



## Welding Technology

**Organization** Washburn Institute of Technology

**Program Number** 48.0508

**Instructional Level** Certificate

### Target Population

Grades 11 & 12  
Post-secondary

### Description

The Welding Technology program prepares individuals to apply technical knowledge and skills to join or cut metal surfaces. Formal and self-paced instruction includes: Shielded Metal Arc Welding (SMAW); Gas Metal Arc Welding (GMAW); Flux Cored Arc Welding (FCAW), and cutting processes. Related technical instruction also includes quality assurance and control, print reading, safety, and workplace skills.

### Entry Requirements

WorkKeys®	Applied Math	Level 4
WorkKeys®	Reading for Information	Level 4

### Assessment Plan

Assessment is an integral part of the educational process at Washburn Tech and accurate feedback is an important tool in continuously improving the institution's technical programs. Students can expect to participate in assessment activities prior to entry into programs, within specific courses and following program completion for specific fields of study.

### Student Learning Outcomes

- A. Communicate effectively.
- B. Integrate technology.
- C. Learn effectively - use academics effectively.
- D. Demonstrate cooperative/teamwork skills.
- E. Apply safety.
- F. Think critically and creatively.
- G. Demonstrate responsible work ethics.

## Program Outcomes

- A. Practice safety in a welding shop.
- B. Demonstrate ability to set-up and operate welding and cutting equipment.
- C. Demonstrate entry level welding ability in flat, horizontal, vertical, and overhead positions.
- D. The student will have an understanding of flux cored arc welding (FCAW) and will prove that knowledge by scoring at least 80 percent on each written test.
- E. The student will know set-up procedures and how to properly run a bead in all positions.
- F. The student will know how to prepare metal for welding and how to fit-up joints properly. This skill will be demonstrated during seven skill demonstrations and five performance tests.
- G. Upon completion of this section, the student will have entry level gas metal arc welding (GMAW) skill. Welding skill demonstrations in all positions and tests using different joint configurations will be used to verify skill level. Standards of the American Welding Society (AWS) will be used to evaluate weld quality.
- H. The student will know how to prepare metal for welding and how to fit-up open-root, lap, and t-joints properly. This skill will be demonstrated during seven skill demonstrations and five performance tests.
- I. Student will have an understanding of gas metal arc welding (GMAW) and will prove that knowledge by scoring at least 80 percent on each written test.
- J. Student will know set-up procedures and how to properly run a bead in all positions.
- K. Student will have entry level gas metal arc welding (GMAW) skill in the all positions. Welding skill demonstrations in all positions and tests using different joint configurations will be used to verify skill level. Standards of the American Welding Society (AWS) will be used to evaluate weld quality.
- L. Develop code of behavior for working in a welding shop environment.
- M. Student will have the ability to set-up and operate welding equipment.
- N. Student will know how to work safely in a welding shop.
- O. Student will have entry level welding ability in flat, horizontal, vertical, and overhead positions.
- P. Student will have entry level welding skill using the SMAW, GMAW, and FCAW.
- Q. Student will learn the skills needed for employment; good attendance, good work habits, and good personal relation skills.
- R. Student will have the ability to set-up and operate welding and cutting equipment.
- S. The student will be introduced to oxy-fuel welding, GTAW, and aluminum welding.
- T. Student will have entry level skill using oxy-acetylene, plasma arc, and air carbon arc cutting.
- U. Demonstrate entry level welding skill using the SMAW.

Course #	Course Title	Credit Hours	Required
WEL101	Welding Safety/OSHA 10	2	Yes
WEL110	Print Reading/Math I	1	Yes
WEL120	Oxy-Fuel/Cutting Procedures	3	Yes
WEL131	SMAW	3	Yes
WEL135	SMAW I	3	Yes
WEL141	GMAW	3	Yes
WEL145	GMAW Welding	3	Yes
WEL150	Workplace Skills I	2	Yes
WEL160	Oxy-Fuel Welding	4	Yes

WEL230	SMAW II	5	Yes
WEL220	FCAW Welding	5	Yes
WEL210	Print Reading/Math II	2	Yes
WEL241	Welding Special Topics	5	Yes
WEL246	GTAW	3	Yes
WEL267	GTAW I	2	Yes
WEL250	Workplace Skills II	2	Yes
WEL260	Welding OJT	3	No

## Program Course Descriptions

### WEL101 Welding Safely/OSHA 10 (2 credits)

Through a variety of classroom and/or lab learning and assessment activities, students in this course will explain job/site safety and precautions for job/site hazards, determine the uses of personal protective equipment (PPE), identify the safety equipment and procedures related to safe work practices and environment, identify fire prevention and protection techniques, and explore Hazardous Communications (HazCom) including Material Safety Data Sheets (MSDS).

### WEL110 Print Reading/Math I (1 credit)

The course is designed to teach a basic understanding of welder's math and the symbols used on blueprints. The symbols used on blueprints give the designer a way to relay information to the fitter and welder. The graphic language on blueprints uses various symbols, lines, and notes to convey information. A blueprint is used by a welder to visualize the parts final form, to position and align various members, and to determine the type of joint preparation. It tells the welder what type of filler metal to use, where the weld metal is to be placed, the extent of welding and the size, contour, and finish method for the welds.

### WEL120 Oxy-Fuel/Cutting Procedures (3 credits)

This course will include cutting of ferrous and non-ferrous materials with manual, motor driven, and oxy-fuel shape cutting equipment. Also included are plasma-arc cutting (PAC) and carbon-arc cutting (CAC-A). Safety, equipment, and the basic fundamentals of cutting processes will be introduced. Student will be expected to produce acceptable oxy-fuel, PAC, and CAC-A cuts. This unit follows ANSI / AWS C4.2-90 an American National Standard.

