# WEL WELDING

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<td><strong>WEL.100 Welding Theory OFC &amp; OAW</strong></td>
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<td><strong>WEL.101 Fundamentals of Welding Theory</strong></td>
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### WEL.106 Welding Theory GTAW

This course provides a convenient source of know-how or information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include: * GTAW process, * Nomenclature and definitions specific to this process, and * Safety, weld quality control, and other related welding information.

Offered: Fall or Spring  
Prerequisites: Take WEL.114 and WEL.115 with a grade of C or better  
Take WEL.116 WEL.117  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS and Certificates where applicable.  
General Education — Not Applicable

### WEL.107 Welding Theory Basic GMAW

This course provides a convenient source of know-how or information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include: GMAW process, Nomenclature and definitions specific to this process, and Safety, weld quality control, and other related welding information.

Offered: Fall or Spring  
Prerequisites: Take WEL.100 WEL 102. WEL.109; minimum grade C; Take WEL.104 WEL.112  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS and Certificates where applicable.  
General Education — Not Applicable

### WEL.108 Welding Theory GMAW & FCAW

This course provides a convenient source of know-how or information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include: * Advanced GMAW and FCAW processes, * Nomenclature and definitions specific to these processes, and * Safety, weld quality control, and other related welding information.

Offered: Fall or Spring  
Prerequisites: Take WEL.107 WEL.118 and WEL.119, with grade of C or better. Take WEL.120 WEL.129;  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS and Certificates where applicable.  
General Education — Not Applicable

### WEL.109 Oxyacetylene Welding

This is a course designed to prepare the student for employment by developing basic welding skills and proficiency in the safe operation of the oxyacetylene welding process. The student will get extensive practice in gas welding and brazing on mild steels.

Offered: Fall or Spring  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS, and Certificates where applicable.  
General Education — Not Applicable

### WEL.110 Welding Theory/Applications

This course provides a convenient source of know-how or information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the projects being fabricated and welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include: * Fabrication and layout.  
* Nomenclature and definitions specific to this process.  
* Safety, weld quality control and other related welding information.

Offered: Fall or Spring  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS and Certificates where applicable.  
General Education — Not Applicable

### WEL.111 Arc Welding Basic 1

This course is designed to prepare the student for entry level employment as a production arc welding operator in the steel fabricating and machinery building industry. The student will develop proficiency in the safe operation of the manual metallic shielded arc welding processes to meet commercial quality standards and is devoted primarily to introductory skills, safety, proper techniques to use in the welding process, and blueprint reading.

Offered: Fall or Spring  
Prerequisites: Take WEL.102 WEL.109 with a grade of C or better Take WEL.104 WEL.112  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS, and Certificates where applicable.  
General Education — Not Applicable

### WEL.112 Arc Welding Basic 2

As a continuation of WEL 111, Arc Welding Basic 1, this courses is designed to prepare the student for entry level employment as a production arc welding operator in the steel fabricating and machinery building industry. The student will develop proficiency in the safe operation of manual metallic shielded arc welding processes to meet commercial quality standards and is devoted to welding mild steel in the downhand positions.

Offered: Fall or Spring  
Prerequisites: Take WEL.102 and WEL.109 with a grade of C or better Take WEL.104 WEL.111;  
Applicable toward graduation at Sandburg where program structure permits:  
Degree or Certificate: AAS, AGS, and Certificates where applicable.  
General Education — Not Applicable
**WEL.114 Arc Welding Advanced 1**

This is the first of two advanced courses designed to prepare the student for entry level employment as a production arc welding operator in the steel fabricating and machinery building industry. The student will develop proficiency in the safe operation of manual metallic shielded arc welding processes to meet commercial quality standards.

Offered: Fall or Spring
Prerequisites: Take WEL.111, WEL.112 and WEL.104 grade of C or better
Take WEL.105 WEL.115
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.115 Arc Welding Advanced 2**

As a continuation of WEL 114, Arc Welding Advanced 1 is designed to prepare students for entry level employment as production arc welding operators in the steel fabrication and machinery building industries. Students will develop proficiency in the safe operation of the manual metallic shielded arc welding processes in all positions to meet commercial quality standards.

