

WELDING

- Dual Credit Arc Welding Certificate (coursecatalog.tvcc.edu/pathways/service-production-industry/welding/dual-arc-welding-certificate/)
- Pipe Welding Certificate (coursecatalog.tvcc.edu/pathways/service-production-industry/welding/pipe-welding-certificate/)
- TIG Welding Certificate (coursecatalog.tvcc.edu/pathways/service-production-industry/welding/tig-welding-certificate/)
- Welding Certificate (coursecatalog.tvcc.edu/pathways/service-production-industry/welding/welding-certificate/)
- Welding OSA (coursecatalog.tvcc.edu/pathways/service-production-industry/welding/welding-osa/)
- Welding Technology AAS Degree (coursecatalog.tvcc.edu/pathways/service-production-industry/welding/welding-technology-aas/)

WLDG-1202. Fundamentals of Gas Metal Arc Welding (gmaw). (2 Credits)

(2-1-4) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Fundamentals of Gas Metal Arc Welding (GMAW). Includes setup and safe use of GMAW equipment as well as instruction in various basic weld joints. Lab fee.

WLDG-1206. Fundamentals of Gas Tungsten Arc Welding (gtaw). (2 Credits)

(2-1-4) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Fundamentals of Gas Metal Arc Welding (GMAW). Includes setup and safe use of GTAW equipment as well as instruction in flat positions on joint designs. Lab fee.

WLDG-1317. Introduction to Layout and Fabrication. (3 Credits)

(3-3-0) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A fundamental course in layout and fabrication related to the welding industry. Major emphasis on structural shapes and use in construction.

WLDG-1323. Welding, Safety, Tools, and Equipment. (3 Credits)

(3-3-0) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to welding equipment and safety practices, including OSHA standards for industry. Lab Fees.

WLDG-1353. Intermediate Layout and Fabrication. (3 Credits)

(3-2-4) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An intermediate course in layout and fabrication. Includes design and production of shop layout and fabrication. Emphasis placed on symbols, blueprints, and written specifications. Lab Fees.

WLDG-1407. Introduction to Welding Using Multiple Processes. (4 Credits)

(4-2-4) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Basic welding techniques using some of the following processes: Oxy-fuel welding (OFW) and cutting, shielded metal arc welding (SMAW), gas metal arc welding (GMAW), flux cored arc welding (FCAW), and gas tungsten arc welding (GTAW). Lab Fee.

WLDG-1417. Introduction to Layout and Fabrication. (4 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A fundamental course in layout and fabrication related to the welding industry. Major emphasis on structural shapes and use in construction.

WLDG-1421. Welding Fundamentals. (4 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to the fundamentals of equipment used in oxy-fuel and arc welding, including welding and cutting safety, basic oxy-fuel welding and cutting, basic arc welding processes and basic metallurgy.

WLDG-1423. Welding Safety, Tools, & Equipment. (4 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to welding equipment and safety practices, including OSHA standards for industry.

WLDG-1425. Introduction to Oxy-Fuel Welding & Cutting. (4 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to oxy-fuel welding and cutting, including history and future in welding, safety, setup and maintenance of oxy-fuel welding, and cutting equipment and supplies.

WLDG-1428. Introduction to Shielded Metal Arc Welding. (smaw). (4 Credits)

(4-2-4) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to the shielded metal arc welding process. Emphasis placed on power sources, electrode selection, and various joint designs. Lab Fee.

WLDG-1430. Introduction to Gas Metal Arc Welding (gmaW). (4 Credits)

(4-2-4) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Principles of gas metal arc welding, setup and use of Gas Metal Arc Welding (GMAW) equipment, and safe use of tools/equipment. Instruction in various joint designs. Lab fee.

WLDG-1435. Introduction to Pipe Welding. (4 Credits)

(4-2-8) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to welding of pipe using the shielded metal arc welding process (SMAW) including electrode selection, equipment setup and safe shop practices. Emphasis on weld positions 1G and 2G using various electrodes. Lab fee.

