WELDING TECHNOLOGY

AWS S.E.N.S.E. Advanced Welder

Associate of Applied Science Degree
Certificate of Completion

Welders are in greater demand today than at any time during the past 30 years, and the job outlook is expected to remain excellent throughout the foreseeable future. They are needed in energy exploration and production and are required in virtually every field or industry that uses parts made of metal.

Simply stated, welders are people who join metals such as steel, stainless steel, aluminum, titanium, brass, bronze, copper, and nickel. Welding processes vary depending on the application. Extremely delicate and precise items, such as aerospace components and jewelry, may be welded using electron beams, lasers, and plasma, while huge structures for buildings and bridges are typically welded using submerged arc and flux core. Welding may take place in almost any setting: in a laboratory, out-of-doors, or even underwater, as in the case of offshore, oil-and-gas platform construction.

According to the US Department of Labor, job prospects for welders are excellent, with comparable projected job growth in New Mexico. Increases in welder wages have kept pace with or exceeded those of other occupations since 2002.

The DACC Welding Technology program is nationally accredited by the American Welding Society (AWS), and is taught by nationally qualified instructors. DACC welding instructors have extensive welding experience (nuclear, pressure vessels, aerospace, etc.), numeous welding certifications (SMAW, GTAW, GMAW, FCAW, SAW), and extensive experience teaching welding technology. Several DACC welding instructors are AWS Certified Welding Educators (CWE). several of which are also AWS Certified Welding Inspectors (CWI).

The DACC Welding Technology program performs hundreds of welder performance qualification tests every year. DACC welding instructors hold AWS national endorsements for multiple welding/fabrication codes.

The program is competency and performance based, consisting of lectures and hands-on laboratory exercises. Students learn to weld steels, stainless steels, and aluminum alloy plate and pipe with five welding processes. They also learn basic fabrication skills, oxy-fuel cutting, plasma cutting, and air-carbon arc cutting. The DACC Welding Technology Program is one of a handful of programs, nationwide, that has an orbital TIG unit that allows students to join tubing as small as one-quarter inch in diameter. Students are also exposed to heat treating of steel and its effects with a heat-treating oven.

Students are eligible to join SkillsUSA, an organization for high school and post-secondary students that promotes leadership and sponsors skills and leadership competitions at the state and national levels. In addition, students may become members of the American Welding Society (AWS) and participate in the activities of the new AWS El Paso Section.

All students who complete the certificate or associate degree will graduate as certified welders in one or more welding processes on steel, stainless steel, and/or aluminum. (It is important to note that, although some local welding jobs may not currently require certification, nearly all welding jobs nationwide do require it.) DACC welding instructors are well known nationally and have many job contacts in the United States.

Since the technical requirements for the certificate are the same as those for the associate degree, a student may complete the certificate program first and then later apply all the credits earned in the certificate program toward the associate degree. This associate degree then may be applied in its entirety toward the bachelor of applied studies degree offered by NMSU. Alternatively, those planning to teach at the secondary level may apply up to 36 credits earned in the Welding Technology associate degree program toward a bachelor of science degree in Agricultural and Extension Education.

To enter the Welding Technology program, a high school diploma or GED is required, along with good overall health, eyesight, and hand-eye coordination. Students must purchase tools and personal safety equipment, usually costing approximately $900.

Whether taking classes or working on a job site, students enrolled in this program will be required to perform the same job duties and meet the same physical requirements that they will as a graduate in the field. These requirements include the ability to achieve performance qualifications using a variety or processes while welding materials in different positions. Depending where they find employment, graduates may be required to work in extreme temperatures, to lift and safely move 50 pounds, to have good eye-hand coordination, to work safely around compressed gasses and electrical equipment, to ascend and descend ladders, to work safely in confined spaces and awkward welding positions, and to tolerate a noisy working environment.

NOTE: Students must receive a final grade of C- or better in all required WELD courses/Technical Requirements and achieve a cumulative grade-point average of at least 2.0. A grade of C- or better is required in ENGL 1110G Composition I and designated Mathematics courses.

Welding Technology - Associate of Applied Science (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/welding-technology/welding-technology-associate-applied-science/)

Welding Technology - Certificate of Completion (https://catalogs.nmsu.edu/dona-ana/academic-career-programs/welding-technology/welding-technology-certificate-completion/)

WELD 1110. Introduction to Welding Fundamentals
3 Credits (2+2P)
This course focuses on the fundamental techniques employed in the welding field. It is a laboratory approach to understanding and building skills in welding related areas including shop safety, hand and portable power tool usage, and welding.
Learning Outcomes

1. Demonstrate knowledge of basic welding processes.
2. Demonstrate shop safety including the proper use of welding hand and machine tools.
3. Practice and demonstrate SMAW with various electrodes in all positions.