Offered: Fall or Spring
Prerequisites: Take WEL.104 WEL.111 and WEL.112 with a grade of C or better Take WEL.105 WEL.114;
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.116 Gas Shielded Arc-TIG 1**

This course is designed to broaden the knowledge and skill of individuals who have already developed employment skills in arc welding. It is the first of two courses which offer students an opportunity to develop proficiency in the safe operation of the tungsten inert gas (TIG) welding process.

Offered: Fall or Spring
Prerequisites: Take WEL.105 WEL.114 and WEL.115 with grade of C or better Take WEL.106 WEL.117;
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.117 Gas Shielded Arc-TIG 2**

As a continuation of WEL 116, Gas Shielded ARC/TIG 1, this course is designed to broaden the knowledge and skill of individuals who have already developed employment skills in arc welding. It is the second of two courses which offer students an opportunity to develop proficiency in the safe operation of the tungsten inert gas (TIG) welding process.

Offered: Fall or Spring
Prerequisites: Take WEL.105 WEL.114 and WEL.115 grade of C or better Take WEL.106 WEL.116;
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.118 Gas Shielded Arc-MIG 1**

This is the first of two courses designed to develop proficiency in the safe operation of the metal inert gas (MIG) welding processes to commercial quality standards.

Offered: Fall or Spring
Prerequisites: Take WEL.106 WEL.116 and WEL.117 Take WEL.107 WEL.119;
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.119 Gas Shielded Arc-MIG 2**

As a continuation of WEL 118, Gas Shielded ARC/MIG 1, this is the second of two courses designed to continue to develop proficiency in the safe operation of the metal inert gas (MIG) welding processes to commercial quality standards.

Offered: Fall or Spring
Prerequisites: Take WEL.106 WEL.116 and WEL.117 Take WEL.107 WEL.118
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.120 Gas Shielded Applications**

This course is designed to help prepare a person for employment by developing proficiency in the application of advanced skills in the gas shielded welding processes. The student will gain extensive practice in the proper techniques employed by trade and industry in the application of Gas shielded processes.

Offered: Fall or Spring
Prerequisites: Take WEL.107 WEL.118 and WEL.119 grade of C or better Take WEL.108 WEL.129;
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

**WEL.121 Application Welding 1**

This is the first of two courses designed for students to utilize their welding abilities to demonstrate comprehension of skills and knowledge. It provides the student with experience in the four welding positions - flat, horizontal, vertical, and overhead - using various welding procedures and related equipment. Emphasis will be on welding strength, multibead welding and fabrication.

Offered: Fall or Spring
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable
### WEL.122 Application Welding 2

A continuation of WEL 121, Application Welding 1, this course is considered to be one of the final courses that a welding student enrolls in, as it utilizes skills gained from a number of previously completed courses in the simulation of welding processes where the students will be directed by blueprints and shop notes. The finished product will be evaluated as to size, dimension, angle of cuts, bead placement, weld size, etc. as indicated by the prints provided.

**Offered:** Fall or Spring

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS and Certificates where applicable.

General Education – Not Applicable

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<th>WEL.122 Application Welding 2</th>
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### WEL.123 Work Experience

This work experience is designed as a culminating experience for the student pursuing the Welding Certificate program. It provides a significant opportunity for the student to apply previously learned principles in the employment setting. This work experience requires 120 hours or more of on-the-job activities.

**Offered:** As Needed

Prerequisites: All courses in the Welding Certificate curriculum

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS, and Certificates where applicable.

General Education – Not Applicable

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<th>WEL.123 Work Experience</th>
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### WEL.124 Auto Body Welding

This course is a continuation of WEL 118 with concentration on auto body applications. The types of joints and welds used on thin, high strength steel automobiles will be emphasized. An additional fee is required.

**Offered:** Fall

Prerequisites: WEL.118

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS, and Certificates where applicable.

General Education – Not Applicable

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### WEL.125 Welding Blueprints

This course provides an introduction to blueprint reading and related math for those individuals with limited or no background. Emphasis will be on welding prints, symbols, and mathematics pertinent to the welding field. Current welding prints from local businesses will be utilized throughout the course. This course is intended for welding majors or current welding employees seeking to improve their skills in these areas.

**Offered:** Fall or Spring

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS, and Certificates where applicable.

