

Welding Technology

Degree: A.S. - Welding Technology
Certificates of completion offered by the department:
Blueprint Interpretation
Gas Metal Arc Plate & Pipe Welding
Gas Tungsten Arc Plate & Pipe Welding
Shielded Metal Arc Plate & Pipe Welding

Website: www.arc.losrios.edu/techvoc

Area: Technical Education
Dean: Gabriel Meehan
Phone: (916) 484-8354
Counseling: (916) 484-8572



American Welding Society
Accredited Testing Facility, 2001

Welding is the most common way of permanently joining metal parts. Heat is applied to the pieces to be joined, the metal melts and fuses together to form a permanent bond. The resultant weld joint is as strong as if the two parts were one.

Because of its strength, welding is used to construct and repair ships, automobiles, spacecraft and to join steel beams and reinforcing rods in buildings, bridges and highways.

There are three basic methods used to create the heat necessary to weld metals.

The most frequently used process is called arc welding. It uses electricity to create heat as electrical current arcs between the tip of an electrode and the metal parts to be joined.

In resistance (or spot) welding, heat is created by resistance to the flow of electrical current through the metal parts. In gas welding, the flame from the combustion of gases is used to melt the metal.

It is the welder's responsibility to control the amount of heat and the size of the melted area and to add the proper amount of filler material so that the parts form a strong bond or joint.

Welders must know how to use gas and electric welding equipment safely, and how to plan their work from drawings or specifications.

The ARC Program

The American Welding Society (AWS) nationally accredits American River College's welding program. ARC has met all the requirements of the AWS QC4 Standards for Accreditation of Test Facilities for their Certified Welder Program. AWS certification is recognized by the welding industry as an important step in professional development. With multiple certifications, ARC will prepare students to work

with welding industry codes, standards and specifications.

The ARC welding program provides both classroom instruction and shop training for positions in most fields of welding. Competencies include techniques of jointing ferrous and non-ferrous metals by use of Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Fluxed Core Arc Welding (FCAW) and Gas Tungsten Arc Welding (GTAW) welding processes. Competencies also include shop math, blueprint reading, welding symbol interpretation, oxy fuel gas cutting, plasma arc cutting, air arc gouging, welding metallurgy, welding inspection, and intensive training for welding certification.

Welding Technology

| Requirements for Degree Major: | 37 units |
|--------------------------------|----------|
| WELD 102 | 3 |
| WELD 116 | 2 |
| WELD 122 | 3 |
| WELD 130 | 3 |
| WELD 132 | 3 |
| WELD 133 | 3 |
| WELD 134 | 2 |
| WELD 135 | 3 |
| WELD 140 | 3 |
| WELD 300 | 3 |
| WELD 320 | 3 |
| WELD 321 | 3 |
| WELD 342 | 3 |

Recommended Electives

DESGN 100, MATH 100.

General Education Graduation Requirement:

Students must also complete the general education graduation requirements for an A.S. degree. See general education requirements.

Cannot be completed in one year.

Mathematics and Blueprint Interpretation (144 hours)

| Requirements for Certificate | 9 Units |
|------------------------------|---------|
| WELD 140 | 3 |
| WELD 300 | 3 |
| WELD 342 | 3 |

Gas Metal Arc Plate and Pipe (252 hours)

| Requirements for Certificate | 11 Units |
|------------------------------|----------|
| WELD 133 | 3 |
| WELD 134 | 2 |
| WELD 135 | 3 |
| WELD 300 | 3 |

Gas Tungsten Arc Plate and Pipe WELD (180 hours)

| Requirements for Certificate | 9 Units |
|------------------------------|---------|
| WELD 130 | 3 |
| WELD 132 | 3 |
| WELD 300 | 3 |

Shielded Metal Arc Plate and Pipe (270 hours)

| Requirements for Certificate | 12 Units |
|------------------------------|----------|
| WELD 122 | 3 |
| WELD 300 | 3 |
| WELD 320 | 3 |
| WELD 321 | 3 |

WELD 102 Introduction to Welding Metallurgy 3 Units

Formerly: WELD 54

Prerequisite: WELD 300.

Course Not Transferable UC or CSU

Hours: 54 hours LEC; 36 hours LAB

This course introduces production of iron and the manufacture of iron and steel in shapes and forms used in industry. The focus is on identification and selection of irons and steels, mechanical and physical properties of metals, and crystal structure of metals. Additionally failure and deformation, the heat treating of steel, and the metallurgy of welds will be covered.