WELD 1120. Print Reading for Welders
3 Credits (3)
Provides students with the knowledge to read and interpret prints and welding symbols and transfer this knowledge to the workplace with layout tools and measuring instruments.

Learning Outcomes

1. Identify, read and follow AWS welding symbols.
2. Demonstrate the ability to interpret orthographic and isometric drawings.
3. Demonstrate the ability to read/interpret pipe welding drawing and schematics.
4. Demonstrate proficiency in the mathematics utilized in welding and fabrication.

WELD 1130. SMAW (Shielded Metal Arc Welding) I
6 Credits (3+6P)
This course will cover introductory theory and practical applications of structural plate welding, welding safety, handheld torch cutting operations and equipment set up. The development of student skills using the Shielded Metal Arc Welding process in all positions will be stressed. The standards of this course are set by the American Welding Society and utilized in both classroom study and laboratory work.
Learning Outcomes

1. Perform welds on various joints in all positions.
2. Perform welds on various joints in all positions.
3. Demonstrate proficiency in identification of electrode classification and proper storage.
4. Identify SMAW power sources and their characteristics.
5. Maintain, use, and safely operate SMAW equipment.

WELD 1140. GMAW-Gas Metal Arc Welding I
3 Credits (2+2P)
Introduces Gas Metal Arc Welding (GMAW) short circuit welding safety, machine set up and shutdown procedures. Topics include personal protective equipment (PPE), GMAW uses, advantages and disadvantages, constant voltage (CV) power source, polarity, electrode types, shielding gasses, and weld discontinuities and defects identification and corrective practices. Lab exercises will include various joints in all positions.
Learning Outcomes

1. Demonstrate the ability to safely operate the Gas Metal Arc Welding equipment.
2. Demonstrate Gas Metal Arc Welding theory and application.
3. Demonstrate the ability to perform Gas Metal Arc Welding on various joints in all positions.
4. Demonstrate the ability to fabricate assigned projects while applying proper tolerance to finished projects.

WELD 1155. GTAW-Gas Tungsten Arc Welding I
3 Credits (2+2P)
A basic course designed to provide the student with the ability to setup, maintain and operate Gas Tungsten Arc Welding (GTAW) equipment safely. Develop skills to weld structural joints to bend tests standards utilizing various metals. Weld quality will be measured in accordance with American Welding Society standards.
Learning Outcomes

1. Demonstrate the ability set up GTAW equipment for use, inspect equipment prior to use, perform minor maintenance, and identify potential hazards.
2. Demonstrate the ability to perform GTAW on various base metals in all positions.
3. Demonstrate the understanding of basic metallurgical differences in various base and filler metals.
4. Demonstrate an understanding of welding currents and power sources.

WELD 1171. Layout and Fabrication
3 Credits (1+4P)
This class is an introduction to general layout and fabrication techniques as related to structural welding. Emphasis will be on construction of small projects to tolerances using prints. A variety of welding processes will be used in all positions.
Prerequisites: WELD 1130, WELD 1120, WELD 1140, and OETS 104 or OETS 118.
Learning Outcomes

1. Demonstrate the ability to fabricate projects.
2. Use shop drawing and/or prints to create projects and develop the bill of materials for the project.
3. Demonstrate ability to properly follow WPS (Welding Procedure Specification) during fabrication.

WELD 1191. Welded Art
3 Credits (1+4P)
Students explore the possibilities of welded art.
Prerequisite: WELD 1110.
Learning Outcomes

1. Demonstrate knowledge of the different forms of welded art.

WELD 1210. Flux Cored Arc Welding
3 Credits (2+2P)
Principles of flux cored arc welding (FCAW) terminology, safety procedures, and equipment set-up. Students will practice welding structural joints in all positions using the FCAW process.
Learning Outcomes

1. Demonstrate the set up of FCAW equipment.
2. Demonstrate safe operations of FCAW equipment.
3. Demonstrate minor repairs/maintenance of equipment.
4. Perform FCAW welds to minimum required specifications.

WELD 1220. Pipe Welding I
3 Credits (2+2P)
Stresses the theory and practical application of pipe welding in the 1-G and 2-G positions. This course will develop skills in the fit-up and technique of welding pipe, using electrodes and various Welding process.
Prerequisite(s): WELD 1130, WELD 1140, and WELD 1155, or consent of instructor.
Learning Outcomes

1. Demonstrate an understanding of 1-G and 2-G pipe welding using a variety of pipe sizes.
2. Demonstrate the ability to produce destructive test samples to AWS and/or API standards.
3. Demonstrate the ability to prepare, fit and tack pipe to specifications, getting pipe ready to weld.
4. Demonstrate knowledge of appropriate pipe fitting terminology and calculations.