General Education – Not Applicable

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### WEL.126 Weld Test Evaluation

This is a course designed to prepare students for employment by allowing them to practice skills already learned in preparation for completion of entry-level qualification tests given in various welding processes at local welding businesses.

**Offered:** Fall or Spring or Summer

Prerequisites: Completion of all other welding lab requirements of the certificate program

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS, and Certificates where applicable.

General Education – Not Applicable

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<th>WEL.126 Weld Test Evaluation</th>
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### WEL.127 Welding Theory/Welding Evaluation

This course provides a convenient source of know-how or information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include: Review of the major processes associated with surrounding industries. Nomenclature and definitions specific to this process.

**Offered:** Fall or Spring

Prerequisites: Take WEL.102 WEL.109 WEL.111 WEL.112 WEL.114 WEL.115 WEL.116 WEL.117 WEL.118 WEL.119 WEL.120 WEL.121 WEL.122 and WEL.129

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS and Certificates where applicable.

General Education – Not Applicable

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<th>WEL.127 Welding Theory/Welding Evaluation</th>
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### WEL.129 Flux Cored Arc Welding

This course is designed to enable students to produce quality fillet and groove welds in all positions using the flux cored arc welding process. Students will learn proper electrode selection, equipment set-up, and proper techniques used in industrial applications.

**Offered:** Fall or Spring

Prerequisites: Take WEL.107 and WEL.118 grade of C or better

Take WEL.108 WEL.120;

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS, and Certificates where applicable.

General Education – Not Applicable

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### WEL.130 Industrial Safety

This course provides the student with specific instruction to facilitate safe work practices in industrial environments. Students will be introduced to different safety philosophies and terminology. Students will also become acquainted with OSHA policy and with the Right to Know laws. Also covered are units specific to fire safety, pressurized gases and welding, electrical hazards, and safe machine usage. Students will have the opportunity to earn the OSHA ten hour safety certification.

**Offered:** Summer

Applicable toward graduation at Sandburg where program structure permits:

Degree or Certificate: AAS, AGS, and Certificates where applicable.

General Education – Not Applicable

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<th>WEL.130 Industrial Safety</th>
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WEL 131 Electrical Principles of Welding 1.5 1 2

This course introduces the fundamentals of electricity used in welding. Basic theory including Ohm’s law, circuit characteristics, and power calculations as applied to power source selection for welding is covered. Some lab work will include testing meters and procedures used in trouble shooting power sources.
Offered: Spring
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

WEL 149 Automated Welding Applications 1 2 2

This course is designed to help students develop basic knowledge and skills related to automated welding and cutting processes used in commercial applications. The topics of the course will include CNC plasma cutting and robotic welding, including basic programming, system operation and maintenance. Safety procedures in automated operations will be emphasized.
Offered: Summer
Prerequisites: WEL.102, WEL.118, WEL.119 and WEL.120
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

WEL 150 Robotic Applications in Welding 1 1.5 2

This course is designed to introduce the welder to the components of the welding robot and the application of robotics in production welding. Emphasis will be directed at the topics of robotic safety, robotic welding programming and robotic system maintenance.
Offered: As Needed
Prerequisites: WEL.118, WEL.119 and WEL.120
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable, Elective Only

WEL 151 Introduction to Pipe Welding 1G Rolled 1 1 1.5

This is the first of a series of courses designed to prepare the student for entry-level employment as a pipe welder in the energy and infrastructure industries. The student will develop proficiency in the safe operation of the shielded metal arc welding processes on pipe to meet commercial quality standards. Emphasis will be on welding pipe in the 1G position (Flat rolled) using SMAW and GTAW with various electrodes.
Offered: Fall or Spring or Summer
Prerequisites: WEL.101, WEL.102, WEL.111, WEL.112, WEL.114, WEL.115, WEL.116, and WEL.117 Take WEL.125;
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

WEL 152 Pipe Welding 2G Horizontal 1 1 1.5

This is the second of a series of courses designed to prepare the student for entry-level employment as a pipe welder in the energy and infrastructure industries. The student will develop proficiency in the safe operation of the shielded metal arc and gas tungsten arc welding processes on pipe to meet commercial quality standards. Emphasis will be on welding pipe in the 2G position (Horizontal) using SMAW and GTAW with various electrodes.
Offered: Fall or Spring or Summer
Prerequisites: WEL.151
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