WELD 103 Gas Metal Arc Welding of Sheet Steel 1.5 Units

Prerequisite: None

Course Not Transferable UC or CSU

Hours: 18 hours LEC; 27 hours LAB

This course covers technique application and joint design used in the auto body repair and sheet steel manufacturing industries. Sheet steel applications in the areas of steel decks, panels, storage racks, and joint framing members are presented using Gas Metal Arc Short Circuit Transfer process. Proper safety welding techniques are also covered.

WELD 104 Introduction to Metal Fabrication and Sculpture (same as Art 120) .5-3 Units

Formerly: WELD 67

Prerequisite: WELD 300 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 0-36 hours LEC; 27-54 hours LAB

This course will cover metal sculpture techniques, design principles and materials used for sculpture, and functional and nonfunctional art forms, on ferrous and non-ferrous metals. Techniques on the major welding processes - gas welding,

SMAW, MIG and TIG - will be an integral part of the course as well as related safety issues. This class may be taken 4 times for maximum of 6 units.

WELD 106 Introduction to Ornamental Iron (same as ART 122) .5-3 Units

Formerly: WELD 68

Prerequisite: WELD 300 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 0-36 hours LEC; 27-54 hours LAB

This course will cover the hands-on basics of metal forming and welding techniques, design principles and materials used for sculpture, and functional art forms with emphasis on the use of the anvil and the gas forge. Techniques on the major welding processes - gas welding, SMAW, MIG and TIG - will be an integral part of the course as well as related safety issues. This class may be taken 4 times for a maximum of 6 units.

WELD 116 Welding Inspection 2 Units

Formerly: WELD 56

Prerequisite: WELD 300.

Course Not Transferable UC or CSU

Hours: 36 hours LEC

This course will cover the welding requirements for any type of welded structure made from the commonly used carbon and low-alloy constructional steel. The course also will cover the rules and regulation of welding in the steel construction industry and the principles of welding inspection.

WELD 117 Ultrasonic Testing Level One 3 Units

Prerequisite: None

Course Not Transferable UC or CSU

Hours: 45 hours LEC; 27 hours LAB

This course covers the theory, technique application, and evaluation techniques used in the material processing, welding, and inspection industries. Ultrasonic testing as applied to industry practices such as building construction, aeronautics, shipbuilding, materials fabrication, and many others are covered. Proper safety techniques are also covered. Successful completion of this course certifies that the requirements of ASNT TCI-A for UT level 1 are met.

WELD 118 Ultrasonic Testing Level Two 3 Units

Prerequisite: WELD 117 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 45 hours LEC; 27 hours LAB

This course covers advanced theory, technique application, and evaluation techniques used in the material processing, welding, and inspection industries. Advanced ultrasonic testing as applied to industry practices such as building construction, aeronautics, shipbuilding, materials fabrication and many others are covered. Proper safety techniques are also covered. Successful completion of this course certifies that the requirements of ASNT TCI-A for UT level II are met. AA/AS area E2

WELD 122 Shielded Metal Arc Welding (Pipe) 3 Units

Formerly: WELD 62C

Prerequisite: WELD 321 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

The course will cover the areas of low-pressure piping systems used to carry water, residential natural gas, noncorrosive or noncombustible piping systems. High-pressure critical piping systems such as steam pipe, pipe lines, boilers, offshore oil-rigs and other critical heavy duty application of piping systems will also be covered.

WELD 130 Gas Tungsten Arc Welding 3 Units

Formerly: WELD 64

Prerequisite: None

Corequisite: WELD 300.

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

This course covers tungsten inert gas welding of aluminum, stainless steel, and other metals used in industry.

WELD 132 Gas Tungsten Arc Welding (Pipe) 3 Units

Formerly: WELD 64A

Prerequisite: WELD 130 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

The course will cover the areas of low-pressure and high-pressure critical piping systems such as in oil, gas, nuclear, and chemical industries.

WELD 133 Gas Metal Arc Welding, Semi-Automatic Processes 3 Units

Formerly: WELD 65A

Prerequisite: None

Corequisite: WELD 300.

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

This course will cover automatic wire feed welding covering fine through heavy wire welding on steel plate gauges of varying thickness. Joint design, gas variations and all welding positions are covered.

WELD 134 Gas Metal Arc Welding of Non-Ferrous Metals 2 Units

Formerly: WELD 65B

Prerequisite: WELD 133 with a grade of "C" or better.