WELD 1310. Metallurgy
3 Credits (3)
This course includes a study of ferrous and nonferrous metals from ore to the finished products. Emphasis is placed on metal alloys, heat-treating, hard surfacing, welding techniques, forging, foundry processes, and mechanical properties of metal including hardness, machinability, and ductility. Technical terms used in the various phases of metallurgy, from early history to present.
Prerequisites: WELD 1130 or consent of instructor.

Learning Outcomes

1. Describe metals and alloys commonly used in industry.
2. Describe mechanical properties of metals including stresses and failures.
3. Describe the metalworking processes of casting, forming, and machining.
4. Describe the two basic processes, and state the four major purposes of heat treatment.

WELD 2130. SMAW (Shielded Metal Arc Welding) II
6 Credits (3+6P)
Reviews and builds upon SMAW-1 skills. Students will learn joint design and AWS standards for welder qualification testing. Continuation of WELD 1130. May be repeated up to 6 credits.
Prerequisite: WELD 1130.
Learning Outcomes

1. Meet AWS acceptance criteria for weld quality and destructive tests (bend test).

WELD 2155. GTAW-Gas Tungsten Arc Welding II
3 Credits (2+2P)
A continuation of GTAW I. This course is designed to provide the student with the ability to setup, maintain and operate Gas Tungsten Arc Welding (GTAW) equipment safely. Develop skills to weld structural joints to bend tests standards utilizing various metals. Weld quality will be measured in accordance with American Welding Society standards.
Prerequisite: WELD 1155 or consent of instructor.
Learning Outcomes

1. Demonstrate the ability to perform increasingly complex welds.
2. Demonstrate the ability set up GTAW equipment for use, inspect equipment prior to use, perform minor maintenance, and identify potential hazards.
3. Demonstrate the ability to perform GTAW on various base metals in all positions.
4. Demonstrate the understanding of basic metallurgical differences in various base and filler metals.
5. Demonstrate an understanding of welding currents and power sources.

WELD 2220. Pipe Welding II
3 Credits (2+2P)
Stresses the theory and practical application of 5-G and 6-G pipe welding. This course will develop skills in the technique of pipe welding, using various Welding processes.
Prerequisite: WELD 2120.
Learning Outcomes

1. Demonstrate an understanding of 5-G and 6-G pipe welding using a variety of pipe sizes.
2. Demonstrate the ability to produce destructive test samples to AWS and/or API standards.
3. Demonstrate the ability to prepare, fit and tack pipe to specifications, getting pipe ready to weld.
4. Demonstrate knowledge of appropriate pipe fitting terminology and calculations.

WELD 2290. Welder Qualifications
6 Credits (3+6P)
Laboratory and classroom instruction on AWS and ASME Welder Performance Qualification Tests. All position plate and pipe techniques and tests for SMAW, GMAW, GTAW, FCAW, and SAW. Nondestructive and destructive examination methods, and basics of welding codes. Restricted to Welding majors.
Prerequisites: OETS 104 or OETS 118; and WELD 1130, WELD 1120, WELD 1310, WELD 1140, WELD 1155, WELD 1210 and WELD 2155 or consent of instructor.
Learning Outcomes

1. Pass the AWS and ASME Welder Performance Qualification Tests in all processes and all positions.
2. Recognize the role of welding inspection and testing in industry.
3. Identify essential information for welding procedure and performance qualification.
4. Identify essential welding and inspection information from Welding Procedure Specifications (WPS's).
5. Identify essential welding and inspection information from AWS D1 1, Structural Welding Code – Steel.
6. Identify essential welding and inspection information from ASME, Boiler and Pressure Vessel Code - Section IX.
7. Describe the basic principles of non-destructive testing methods.

WELD 2995. Cooperative Education in Welding
1-6 Credits
Supervised cooperative work program. Student is employed in an approved occupation and supervised and rated by the employer and instructor. Student will meet in a weekly class. May be repeated up to 6 credits.
Learning Outcomes

1. Varies.

WELD 2996. Topics in Welding
1-6 Credits
Individual studies in areas of welding technology. May be repeated up to 12 credits.
Learning Outcomes

1. Varies.

WELD 2997. Independent Study
1-4 Credits
Individual Studies related to Welding.
Learning Outcomes

1. Varies.

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