Carbon Arc Cutting and Gouging			• Prepare the work area and CAC-A equipment for safe operation • Use CAC-A equipment for washing and gouging activities. • Perform storage and Housekeeping activities for CAC-A equipment • Make minor repairs to CAC-A equipment	
NCCER-CONTREN LEARNING SERIES Welding Level One Module 29105-09 Base Metal Preparation	**STANDARD 9.0** **PERFORM WELDMENT TESTING** **9.1 Describe nondestructive test** **9.2 Perform destructive test**		Students will be able to: • Identify and explain codes governing welding • Identify and explain weld imperfections and their causes • Identify and explain nondestructive examination practices • Identify and explain welder qualification tests • Explain the importance of quality workmanship • Identify common destructive testing methods • Perform a visual inspection of fillet welds	○ Defect ○ Discontinuity ○ Embrittled ○ Hardenable materials ○ Homogeneity ○ Inclusion ○ Laminations ○ Procedure qualification ○ Procedure qualification record (PQR) ○ Radiographic ○ Underbead cracking
3rd QTR: **NCCER-CONTREN LEARNING SERIES Welding Level One**	**STANDARD 3.0** **SET UP AND USE SHEILDED METAL ARC WELDING (SMAW) EQIPMENT** **3.1 Set up SMAW equipment.**		Students will be able to: • Identify and explain shielded metal arc welding (SMAW) safety. • Explain welding electrical current. • Identify welding power supplies and their characteristics. • Explain how to set up welding power supplies.	○ Alternating current (AC) ○ Amperage ○ Arc ○ Direct current (DC) ○ Electrode ○ Polarity ○ Primary current ○ Step-down transformer ○ Voltage

Module 29107-09 SMAW – Equipment and Setup			• Set up a machine for welding. • Identify tools used for weld cleaning.	
NCCER-CONTREN LEARNING SERIES Welding Level One Module 29108-09 Shielded Metal Arc Welding – Electrodes	**STANDARD 3.0** **SET UP AND USE SHEILDED METAL ARC WELDING (SMAW) EQIPMENT** **3.1 Identify and use types, storage, and handling of electrodes**		Students will be able to: • Identify factors that affect electrode selection. • Explain the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system. • Identify different types of filler metals. • Explain the storage and control of filler metals. • Explain filler metal traceability requirements and how to use applicable code requirements. Identify and select the proper electrode for an identified welding task.	○ Alloy ○ Condensation ○ Ductile ○ Flux ○ Heat-affected zone ○ Hermetically sealed ○ Low-hydrogen electrode ○ Notch toughness ○ Traceability Vertical welding
NCCER-CONTREN LEARNING SERIES Welding Level One Module 29109-09 SMAW – Beads and Fillet Welds	**STANDARD 3.0** **SET UP AND USE SHEILDED METAL ARC WELDING (SMAW) EQIPMENT** **3.3 Make fillet weld (all positions) on carbon steel in flat position (all positions not required for S.E.N.S.E)** **3.4 Had face and build up steel surface with SMAW eqipment**		Students will be able to: • Set up welding equipment. • Strike an arc. • Make stringer, weave, and overlapping beads using E6010 and E7018 electrodes. • Make fillet welds using E6010 and E7018 in the specified positions: ○ Horizontal (2F) ○ Vertical (3F) Overhead (4F)	○ Arc blow ○ Arc strike ○ Drug angle ○ Oscillation ○ Push angle ○ Restart ○ SMAW ○ Stringer bead ○ Weave bead ○ Weld axis ○ Weld Coupon ○ Work angle
4th QTR:	**STANDARD 1.0** **LAYOUT AND FIT UP PROJECT FROM BLUEPRINTS**		Students will be able to: • Identify and explain job code specifications.	○ Addendum ○ Ambient temperature

NCCER-CONTREN LEARNING SERIES Welding Level One Module 29110-09 Joint Fit-Up and Alignment	**1.1 Interpret drawings, symbols, and procedures** **1.2 Use measuring devices** **1.3 Lay out project from blueprints** **1.4 Measure and cut materials** **1.5 Tack materials into position for welding**		• Use fit-up gauges and measuring devices to check joint fit-up. • Identify and explain distortion and how it is controlled. • Fit up joints using plate and pipe fit-up tools. Check for joint misalignment and poor fit-up before and after welding.	○ Certification of thermal expansion (linear) ○ Consumable insert ○ High-flow ○ Level ○ Peening ○ Plumb ○ Radial stress ○ Specific heat per unit volume ○ Tack weld
NCCER-CONTREN LEARNING SERIES Welding Level One Module 29111-09 SMAW – Grove Welds with Backing	**STANDARD 1.0** **LAYOUT AND FIT UP PROJECT FROM BLUPRINTS** **1.1 Interpret drawings, symbols, and procedures** **1.2 Use measuring devices** **1.3 Lay out project from blueprints** **1.4 Measure and cut materials** **1.5 Tack materials into position for welding**		Students will be able to: • Identify and explain groove welds. • Identify and explain groove welds with backing. • Set up shielded metal arc welding (SMAW) equipment for making V-groove welds. • Perform SMAW for V-groove welds with backing in the following positions -Flat (1G) -Horizontal (2G) -Vertical (3G) -Overhead (4G)	Root reinforcement
NCCER-CONTREN LEARNING SERIES Welding Level One Module 29112-09 SMAW – Open V-Groove Welds	**STANDARD 1.0** **LAYOUT AND FIT UP PROJECT FROM BLUPRINTS** **1.1 Interpret drawings, symbols, and procedures** **1.2 Use measuring devices** **1.3 Lay out project from blueprints**		Students will be able to: • Prepare arc welding equipment for open V-groove welds. • Make open V-groove welds with E6010 and E7018 electrodes in the following positions: - Flat (1G) position	○ Feather Root surfaces

	1.4 Measure and cut materials **1.5 Tack materials into position for welding**		- Horizontal (2G) position - Vertical (3G) position Overhead (4G) position	