WLDG-1457. Intermediate Shielded Metal Arc Welding (smaw). (4 Credits)

(4-3-3) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A study of the production of various fillets and groove welds. Preparation of specimens for testing in various positions. Lab fee.

WLDG-1491. Special Topics. (4 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W.

WLDG-1521. Welding Fundamentals. (5 Credits)

(5-3-6) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. An introduction to the fundamentals of equipment used in oxyacetylene and arc welding, including welding and cutting safety, basic oxy acetylene welding and cutting, basic arc welding processes and basic metallurgy. Lab fee.

WLDG-1530. Introduction to Gas Metal Arc Welding (gmaw). (5 Credits)

(5-3-6) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A study of the principles of gas metal arc welding, setup and use of GMAW equipment and safe use of tools/equipment. Instruction in various joint designs. Lab fee.

WLDG-1534. Introduction to Gas Tungsten Arc Welding. (gtaw). (5 Credits)

(5-3-6) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Principles of gas tungsten arc welding (GTAW), including setup, GTAW equipment. Instruction in various positions and joint designs. Lab Fee.

WLDG-1557. Intermediate Shielded Metal Arc Welding (smaw). (5 Credits)

(5-3-6) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A study of the production of various fillets and groove welds. Preparation of specimens for testing in all test positions. Lab fee.

WLDG-2413. Intermediate Welding Using Multiple Processes. (4 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Introduction using layout tools and blueprint reading with demonstration and guided practices with some of the following welding processes: oxy-fuel gas cutting and welding, shield metal arc welding (SMAW), gas metal arc welding (GMAW), flux-cored arc welding (FCAW), gas tungsten arc welding (GTAW).

WLDG-2443. Advanced Shielded Metal Arc Welding (smaw). (4 Credits)

(4-3-3) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Advanced topics based on accepted welding codes. Training provided with various electrodes in shielded metal arc welding processes with open V-groove joints in all positions. Lab fee.

WLDG-2506. Intermediate Pipe Welding. (5 Credits)

(5-3-5) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. A comprehensive course on the welding of pipe using the shielded metal arc welding the shielded metal arc welding (SMAW) process. Welding will be done using various positions. Topics covered include electrode selection, equipment setup and safe shop practices. Lab fee.

WLDG-2543. Advanced Shielded Metal Arc Welding. (5 Credits)

(5-3-6) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Advanced topics based on accepted welding codes. Training provided with various electrodes in shielded metal arc welding processes with open V-groove joint in various positions. Lab Fee.

WLDG-2551. Advanced Gas Tungsten Arc Welding (gtaw). (5 Credits)

(5-3-6) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Advanced topics in GTAW welding, including welding in various positions and directions. Lab Fee.

WLDG-2553. Advanced Pipe Welding. (5 Credits)

(5-3-5) This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Advanced topics involving welding of pipe using the shielded metal arc welding (SMAW) process. Topics include electrode selection, equipment setup and safe shop practices. Emphasis on weld positions 5G and 6G using various electrodes. Lab fee.

What Welders, Cutters, Solderers, and Brazers Do (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-2>)

Welders, cutters, solderers, and brazers use hand-held or remotely controlled equipment to join or cut metal parts. They also fill holes, indentations, or seams in metal products.

Duties

Welders, cutters, solderers, and brazers typically do the following:

- Study blueprints, sketches, or specifications
- Calculate the dimensions of parts to be welded
- Inspect structures or materials to be welded
- Ignite torches or start power supplies
- Monitor the welding process to avoid overheating
- Maintain equipment and machinery

Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting and fusing them to form a permanent bond. Because of its strength, welding is used in shipbuilding, automobile manufacturing and repair, aerospace applications, and thousands of other manufacturing activities. Welding also is used to join steel beams in the construction of buildings, bridges, and other structures and to join pipes in pipelines, power plants, and refineries.

Welders work in a wide variety of industries, from car racing to manufacturing. The work that welders do and the equipment they use vary with the industry. Arc welding, the most common type of welding today, uses electrical currents to create heat and bond metals together—but there are more than 100 different processes that a welder can use. The type of weld is usually determined by the types of metals being joined and the conditions under which the welding is to take place.