WEL 153 Pipe Welding 5G Vertical 1 1 1.5

This is the third of a series of courses designed to prepare the student for entry-level employment as a pipe welder in the energy and infrastructure industries. The student will develop proficiency in the safe operation of the shielded metal arc and gas tungsten arc welding processes on pipe to meet commercial quality standards. Emphasis will be on welding pipe in the 5G (vertical up and down) position using SMAW and GTAW with various electrodes.
Offered: Fall or Spring or Summer
Prerequisites: WEL.152
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

WEL 154 Pipe Welding 6G Inclined 1 1 1.5

This is the final pipe welding course designed to prepare the student for entry-level employment as a pipe welder in the energy and infrastructure industries. The student will develop proficiency in the safe operation of the shielded metal arc and gas tungsten arc welding processes on pipe to meet commercial quality standards. Emphasis will be on welding pipe in the 6G (inclined 45 degrees) position using SMAW and GTAW with various electrodes.
Offered: Fall or Spring or Summer
Prerequisites: WEL.153
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS, and Certificates where applicable.
General Education – Not Applicable

WEL 160 Oxyacetylene Welding & Metal Preparation 1 4 3

This course is designed to develop proficiency in metal preparation and cutting techniques, as well as develop basic welding skills. Information provides aid in selecting the correct process since this is directly related to the metal being cut and/or welded. Emphasis will be placed upon: IAI Course No. Oxy-fuel cutting (OFC), plasma arc-cutting (PAC), carbon arc-cutting (CAC-A) and oxy-acetylene welding (OAW) processes. Nomenclature specific to these processes, and
This course is designed to prepare the student for entry level employment as a production arc welding operator in the steel fabricating and machinery building industry. The student will develop proficiency in the safe operation of the manual metallic shielded arc welding processes to meet commercial quality standards and is devoted to welding mild steel in the down hand positions. Areas of concentration will include:... IAI Course No. SMAW process, Nomenclature and definitions specific to this process, and

WEL.164 Arc Welding Advanced

This course is a continuation of WEL 162 and provides information that is needed by all persons advancing in the field of welding. The focus of this course is correctly matching the welding process to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include:... IAI Course No. Shielded Metal Arc Welding (SMAW) process and advanced welding techniques, Nomenclature and definitions specific to this process, and

WEL.166 Gas Shielded Arc Tig

This course provides information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include:... IAI Course No. GTAW process, Nomenclature and definitions specific to this process, and

WEL.168 Gas Shielded Arc Mig

This course provides information that is needed by all persons going into the field of welding. Much information provides aids in selecting the correct process since this is directly related to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include:... IAI Course No. GMAW process, Nomenclature and definitions specific to this process, and

WEL.170 Applications of GMAW & FCAW

This course provides information that is needed by all persons going into the field of welding. The focus of this course is correctly matching the welding process to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include:... IAI Course No. Advanced gas metal arc welding (GMAW) and flux cored arc welding (FCAW) processes, Nomenclature and definitions specific to this process, and

WEL.172 Welding Applications

This course provides information that is needed by all persons going into the field of welding. The focus of this course is correctly matching the welding process to the metal being welded. The processes are explained in detail and the course provides quality control data and reference material that is of high interest to welding personnel. Areas of concentration will include:... IAI Course No. Fabrication and layout, Nomenclature and definitions specific to this process, and

WEL.202 Production and Inventory Control

This course is designed for students in the welding program, and it will help them to effectively work in environments from small jobbing shops to major manufacturing plants. They will receive a broad overview of planning and control factors involved in controlling inventory as well as managing production. Students will learn the essentials of forecasting and the variety of ways forecasters attempt to minimize error, including the use of software programs. They will learn about Master Production Schedules (MPS) and Material Requirements Planning (MRP) as well as Capacity Management and required planning for input and output. Kanban, the Theory of Constraints, Lean Production, and Just-In-Time (JIT) will be introduced. Finally, they will consider the benefit of partnering functions in purchasing and distribution, as well as integrating various systems for efficiency and effectiveness.

Offered: Fall or Spring
Applicable toward graduation at Sandburg where program structure permits:
Degree or Certificate: AAS, AGS and Certificates where applicable.
General Education – Not Applicable