



Advanced Welding Technology

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| Career Cluster | Manufacturing |
| Course Code | 13208 |
| Prerequisite(s) | Welding Technology |
| Credit | ½ credit or 1 credit |
| Graduation Requirement | No |
| Program of Study and Sequence | Welding Technology – Advanced Welding Technology – Welding Engineering or Capstone Experience |
| Student Organization | Skills USA |
| Coordinating Work-Based Learning | Manufacturing tours, internships |
| Industry Certifications | AWS, OSHA 10 |
| Dual Credit or Dual Enrollment | |
| Teacher Certification | |
| Resources | AWS, NCCER, and Industry |

Course Description:

Advanced Welding provides students with opportunities to effectively perform cutting and welding applications of increasing complexity used in the advanced manufacturing industry. Proficient students will build on the knowledge and skills of the Welding Technology course while learning additional welding techniques not covered in previous courses. Specifically, students will be proficient in fundamental safety practices in welding, gas metal arc welding (GMAW), gas tungsten arc welding (GTAW), shielded metal arc welding (SMAW), and quality control methods. Upon completion of the Advanced Welding Technology course, proficient students will be prepared to complete the American Welding Society (AWS) Entry Welder qualification and certification.

Program of Study Application

Advanced Welding Technology is the second pathway course in the Manufacturing cluster, welding pathway. Welding Technology is a prerequisite for this course. The course may be followed by further dual-enrollment studies or a capstone experience.

Career Cluster: Manufacturing

Course: Advanced Welding Technology

Course Standards

AWT 1 Identify and conform to basic welding safety standards

| <i>Webb Level</i> | <i>Sub-indicator</i> | <i>Integrated Content</i> |
|----------------------|---|---|
| Two Skill/Concept | AWT 1.1 Identify and practice the proper industry safety standards. Examples: <ul style="list-style-type: none">• Complete 10 hour OSHA (Occupational Safety Health Administration) certification• American Welding Society Certification | Link http://awo.aws.org/seminars/safety/ |

Notes:

AWT 2 Interpret, layout, and fabricate in conformance to fabrication drawings

| <i>Webb Level</i> | <i>Sub-indicator</i> | <i>Integrated Content</i> |
|-------------------|--|---------------------------|
| Two Skill/Concept | <p>AWT 2.1 Correctly interpret dimensions and locations of components in fabrication drawings.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Make a bill of materials to construct and fabricate in accordance to drawing specifications • Lay out structural and other components and their locations to dimensions and tolerances indicated on construction and fabrication drawing. | |
| Two Skill/Concept | <p>AWT 2.2 Correctly scale dimensions in fabrication drawings.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Use the scale of a drawing to determine locations not explicitly dimensioned • Use the scale of drawing to determine dimension not explicitly shown on the drawing | |
| Two Skill/Concept | <p>AWT 2.3 Correctly interpret orthographic and pictorial plan views shown in fabrication drawings.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Interpret two and three-dimensional features found in construction and fabrication drawing | |
| Two Skill/Concept | <p>AWT 2.4 Recognize and correctly interpret lines and symbols commonly used in fabrication drawings.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Identify and explain a welding detail drawing • Identify and explain line types • Interpret welding symbols to determine type, geometry, process, extent, and required testing of welds | |

Notes:

AWT 3 Exhibit knowledge and perform base metal preparation.

| <i>Webb Level</i> | <i>Sub-indicator</i> | <i>Integrated Content</i> |
|----------------------|---|---------------------------|
| Two Skill/Concept | AWT 3.1 Prepare base metal for various welding processes. Examples: <ul style="list-style-type: none"> • Safely use stationary and hand-held grinders • Clean base metal for welding and cutting • Identify and explain joint design • Explain joint design considerations • Mechanically and thermally bevel the end of mild steel | AWS D1.1 Section 7.4.3 |

Notes:

AWT 4 Understand and perform Gas Metal Arc Welding (GMAW) process

| Webb Level | Sub Indicator | Integrated content |
|-------------------|---|------------------------------------|
| Two Skill/Concept | AWT 4.1 Identify and understand GMAW equipment and setup. Examples: <ul style="list-style-type: none"> • Explain gas metal arc welding (GMAW) safety • Explain the characteristic of welding current and power sources • Demonstrate knowledge of GMAW equipment • Set up GMAW equipment • Identify tools for weld cleaning | |
| Two Skill/Concept | AWT 4.2 Demonstrate Gas Metal Arc Welding (GMAW) on steel. Examples: <ul style="list-style-type: none"> • Demonstrate fillet welds in one or more positions • Demonstrate groove welds in one or more positions • Complete a test plate in the flat weld position | AWS D1.1 Table 6.1 AWS D1.3 6.1 |

