# Welding Processes I Course No. 39207 Credit: 1.0

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

Pathways and CIP Codes: **Manufacturing (48.0000)**; Business Management & Entrepreneurship (52.0799);Power, Structural and Technical Systems (01.0201)

Course Description: A comprehensive, **technical level** course designed to provide students with the knowledge and skills in basic welding theories and terminology needed to perform welding procedures.

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.

## Benchmark 1: Safety Practices

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 1.1 | Identify hazards associate with welding. |  |
| 1.2 | Identify and demonstrate proper use of Personal Protective Equipment (PPE). |  |
| 1.3 | Identify the parts of a fire triangle. |  |
| 1.4 | Demonstrate proper assembly of welding and cutting equipment. |  |

## Benchmark 2: Welding, Cutting and Inspection Theory

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 2.1 | Investigate various industries and occupations related to welding |  |
| 2.2 | Differentiate between different methods of cutting (thermal, sheering, abrasive, sawing, etc.). |  |
| 2.3 | Describe the thermal cutting process (plasma and oxyacetylene). |  |
| 2.4 | Identify and describe welding theory AND processes (e.g. laser, friction stir, etc.). |  |
| 2.5 | Explain the difference between welding, brazing and soldering. |  |
| 2.6 | Identify and describe welding theory related to standard welding processes (SMAW, GMAW, GTAW, FCAW). |  |
| 2.7 | Identify various filler metals used for welding, brazing and soldering. |  |
| 2.8 | Identify weld types (groove, fillet, etc.), joint types (T, Lap, etc.), and positions (1=flat, 2=horizontal, etc.) for plate and pipe |  |
| 2.9 | Describe common destructive and non-destructive inspection and testing methods. |  |
| 2.10 | Explain requirements and procedures for welder qualification test |  |
| 2.11 | Identify physical and chemical properties of metals and how they impact a metals weldability |  |
| 2.12 | Interpret welding symbols. |  |

## Benchmark 3: Cutting Processes

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 3.1 | Demonstrate the ability to make cuts using sheering type equipment. |  |
| 3.2 | Demonstrate the ability to make cuts using abrasive type cutters. |  |
| 3.3 | Demonstrate the ability to make cuts using sawing equipment. |  |
| 3.4 | Demonstrate the ability to make cuts using oxyacetylene cutting equipment. |  |
| 3.5 | Demonstrate the ability to make cuts using plasma cutting equipment. |  |

## Benchmark 4: Shielded Metal Arc Welding (SMAW)

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 4.1 | Describe the advantages and disadvantages of SMAW |  |
| 4.2 | Explain the importance of welding essentials such as travel speed, angles, machine settings, etc. |  |
| 4.3 | Weld joints in the F and H positions using a fast fill electrode. |  |
| 4.4 | Demonstrate 1F, 2F, 1G, and 2G welds using 6010 or 6011 on lap, Tee, corner, pipe to plate, and butt joints. |  |
| 4.5 | Demonstrate 1F, 2F, 1G, and 2G welds using 70X4 or 6013 on lap, Tee, and butt joints. |  |
| 4.6 | Demonstrate 1F, 2F, 1G, and 2G welds using 7018 on lap, Tee, corner, pipe to plate, and butt joints. |  |

## Benchmark 5: Gas Metal Arc Welding (GMAW)

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 5.1 | Describe the advantages and disadvantages of GMAW. |  |
| 5.2 | Explain the importance of welding essentials such as travel speed, angles, machine settings, etc. |  |
| 5.3 | Demonstrate 1F, 2F, 1G, and 2G Short Circuit welds on lap, Tee, pipe to plate, and butt joints. |  |
| 5.4 | Demonstrate 1F, 2F, and 1G Globular welds in the flat and horizontal positions on lap, Tee, and butt joints. |  |
| 5.5 | Demonstrate 1F, 2F, and 1G Spray welds on lap, Tee, and butt joints. |  |
| 5.6 | Demonstrate 1F, 2F, 1G, and 2G Pulse welds on lap, Tee, and butt joints. |  |

## Benchmark 6: Gas Tungsten Arc Welding (GTAW)

### Competencies

| **#** | **DESCRIPTION** | **RATING** |
| --- | --- | --- |
| 6.1 | Demonstrate the set-up and shut-down of GTAW equipment. |  |
| 6.2 | Describe the different types of gases used with GTAW |  |
| 6.3 | Explain the importance of welding essentials such as travel speed, angles, machine settings, etc. |  |
| 6.4 | Demonstrate 1F, 2F, and 1G welds without filler metal (autogenous) on lap, and butt joints. |  |
| 6.5 | Demonstrate 1F, 2F, 1G, and 2G welds with filler metal on lap, Tee, pipe to plate, and butt joints |  |
| 6.6 | Describe the advantages and disadvantages of GTAW. |  |

## Benchmark 7: Qualification requirements for GMAW & SMAW

### Competencies

| **#** | **Description** | **RATING** |
| --- | --- | --- |
| 7.1 | Demonstrate 1F single pass ¼” weld on ¼”x2”x12” Tee joint |  |
| 7.2 | Demonstrate 2F 3 pass 3/8” welds on ¼”x2”x12” Tee joint. |  |
| 7.3 | Demonstrate 1G multi-pass welds on 3/8”x3”x7” single Vee (45 degrees) plate with ¼”x1”x9” backing bar. |  |
| 7.4 | Prepare 1G weldment (7.3) for root and face bend test. |  |
| 7.5 | Pass Bend test according to applicable testing criteria |  |
| 7.6 | Complete requirements for industry certification(s) (e.g. AWS SENSE program). |  |

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

Instructor Signature:

For more information, contact:

CTE Pathways Help Desk

(785) 296-4908

[pathwayshelpdesk@ksde.org](mailto:pathwayshelpdesk@ksde.org)



900 S.W. Jackson Street, Suite 102

Topeka, Kansas 66612-1212

[https://www.ksde.org](https://www.ksde.org/)

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