### WEL131 SMAW (3 credits)

Through classroom and/or lab/shop learning and assessment activities, students in the course will describe the shielded metal arc welding (SMAW) process, demonstrate the safe and correct set-up of the SMAW work station, associate SMAW electrode classifications with base metals and joint criteria, demonstrate proper electrode selection and use based on metal types and thicknesses, build pads of weld beads with selected electrodes in the flat position, build pads of weld beads with selected electrodes in the horizontal position, perform basic SMAW welds on selected weld joints, and perform visual inspection of welds.

### WEL135 SMAW I (3 credits)

The course is a continuation of SMAW. Additional positions and tests will be introduced providing the student additional experience with Shielded Metal Arc Welding.

### WEL141 GMAW (3 credits)

Through classroom and/or lab/shop learning and assessment activities, students in the course will explain gas metal arc welding (GMAW) process, demonstrate the safe and correct set-up of the GMAW work

station, correlate GMAW electrode classifications with base metals and joint criteria, demonstrate proper electrode selection and use based on metal types and thicknesses, building pads of weld beads with selected electrodes in the flat position, build pads of weld beads with selected electrodes in the horizontal position, produce basic GMAW welds on selected weld joints, and conduct visual inspection of GMAW welds. Prerequisite: WEL101 (Safety) and WEL135 (SMAW 1).

### **WEL145 GMAW Welding (3 credits)**

The course is a continuation of GMAW. Additional positions and tests will be introduced providing the student additional experience with gas metal arc welding.

### **WEL150 Workplace Skills I (2 credits)**

The course teaches some of the skills needed to get a job in any field. This course utilizes WorkKeys assessments which include Applied Math (basic word problem-solving), Reading for Information, and Locating Information. This course also introduces some of the testing methods used in the welding industry. Destructive and non-destructive testing methods will be discussed.

### **WEL160 Oxy-Fuel Welding (4 credits)**

**The** course teaches basic welding using and oxy-fuel welding set-up. A student will learn how to set-up and torch and become proficient in the start-up and shut down procedures. Basic welding skill and understanding of the process is needed in this area. This will lead into gas tungsten arc welding (GTAW) at a later date.

### **WEL230 SMAW II (5 credits)**

The Shielded Metal Arc Welding II (SMAW) unit is designed to teach the student the correct techniques to weld in the vertical up and overhead position. Safety is stressed in the shop. Practice and training in the welding shop will develop the basic skill level necessary to produce quality welds in these positions using lap joints and tee joints.

### **WEL220 FCAW Welding (5 credits)**

The Flux Cored Arc Welding Unit (FCAW) is designed to teach the student the correct techniques to weld in all positions. Safety is stressed in the shop. Practice and training in the welding shop will develop the basic skill level necessary to produce quality welds in all positions and in different joint configurations. Prerequisites: WEL101 (Safety), WEL135 (SMAW I), and WEL141 (GMAW).

### **WEL210 Print Reading/Math II (2 credits)**

This course is designed to teach a basic understanding of blueprints. The symbols used on blueprints give the designer a way to relay information to the fitter and welder. The graphic language on blueprints uses various symbols, lines, and notes to convey information. A blueprint is used by a welder to visualize the parts final form, to position and align various members, and to determine the type of joint preparation. It tells the welder what type of filler metal to use, where the weld metal is to be placed, the extent of welding and the size, and the contour and finish method for the welds. Prerequisite: WEL110 (Print Reading/Math I).

### **WEL241 Welding Special Topics (5 credits)**

The Gas Metal Arc Welding Aluminum (GMAW) unit is designed to teach the student the correct techniques to weld in all positions. Safety is stressed in the shop. Practice and training in the welding shop will develop the basic skill level necessary to produce quality welds in all positions and in different joint configurations. Prerequisites: WEL101 (Safety), WEL141 (GMAW).

### **WEL246 GTAW (3 credits)**

Through classroom and/or lab/shop learning and assessment activities, students in this course will explain the gas tungsten arc welding (GTAW) process, demonstrate the safe and correct set-up of the GTAW work station, relate GTAW electrode and filler metal classifications with base metals and joint build

pads of weld beads with selected electrodes and filler material in the flat position, build pads of weld beads with selected electrodes and filler material in the horizontal position, perform basic GTAW welds on selected weld joints, and perform visual inspection of GTAW welds.

### **WEL267 GTAW I (2 credits)**

The course is a continuation of GTAW. Additional positions and tests will be introduced providing the student additional experience with gas tungsten arc welding.

### **WEL250 Workplace Skills II (2 credits)**

Workplace skills include writing a resume and job search technique. This section is at the very end of the program and if a student is going directly into the work force then resumes should be sent to prospective employers. Any job searches and possible job interviews will take place during this section. This is also final preparation for the exit assessment by using Key Train software for Applied Math, Reading for Information, and Locating Information.

### **WEL260 Welding OJT (3 credits)-Optional**

Student works in a welding position or department at an employer's business.

### **ADA Notification Statement and Disability Services:**

The Testing/ADA Coordinator office is responsible for assisting in arranging accommodations and for identifying resources at Washburn Tech for persons with disabilities. Qualified students with disabilities MUST register and provide documentation with the office to be eligible for services. New requests for accommodations should be submitted two months or more prior to the date services should begin by contacting the Testing/ADA Coordinator's office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of services. Testing/ADA Coordinator coordinates and assists in arranging services it deems appropriate for eligible students on a case-by-case basis.

If you are a student with a disability that may substantially limit your ability to participate in this class and believe you will need accommodations, it is your responsibility to contact:

Testing/ADA Coordinator                      Phone:                      785-228-6356  
E-Mail:                      [ssscoordinator@washburn.edu](mailto:ssscoordinator@washburn.edu)