Notes:

AWT 5 Understand and perform Gas Tungsten Arc Welding (GTAW) process

| Webb Level | Sub Indicator | Integrated Content |
|-------------------|--|------------------------------------|
| Two Skill/Concept | AWT 5.1 Understand GTAW equipment and filler metals. Examples: <ul style="list-style-type: none"> • Explain and demonstrate GTAW safety • Identify and explain the function of GTAW equipment, filler metals, and shielding gases • Set up GTAW equipment | |
| Two Skill/Concept | AWT 5.2 Demonstrate Gas Tungsten Arc Welding (GTAW) process on Steel. Examples: <ul style="list-style-type: none"> • Demonstrate fillet welds in one or more positions • Demonstrate groove welds in one or more positions • Complete a test plate in the flat weld position | AWS D1.1 Table 6.1 AWS D1.3 6.1 |

Notes:

AWT 6 Understand and perform Shielded Metal Arc Welding (SMAW) process

| Webb Level | Sub Indicator | Integrated Content |
|----------------------|--|---|
| Two Skill/Concept | AWT 6.1 Understand SMAW equipment and filler metals. Examples: <ul style="list-style-type: none"> • Explain arc welding (SMAW) safety • Identify and explain the function of SMAW equipment • Identify and explain the function of SMAW filler metals • Set up SMAW equipment | |
| Two Skill/Concept | AWT 6.2 Demonstrate knowledge of the Shielded Metal Arc Welding (SMAW) process. Examples: <ul style="list-style-type: none"> • Demonstrate fillet welds in one or more positions • Demonstrate groove welds in one or more positions • Complete a welder qualification test record | AWS D1.1 Table 6.1 AWS D1.3 6.1 AWS D1.1 Figure 4.37 & Figure 4.31 AWS D1.3 Figure 4.2A |

Notes:

AWT 7 Understand and perform Carbon Arc cutting and gouging process

| Webb Level | Sub Indicator | Integrated Content |
|----------------------|---|--------------------|
| Two Skill/Concept | AWT 7.1 Understand carbon arc equipment. Examples: <ul style="list-style-type: none"> • Explain carbon arc safety • Identify and explain the function of carbon arc equipment • Identify and explain the function of carbon arc cutting and filler removal • Set up carbon arc equipment | |
| Two Skill/Concept | AWT 7.2 Demonstrate Carbon Arc cutting process. Examples: <ul style="list-style-type: none"> • Demonstrate removal of filler metal • Demonstrate the cutting of base metals | |

Notes:

AWT 8 Identify and demonstrate knowledge of quality control of the welding process including visual and destructive testing.

| Webb Level | Sub Indicator | Integrated Content |
|-----------------------------|--|--|
| Three Strategic Thinking | AWT 8.1 Demonstrate knowledge of weld quality Examples: <ul style="list-style-type: none"> • Explain codes governing welding • Explain weld imperfections and their causes • Explain nondestructive examination practices • Explain welder qualification tests • Explain the importance of quality workmanship • Identify common destructive testing methods • Perform visual inspection of fillet welds | AWS D1.1 Table 6.1 Visual Inspection Acceptance Criteria AWS D1.3 6.1 Visual Inspection Acceptance Criteria |

Notes:

AWT 9 Participate in career exploration activities

| Webb Level | Sub Indicator | Integrated Content |
|----------------------|--|--|
| Two Skill/Concept | AWT 9.1 Research career opportunities in the welding pathways. Examples: <ul style="list-style-type: none">• Utilizing career exploration software research and write a report on career opportunities in the manufacturing fields• Utilizing career exploration software research educational requirements for a chosen career path• Utilizing career exploration software, update a student's portfolio | SDMyLife.com |

Notes:

AWT 10 Demonstrate ethical work behaviors.

| Webb Level | Sub Indicator | Integrated Content |
|---------------|--|--|
| One Recall | <p>AWT 10.1 Follow the following required ethical practices of Manufacturing Industry:</p> <ul style="list-style-type: none"> • Complete assignments efficiently and on time • Be aware of the importance of attendance • Utilize principles of time management • Present a positive attitude • Work well with peers/supervisor • Be prepared for work assignments | <p>Student handbook and student contract Lean manufacturing</p> |

Notes: