

Welding

Gainful Employment	Program Name	Program Type	Area of Study
	Welding and Fabrication Technology (9414) , AAS (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/9414/)	Degree	WELD
	FCAW (Flux Cored) Welding Certificate (4333) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4333/)	Certificate	WELD
	GMAW (MIG/MAG) Welding Certificate (4334) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4334/)	Certificate	WELD
	GTAW (TIG) Welding Certificate (4330) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4330/)	Certificate	WELD
	Pipe Welding Certificate (4331) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4331/)	Certificate	WELD
	SMAW (Stick) Welding Certificate (4326) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4326/)	Certificate	WELD
	Thermal Cutting, Gouging, Brazing, and Soldering Certificate (4335) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4335/)	Certificate	WELD
	Welding and Fabrication Technology I Certificate (4336) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4336/)	Certificate	WELD
	Welding and Fabrication Technology II Certificate (4337) (https://catalog.lakelandcc.edu/degree-certificate-programs/weld/4337/)	Certificate	WELD

WELD 1030 Arc Welding Fundamentals

3 Credits

This course provides an overview of the basic knowledge and skills related to welding. It does not provide hands-on welding experience. Topics include blueprint reading and sketching, machining, metalworking principles and techniques, basic metallurgy, and fixturing. It also presents basic concepts of electricity and how this relates to welding. A calculator capable of calculating the square root of a number is required.

(3 contact hours)

WELD 1040 Introduction to Metal Fabrication and Mechanized Welding

3 Credits

This course provides instruction and laboratory work to gain knowledge and skills related to metal fabricating-including hands on use of basic metal fabricating machines and mechanized arc resistance welding equipment. Students do not do any hands-on manual or semi automatic welding in this course. Topics include safety and health concerns; print reading and sketching; welding symbols and weld gauges; measuring devices and instruments; lay-outs; metal fabricating processes; operation of metal fabricating machines and related material handling equipment operation of resistance spot welding and mechanized or robotic welding equipment; and the design, building and use of jigs and fixtures. Students must provide safety glasses, work gloves, work boots with steel toes and a calculator capable of calculating square roots for this course.

(5 contact hours: 2 lecture, 3 lab)

WELD 1300 Thermal Cutting, Gouging, Brazing, and Soldering

2 Credits

This course introduces students to oxyfuel cutting, carbon arc gouging, plasma arc cutting, oxyfuel hand and machine cutting, oxyfuel braze welding, brazing, and soldering. Laboratory experience includes the oxy-acetylene cutting of low carbon steels, and manual oxy-acetylene and straight-line oxy-propane machine cutting of low carbon steel as well as carbon arc gouging on low carbon steel. Students learn how to plasma arc cut, use a plasma arc cutting table, and learn the basics in brazing and soldering on sheet metal and copper tubing. Laboratory experience includes an emphasis on individual instruction. The student must furnish: welding helmet (shade #10 or above); welding goggles (shade 3-5); safety glasses; work gloves; long pants; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional.

(4 contact hours: 1 lecture, 3 lab)

WELD 1320 Basic SMAW (Stick) Welding**2 Credits***Prerequisite: WELD 1030 (can be taken concurrently).*

This course introduces students to Shielded Metal Arc Welding (SMAW) of carbon steel. Laboratory experience develops the skill to produce acceptable fillet and groove welds in the flat and horizontal positions, and includes functions and specific uses of manual welding equipment, various SMAW (Stick) welding techniques, special metals handling, and welding certification requirements. Students must furnish: welding helmet (shade #10 or above); safety glasses; work gloves; long pants; welding jacket; leather work boots, preferable steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; center punch; 12 oz. ball peen hammer; and tool bag. 4 1/2" grinder is optional.

(4 contact hours: 1 lecture, 3 lab)

WELD 1330 Basic GTAW (TIG)**3 Credits***Prerequisite: WELD 1030 (can be taken concurrently).*

This course introduces students to the basic concepts involved in using the Gas Tungsten Arc Welding (GTAW) or (TIG) process to produce cost effective fillet and groove welds in the flat and horizontal positions. Welds are made in carbon steel, stainless steel, and aluminum. Familiarization with the equipment, set up, materials, and the manipulation technique are emphasized. Students must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferable steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; center punch; 12 oz. ball peen hammer; and tool bag. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 1340 Basic FCAW (Flux Cored) and GMAW (MIG/MAG) Welding**3 Credits***Prerequisite: WELD 1030 (can be taken concurrently).*

This course introduces students to the basic concepts of utilizing the Flux Cored Arc Welding (FCAW) and Gas Metal Arc Welding (GMAW) processes to make fillet and groove welds in the flat and horizontal positions in carbon steel, stainless steel, and aluminum. Laboratory experience includes skill development in both types of arc welding. Students must furnish: welding helmet (shade #10 or above); safety glasses; work gloves; long pants; welding jacket; leather work boots, preferable steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; center punch; 12 oz. ball peen hammer; and tool bag. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 1370 Basic Pipe Welding**3 Credits***Prerequisite: WELD 1030, WELD 1320; or permission of instructor.*

This course introduces students to the basic American Society of Mechanical Engineers (ASME), American Petroleum Industry (API) and American Welding Society (AWS) pipe welding standards. Students will choose one of these three standards to develop their welding skills in the laboratory. Laboratory sessions will provide hands-on time to develop skills to produce quality welds on flat plate and then on pipe in the flat and horizontal positions. The course covers functions and specific uses of manual-welding equipment, various welding techniques, prepping and fitting of pipe coupons, and welding certification requirements. Students must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferable steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; center punch; 12 oz. ball peen hammer; and tool bag. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 1810 AWS D1.1 - 3G 7018 Certification Preparation**1 Credit***Prerequisite: WELD 1240 or successful completion of Comprehensive Lincoln Electric Welding Program or permission of instructor.*

This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 3G 7018 certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.

(1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1820 AWS D1.1 - 3G GMAW-P Certification Preparation**1 Credit***Prerequisite: WELD 1255 or WELD 1280 or successful completion of Comprehensive Lincoln Electric Welding Program or permission of instructor.*

This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 3G GMAW-P certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.

(1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1830 AWS D1.1 - 3G FCAW-G Certification Preparation**1 Credit***Prerequisite: WELD 1255 or WELD 1270 or successful completion of Comprehensive Lincoln Electric Welding Program or permission of instructor.*

This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 3G FCAW-G certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.

(1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1840 AWS D1.1 - 3G FCAW-S Certification Preparation**1 Credit**

Prerequisite: WELD 1255 or WELD 1270 or successful completion of Comprehensive Lincoln Electric Welding Program or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 3G FCAW-S certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1850 AWS D1.1 – GTAW MS 3F Certification Preparation**1 Credit**

Prerequisite: WELD 1265 or successful completion of Comprehensive Lincoln Electric Welding Program or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.1- GTAW MS 3F certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1855 AWS D1.2 – GTAW AL 3F Certification Preparation**1 Credit**

Prerequisite: WELD 1850 or AWS D1.1 GTAW MS 3F Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.2 - GTAW AL 3F certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1860 AWS D1.6 – GTAW SS 3F Certification Preparation**1 Credit**

Prerequisite: WELD 1850 or AWS D1.1 GTAW MS 3F Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.6 - GTAW SS 3F certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1865 AWS D1.1 - 4G 7018 Certification Preparation**1 Credit**

Prerequisite: WELD 1810 or AWS D1.1 - 3G 7018 Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 4G 7018 certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1870 AWS D1.1 - 4G GMAW-P Certification Preparation**1 Credit**

Prerequisite: WELD 1820 or AWS D1.1 3G GMAW-P Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 4G GMAW-P certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1875 AWS D1.1 - 4G FCAW-G Certification Preparation**1 Credit**

Prerequisite: WELD 1830 or AWS D1.1 - 3G FCAW-G Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 4G FCAW-G certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 1880 AWS D1.1 - 4G FCAW-S Certification Preparation**1 Credit**

Prerequisite: WELD 1840 or AWS D1.1 - 3G FCAW-S Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for AWS D1.1 - 4G FCAW-S certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 2020 ASME - 6G 6010 root 7018 out SMAW Certification Preparation**1 Credit**

Prerequisite: WELD 1865 or AWS D1.1 - 4G 7018 Certification or permission of instructor.
 This course is designed for the sole purpose of preparing experienced welders for ASME - 6G 6010 root 7018 out SMAW certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.
 (1.5 contact hours: 0.5 lecture, 1 lab)

WELD 2025 API 1104 Certification Preparation**1 Credit**

Prerequisite: WELD 1865 or AWS D1.1 - 4G 7018 Certification or permission of instructor.

This course is designed for the sole purpose of preparing experienced welders for API 1104 certification. Students must produce an acceptable weld and become certified for successful completion of the course. Course tuition does include the costs related to acquiring certification. Students who have current and verifiable certification can receive credit by certification for this course.

(1.5 contact hours: 0.5 lecture, 1 lab)

WELD 2320 Advanced SMAW (Stick) Welding**3 Credits**

Prerequisite: WELD 1040 (can be taken concurrently), WELD 1320; or permission of instructor.

This course introduces students to the advanced concepts of design and production of many types of weldments used in industry, with emphasis on proper design, set-up, trouble shooting, and techniques to produce cost effective fillet and groove welds in the vertical and overhead positions using the Shielded Metal Arc Welding (SMAW) process. Laboratory experience includes skill development in advanced SMAW welding techniques, along with project-based learning concepts, blueprint reading, manufacturing of projects, fabrication technique, and producing fillet and groove welds in the vertical and overhead positions. At the conclusion of this course, students take either a 3G or 4G pass/fail welder Certification of Qualification test using the SMAW process. The student must furnish: welding helmet (shade #10 or above); safety glasses; work gloves; long pants; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 2330 Advanced GTAW (TIG)**3 Credits**

Prerequisite: WELD 1040 (can be taken concurrently), WELD1330; or permission of instructor.

This course introduces students to advanced concepts associated with using the Gas Tungsten Arc Welding (GTAW) or (TIG) process to produce fillet and groove welds in the vertical and overhead positions in carbon steel, stainless steel, and aluminum. Emphasis is on proper weld joint design, familiarization with advanced power sources, set-up of equipment, trouble shooting, and the electrode manipulation techniques that must be utilized to produce high-quality welds. Laboratory experience includes project-based learning, blueprint reading, and familiarization with basic concepts relating to welding economics and cost-effective manufacturing. At the conclusion of this course students take either a 3F,4F,5F, 6F,3G or 4G pass/fail welder qualification test using the GTAW (TIG) process. An Industry Recognized Certification of Qualification will be awarded to students passing the test. The student must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square, chipping hammer, wire brush, tool bag, center punch, and 12oz ball peen hammer. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 2340 Advanced FCAW (Flux Cored) Welding**3 Credits**

Prerequisite: WELD 1040 (can be taken concurrently), WELD 1340; or permission of instructor.

This course introduces students to advanced concepts relating to the use of the Flux Cored Arc Welding (FCAW) Self Shielded (S) and Gas Shielded (G) welding processes to make high quality, cost-effective fillet and groove in the vertical and overhead positions in steel and stainless steel. Making such welds involves the use of advanced manipulative techniques that are more difficult to master than those used in WELD 1340. Safety is emphasized and the additional safety concerns associated with vertical and overhead welding are explained. Project Based Learning (PBL) is utilized to familiarize students with being part of a team that takes an idea for a product, designs it and makes it a reality. At the conclusion of this course students take either a 3G or 4G pass/fail welder qualification test using either the FCAW-G or FCAW-S process. An Industry Recognized Certification of Qualification will be awarded to students passing the test. The student must furnish: welding helmet (shade #10 or above); safety glasses; work gloves; long pants; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 2350 Advanced GMAW (MIG/MAG) Welding**3 Credits**

Prerequisite: WELD 1040 (can be taken concurrently), WELD 1340; or permission of instructor.

