# Agricultural Welding II Course No. 18407 Credit: 1.0

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| **Student name:**  |  | **Graduation Date:** |  |

Pathways and CIP Codes: Agricultural Technology and Mechanical Systems (01.0201); Manufacturing (48.0000)

Course Description: **Application Level**: Courses provide students with the skills & knowledge that are specifically applicable to the welding industry with advance blueprint reading and welding in the OH, V and H position along with pipe welding and TIG welding that could result in welding certification

Special Note: The AFNR College and Career Ready Skills are to be taught throughout the course utilizing FFA and SAE programming found at the Kansas Ag Ed website. Specific activities may be found in the SAE for All Teachers Guide and at National FFA.org. The AFNR College and Career Ready Skills competencies can be found at Kansas Ag Ed.

Opportunities in Agriculture Education & FFA:Classroom and laboratory instruction integrates and/or is supplemented by experiential, project, and leadership and personal development through FFA .Students should be introduced to FFA through leadership activities and College and Career Ready Skills. Specific FFA information and activities may be found in the “National FFA Student Handbook, 16thedition”. Student activities, scoring rubrics, grading examples, and teacher lessons are all found in the “FFA Student Handbook Teachers Guide”. Additional information can be found at [www.ffa.org](http://www.ffa.org/).

Workplace Skills, Supervised Agricultural Experience and Record Keeping: Classroom and laboratory instruction integratesand/or is supplemented by experiential, project, and work based learning through SAE. Specific SAE activities that support the College and Career Ready Skills may be found in the “SAE for All Guide”. Students should be introduced to Foundational SAE’s and the AET student portfolio system. Student activities, scoring rubrics, grading examples, and teacher lessons are all found in the “SAE for All Teachers Guide”. Additional information is found in the SAE Individual Learning Guides and Teacher Editions and in the AFNR College and Career Ready Competency Profile found at *Kansas Ag* *Ed.*

Directions:The following competencies are required for full approval of this course. Check the appropriate number to indicate the level of competency reached for learner evaluation.

**RATING SCALE:**

4. Exemplary Achievement: Student possesses outstanding knowledge, skills or professional attitude.

3. Proficient Achievement:Student demonstrates good knowledge, skills or professional attitude. Requires limited supervision.

2. Limited Achievement:Student demonstrates fragmented knowledge, skills or professional attitude. Requires close supervision.

1. Inadequate Achievement:Student lacks knowledge, skills or professional attitude.

0. No Instruction/Training:Student has not received instruction or training in this area.

**Prerequisite: 18404 – Agriculture Welding I and either 18001 – Introduction to Agricultural Science or 18002 - Agriscience**

Benchmark 1: SAFETY & HEALTH OF WELDERS

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 1.1 | Demonstrate knowledge of basic shop safety and Personal Protective Equipment (PPE) by satisfactorily completing the safety exam with a 100% completion score. |  |
| 1.2 | Complete a Shop Safety Contract / Release form.  |  |
| 1.3 | Demonstrate the proper inspection and operation of equipment for each welding or thermal cutting process used.  |  |
| 1.4 | Identify common hazards in welding. |  |
| 1.5 | Identify common causes of job-site accidents. |  |
| 1.6 | Demonstrates knowledge of the fire triangle and react effectively in case of a fire or emergency.  |  |
| 1.7 | Demonstrates safety techniques for storing and handling cylinders.  |  |
| 1.8 | Utilizes proper hand tool safety procedures.  |  |
| 1.9 | Utilizes proper portable and stationary power tool safety procedures.  |  |
| 1.10 | Explain how to avoid electrical shock when welding.  |  |
| 1.11 | Understand the proper use of precautionary labeling and SDS information.  |  |

Benchmark 2: BASE METAL PREPARATION

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 2.1 | Identify the types and defects of metal contamination.  |  |
| 2.2 | Clean base metal utilizing the proper equipment and procedures.  |  |
| 2.3 | Select and demonstrate the methods of joint preparation.  |  |
| 2.4 | Identify common metals such as carbon steel, stainless steel, aluminum, and cast iron.  |  |
| 2.5 | Utilize measurement instruments to measure steel length, width, depth, and weight to the 1/16” of an inch.  |  |
| 2.6 | Demonstrate Imperial/US and Metric measurement and conversion techniques. |  |

Benchmark 3: BLUEPRINTS: READING AND WELDING SYMBOLS

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 3.1 | Identify, explain, and interpret a welding detail drawing to include lines, object views, dimensions, material fills and sections.  |  |
| 3.2 | Identify and explain notes and bill of materials.  |  |
| 3.3 | Develop basic welding drawings.  |  |
| 3.4 | Read and interpret welding symbols on drawings, specifications, and welding procedure specifications.  |  |
| 3.5 | Draw welding symbols based on the observation of actual welds.  |  |

Benchmark 4: OXY-FUEL (OFC): MANUAL

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 4.1 | Performs safety inspections and make minor repairs of manual OFC equipment and accessories. |  |
| 4.2 | Sets up and operates for manual OFC operations on carbon steel.  |  |
| 4.3 | Performs straight and shape cutting operations in the flat and horizontal positions on carbon steel.  |  |