Cutters use heat to cut and trim metal objects to specific dimensions. Their work is closely related to that of welders. However, instead of joining metals, cutters use the heat from an electric arc, a stream of ionized gas called plasma, or burning gases to cut and trim metal objects to specific dimensions. Cutters also dismantle large objects, such as ships, railroad cars, automobiles, buildings, and aircraft. Some operate and monitor cutting machines similar to those used by welding machine operators.

Solderers and **brazers** also use heat to join two or more metal objects together. Soldering and brazing are similar, except that the temperature used to melt the filler metal is lower in soldering. Soldering uses metals with a melting point below 840 degrees Fahrenheit. Brazing uses metals with a higher melting point.

Soldering and brazing workers use molten metal to join two pieces of metal. However, the metal added during the soldering or brazing process has a melting point lower than that of the piece, so only the added metal is melted, not the piece. Therefore, these processes normally do not create distortions or weaknesses in the piece, as can occur with welding.

Soldering commonly is used to make electrical and electronic circuit boards, such as computer chips. Soldering workers tend to work with small pieces that must be positioned precisely.

Brazing often is used to connect cast iron and thinner metals that the higher temperatures of welding would warp. Brazing also can be used to apply coatings to parts in order to reduce wear and protect against corrosion.

SUMMARY (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm>)

- Welders, cutters, solderers, and brazers
- 2018 Median Pay: \$41,380 per year, \$19.89 per hour
- Typical Entry-Level Education: High school diploma or equivalent
- Work Experience in a Related Occupation: None
- On-the-job Training: Moderate-term on-the-job training
- Number of Jobs, 2018: 424,700
- Job Outlook, 2018-28: 3% (Slower than average)
- Employment Change, 2018-28: 14,500

Work Environment (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-3>)

Welders, cutters, solderers, and brazers may work outdoors, often in inclement weather, or indoors, sometimes in a confined area. They may work on a scaffold, high off the ground, and they occasionally must lift heavy objects and work in awkward positions. Most work full time and overtime is common.

How to Become a Welder, Cutter, Solderer, or Brazer (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-4>)

A high school diploma or equivalent, combined with technical and on-the-job training, is typically required for anyone to become a welder, cutter, solderer, or brazer.

Pay (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-5>)

The median annual wage for welders, cutters, solderers, and brazers was \$41,380 in May 2018.

Job Outlook (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-6>)

Employment of welders, cutters, solderers, and brazers is projected to grow 3 percent from 2018 to 2028, slower than the average for all occupations. The nation's aging

infrastructure will require the expertise of welders, cutters, solderers, and brazers to help rebuild bridges, highways, and buildings.

State & Area Data (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-7>)

Explore resources for employment and wages by state and area for welders, cutters, solderers, and brazers.

Similar Occupations (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-8>)

Compare the job duties, education, job growth, and pay of welders, cutters, solderers, and brazers with similar occupations.

More Information, Including Links to O*NET (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-9>)

Learn more about welders, cutters, solderers, and brazers by visiting additional resources, including O*NET, a source on key characteristics of workers and occupations.

SUGGESTED CITATION:

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Welders, Cutters, Solderers, and Brazers, on the Internet at <https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm> (visited March 12, 2020).

TVCC has partnered with Career Coach (<https://tvcc.emsicc.com/?radius=®ion=10%20Mile%20Radius%20from%20Athens%2C%20TX>) for students to discover majors and in-demand careers and education based on your interests!

- Career Assessment Profiler
- Interactive Career Catalog
- Browse TVCC's Pathways

Some careers in this field will require a bachelor's degree.

- TVCC's AA degrees are fully transferable to public universities in Texas. See an academic advisor or TVCC's university transfer webpage (<https://www.tvcc.edu/Advisement/Category.aspx?z=72>) for more information on this transfer opportunity.
- Many of TVCC's AAS degrees lead to an online Bachelor of Applied Arts and Sciences (BAAS) degree with participating universities. See an academic advisor or the BAAS transfer website (<https://www.ntxccc.org/pathways/>) for more information on this transfer opportunity.