Course Not Transferable UC or CSU

Hours: 18 hours LEC; 54 hours LAB

This course will cover semiautomatic wire feed welding covering fine through heavy wire welding on non-ferrous steel plate gauge of varying thickness. Joint design, gas variations and all welding positions are covered. Emphasis is on aluminum, stainless steels, and mixtures of gases. Introduction to open groove plate and pipe of mild steel using Gas Metal Arc and Flux Cored Arc Welding processes. A performance qualification test is optional at end of course.

WELD 135 Gas Metal Arc Welding (GMAW)-Pipe 3 Units

Formerly: WELD 65C

Prerequisite: WELD 133.

Course Not Transferable UC or CSU

Hours: 36 hours LEC; 54 hours LAB

The course will cover the areas of low-pressure heating, air-conditioning, refrigeration, and water supply as well as some gas and chemical systems. The short circuit metal transfer will be used on all gas metal arc welding (GMAW) pipe connection.

WELD 140 Mathematics for Welding Technicians 3 Units

Formerly: WELD 66A

Prerequisite: None

Course Not Transferable UC or CSU

Hours: 54 hours LEC

This course covers practical mathematics as they are applied to technical and trade work. It involves applying mathematics principles to the welding trade. Areas covered are common fractions, decimal fractions, percentages, practical algebra, rectangles, triangles, metric measurement, measuring instruments, strength of materials and essentials of trigonometry. Problems involving labor and cost of material are also covered. AA/AS area D2.

WELD 150 Employability Skills for Technical Careers (same as AT 107 and ET 250) 2 Units

Formerly: WELD 118

Prerequisite: None

Course Not Transferable UC or CSU

Hours: 36 hours LEC

This course provides the opportunity of exploring technical careers while developing valuable work and life skills. It is an introduction to a variety of technically-related occupations. Emphasis is placed on exploring technical careers in the Sacramento area. Activities are designed to enhance personal development, employability skills, and self esteem through leadership, citizenship, and character development.

WELD 290 Advanced Student Projects 2 Units

Formerly: WELD 83

Prerequisite: Must have a "C" or better in the Welding major

Course Not Transferable UC or CSU

Hours: 54 hours LAB

This course provides an opportunity for students to pursue advanced projects selected by the Welding department. This course may be taken twice for credit.

WELD 294 Topics in Welding .5-5 Units

Formerly: WELD 93

Prerequisite: To be determined for each topic.

Course Not Transferable UC or CSU

Hours: 9-90 hours LEC and/or 27-270 hours LAB

Individualized course developed in cooperation with industry to meet specialized training needs. This course may be taken four times with different topics.

WELD 300 Introduction to Welding 3 Units

Formerly: WELD 51

Prerequisite: None

Course Transferable to CSU

Hours: 36 hours LEC; 54 hours LAB

This course is an introduction to welding processes, shielded metal arc, gas metal arc, flux-cored gas shield and self shield, gas tungsten arc, oxyacetylene cutting on joint design, and positions used in industry. Safety in oxyacetylene cutting is also covered.

WELD 320 Shielded Metal Arc Welding (Stick Electrode Welding) 3 Units

Formerly: WELD 62A

Prerequisite: WELD 300 with a grade of "C" or better.

Course Transferable to CSU

Hours: 36 hours LEC; 54 hours LAB

This course will cover pre-employment training for welding technicians. Emphasis on developing manipulative proficiency in the use of shielded metal-arc welding in the flat, horizontal, vertical and overhead positions on light and heavy gauge material. Emphasis will also be placed on groove welding of plate, limited and unlimited thickness in accordance with D1.1 Structural Welding Code. May be taken twice for credit.

WELD 321 Shielded Metal Arc Welding (Stick Electrode Welding) 3 Units

Formerly: WELD 62B

Prerequisite: WELD 320 with a grade of "C" or better.

Course Transferable to CSU

Hours: 36 hours LEC; 54 hours LAB

This is a continuation of skills and content begun in Welding 62A. Emphasis will also be placed on pipe welding procedures and welding techniques. May be taken twice for credit.

WELD 342 Symbol Reading, Layout and Fabrication 3 Units

Formerly: WELD 66B

Prerequisite: None

Corequisite: WELD 300.

Course Transferable to CSU

Hours: 36 hours LEC; 54 hours LAB

This course will cover blueprint and welding symbol interpretation. Metal layout, measurement, marking and layout tools used in construction; techniques of fabrication and assembly methods. Concentration on fundamentals of blueprint reading and topics as basic lines and views, dimensions, notes and specification, structural shapes, sections, detail and assembly.