Benchmark 5: PLASMA ARC CUTTING (PAC): MANUAL

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 5.1 | Identify and understand plasma arc cutting processes and associated equipment.  |  |
| 5.2 | Prepare and set up plasma arc cutting equipment.  |  |
| 5.3 | Use plasma arc cutting equipment to make various types of cuts.  |  |
| 5.4 | Safely store equipment and clean the work area after use.  |  |

Benchmark 6: WELD QUALITY & JOINT FIT-UP

Competencies

| # | DESCRIPTION | RATING |
| --- | --- | --- |
| 6.1 | Describe the differences between welding flaws, defects, discontinuities, and their causes.  |  |
| 6.2 | Identify and explain nondestructive weld examination practices.  |  |
| 6.3 | Identify and explain destructive weld testing practices.  |  |
| 6.4 | Identify and explain welder qualification tests.  |  |
| 6.5 | Explain the importance of quality workmanship.  |  |
| 6.6 | Identify and explain basic code requirements as they apply to welder qualification testing.  |  |
| 6.7 | Check weld joints for proper fit and alignment using gauges and measuring tools prior to welding.  |  |
| 6.8 | Identify and explain material distortion and how it is controlled.  |  |

Benchmark 7: SMAW: EQUIPMENT, SETUP & ELECTRODES

Competencies

| # | Description | RATING |
| --- | --- | --- |
| 7.1 | Explain the duty cycle and output current related to machine ratings.  |  |
| 7.2 | Identify and explain the parts and importance of welding cable (leads).  |  |
| 7.3 | Makes minor external repairs to SMAW equipment and accessories.  |  |
| 7.4 | Identify the function of the electrode coating, flux, and proper storage of electrodes.  |  |
| 7.5 | Explain the AWS electrode and filler metal classification system.  |  |
| 7.6 | Determine the size of the electrode by the core wire diameter.  |  |
| 7.7 | Identify and select the proper electrode for an identified welding task.  |  |
| 7.8 | Describe what causes arc blow and how the welder can combat or alleviate it.  |  |

Benchmark 8: SMAW: FILLET AND GROOVE WELDS

Competencies

| # | Description | RATING |
| --- | --- | --- |
| 8.1 | Identify the components, features, and parts of typical fillet and groove welds.  |  |
| 8.2 | Demonstrate horizontal (2F) fillet welds with E60XX and E70XX.  |  |
| 8.3 | Demonstrate vertical (3F) fillet welds with E60XX and E70XX.  |  |
| 8.4 | Demonstrate overhead (4F) fillet welds with E60XX and E70XX.  |  |
| 8.5 | Demonstrate the proper preparation of weld coupons for groove welds.  |  |
| 8.6 | Practice Flat (1G) V-groove welds with backing using E60XX or E70XX.  |  |

Benchmark 9: GMAW/FCAW: EQUIPMENT, SETUP & ELECTRODES

Competencies

| # | Description | Rating |
| --- | --- | --- |
| 9.1 | Explain the physical processes of GMAW and FCAW.  |  |
| 9.2 | Identify GMAW/FCAW machines, parts of wire feeder, GMAW gun, equipment, and components. |  |
| 9.3 | Identify GMAW/FCAW electrode classifications and selection. |  |
| 9.4 | Demonstrate and explain the setup of a GMAW/FCAW machine, including how to change the wire-based electrodes.  |  |
| 9.5 | Identify, describe, and identify base gas mixtures needed for short circuit, globular, axial spray, and pulse spray transfer methods. |  |

Benchmark 10: GMAW/FCAW: FILLET AND GROOVE WELDS

Competencies

| # | Description | rating |
| --- | --- | --- |
| 10.1 | Demonstrate the correct method of starting a weld, terminating a weld, and properly restarting a weld using the GMAW and FCAW process.  |  |
| 10.2 | Demonstrate horizontal (2F) fillet welds.  |  |
| 10.3 | Demonstrate vertical (3F) fillet welds.  |  |
| 10.4 | Demonstrate overhead (4F) fillet welds.  |  |

Benchmark 11: GTAW: EQUIPMENT, SETUP, ELECTRODES AND FILLER METALS

Competencies

| # | Description | Rating |
| --- | --- | --- |
| 11.1 | Explain the physical processes of GTAW. |  |
| 11.2 | Identify and explain GTAW safety, including particular emphasis on high-frequency safety.  |  |
| 11.3 | Identify GTAW machines, parts of GTAW torch, peripheral equipment, and components. |  |
| 11.4 | Identify GTAW electrode color code classifications, selection, and end preparation.  |  |
| 11.5 | Explain the duty cycle and output current related to machine ratings.  |  |
| 11.6 | Explain the usage of AC, DCEN, and DCEP polarities and the materials that these polarities are used for.  |  |

Benchmark 12: GTAW: CARBON STEEL FILLET WELDS

Competencies

| # | Description | Rating |
| --- | --- | --- |
| 12.1 | Perform safety inspections of GTAW equipment and accessories.  |  |
| 12.2 | Makes minor external repairs to GTAW equipment and accessories.  |  |
| 12.3 | Sets up for GTAW operations on carbon steel.  |  |
| 12.4 | Operate GTAW equipment on carbon steel.  |  |
| 12.5 | Demonstrate start, termination, and restart of beads.  |  |
| 12.6 | Make stringer beads on carbon steel in the flat position.  |  |
| 12.7 | Make fillet welds on carbon steel in the horizontal position.  |  |

I certify that the student has received training in the areas indicated.

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

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