This course introduces students to advanced concepts relating to the use of the Gas Metal Arc Welding (GMAW) (MIG/MAG) process to make high quality, cost-efficient fillet and groove welds in the vertical and overhead positions in steel, aluminum, and stainless steel. It involves the use of advanced manipulative techniques, and utilizing variations of the process such as short-circuiting and spray transfer, pulsed-arc, and modified current wave-forms generated by advanced inverter types of welding power sources. Safety is emphasized and the additional concerns associated with vertical and overhead welding are explained. Project Based Learning (PBL) is utilized to familiarize students with being part of a team that takes an idea for a product, designs it, and makes it a reality. At the conclusion of this course, students take either a 3G or 4G pass/fail welder qualification test using the GMAW process. An Industry Recognized Certification of Qualification will be awarded to students passing the test. The student must furnish: welding helmet (shade #10 or above); safety glasses; work gloves; long pants; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional.

(5 contact hours: 1 lecture, 4 lab)

WELD 2370 Advanced Pipe Welding**3 Credits**

Prerequisite: WELD 1040 (can be taken concurrently), WELD 1320; or permission of instructor.

This course introduces students to advanced American Society of Mechanical Engineers (ASME), American Petroleum Industry (API), and American Welding Society (AWS) pipe welding standards in the vertical and overhead positions using the SMAW process on steel pipe. Students will choose one of these three standards to develop their welding skills and to prepare them for Certification of Qualification to the respective code. At the conclusion of this course, students take a 6G pass/fail welder qualification test using the Shielded Metal Arc Welding (SMAW) process. Laboratory sessions will provide hands-on time to develop skills to produce quality weldments on pipe. The course covers functions and specific uses of manual welding equipment, various SMAW welding techniques, prepping and fitting of pipe coupons, and welding certification requirements. The student must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional. (5 contact hours: 1 lecture, 4 lab)

WELD 2380 GTAW (TIG) Pipe Welding Application**3 Credits**

Prerequisite: WELD 1040 (can be taken concurrently), WELD 1330, WELD 1370; or permission of instructor.

This course introduces students to the Gas Tungsten Arc Welding (GTAW) American Society for Mechanical Engineers (ASME) pipe welding standards. Students will develop their welding skills and prepare for Certification of Qualification in ASME Section IX Code. Laboratory sessions will provide hands-on time to develop skills to produce quality welds with GTAW process on pipe. At the conclusion of this course, students take either a 5G or 6G pass/fail welder qualification test using the GTAW process according to the ASME Section IX code. The course covers functions and specific uses of manual welding equipment, various GTAW welding techniques, prepping and fitting of pipe coupons, and welding certification requirements. The student must furnish: long pants; welding helmet (shade #10 or above); safety glasses; work gloves; welding jacket; leather work boots, preferably steel toe; 8" crescent wrench; soapstone and holder; tape measure; combination square; chipping hammer; wire brush; tool bag; center punch; and 12 oz. ball peen hammer. 4 1/2" grinder is optional. (5 contact hours: 1 lecture, 4 lab)

WELD 2400 Welding Inspection**3 Credits**

This course introduces students to the basic inspection procedures and processes utilized in the welding industry. Topics include safety concerns; the role of a welding inspector; relevant documents; requirements of a weld; types of defects; acceptance criteria; inspections and verifications performed prior to, during and after welding operations; visual inspection; destructive and nondestructive tests and metallography. Laboratory experience provides skill development in evaluating welds through visual examination using various related measuring instruments, nondestructive examination using liquid penetrant, magnetic particle, ultrasonic, and eddy current tests, and the preparation and examination of metallographic specimens. Students must furnish safety glasses for use in the laboratory. (5 contact hours: 2 lecture, 3 lab)

WELD 2410 Welding Economics**3 Credits**

Prerequisite: MATH 1080 or MATH 0890.

This course provides instruction and laboratory work to gain knowledge and skills as an introduction to welding economics. The practical use of welding equipment and technologies will be used to produce a cost effective weldment. Various welding processes and technologies will be introduced. Classroom and laboratory experience includes knowledge and skill development around arc welding processes, welding variables, welding management, weld requirements, and updated welding technologies. Students must furnish a calculator capable of computing square roots (scientific or construction calculator preferred), safety glasses, gloves, protective clothing, leather work boots (preferably steel toe), and helmet for use in the laboratory. (4 contact hours: 2 lecture, 2 lab)