



# Automotive/Advanced Manufacturing Welding

## Program Information

Welding is the technology of using various methods to join, cut, scrape, or finish metal by applying intense heat and/or pressure to melt the edges of metal so they fuse permanently.

The Welding program at Trenholm State Community College is designed to give technical knowledge and experience in six different welding and cutting processes. The student will attain hands-on experience in pipe welding, brazing, manual and machine cutting, blueprint reading, and welding processes used by industry in the fabrication of steel components. Through practical application, a student is taken through a series of welds and processes, using different joints and weld structures duplicated as closely as possible to an actual on-the-job situation.

## Occupational Choices

Employment of welders, cutters, solderers, and brazers is projected to grow 6 percent from 2016 to 2026, about as fast as the average for all occupations. Employment growth reflects the need for welders in manufacturing because of the importance and versatility of welding as a manufacturing process. The basic skills of welding are similar across industries, so welders can easily shift from one industry to another, depending on where they are needed most. For example, welders who are laid off in the automotive manufacturing industry may be able to find work in the oil and gas industry. The nation's aging infrastructure will require the expertise of welders, cutters, solderers, and brazers to help rebuild bridges, highways, and buildings. Also, the construction of new power generation facilities and, specifically, pipelines transporting natural gas and oil may result in new jobs.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2018 Survey

## Average Full-Time Wage

The median annual wage for welders, cutters, solderers, and brazers was \$40,240 in May 2017. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$27,460, and the highest 10 percent earned more than \$63,170.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2018 Survey

## Additional Requirements

1. Must be at least 16 years of age;
2. Must demonstrate adequate hand-eye coordination;
3. Must be oriented to reality and not be mentally impaired by mind altering substances.

## Awards Available

Associate of Applied Science  
Automotive/Advanced Manufacturing  
Welding

Certificate  
Automotive/Advanced Manufacturing  
Welding

Short Term Certificate  
Automotive/Advanced Manufacturing  
Welding  
Construction SMAW Plate Welding  
Manufacturing Welding  
Pipe Welding

## Program Contact

Chris Burdick  
Program Coordinator/Instructor  
334-420-4379  
Location: Patterson Site - Bldg. H

As part of ongoing planning and evaluation, the College regularly evaluates student learning outcomes for each program.

## Estimated Program Length & Cost \*

Award	Length	Credit Hours	Tuition Fees	Books	Tools	Supplies
Associate Degree	6 Terms	65	\$10,075	\$400	\$250	\$0
Certificate	4 Terms	55	\$8,525	\$400	\$250	\$0
Short Term Certificates	1 Term	13	\$2,015	\$150	\$230	\$0

\* Tax not included. Prices are subject to change without prior notice; cost of books may vary considerably among suppliers. Cost of general education books is in addition to the total listed above. The length of the program is based on full-time status of 12-15 credit hours per term. Enrollment in transitional level general education courses will alter the length of the program.

## Associate of Applied Science Automotive/Advanced Manufacturing Welding

### General Education Requirements (16 hours)

#### Area I - Written Composition (3 hours)

ENG-100	Vocational Technical English I	3
ENG-101	English Composition I	3
ENG-102	English Composition II	3
ENG-130	Technical Report Writing	3

#### Area II - Humanities & Fine Arts (3 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

**Note:** If SPH-103, SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

#### Arts:

ART-100	Art Appreciation	3
MUS-101	Music Appreciation	3

#### Humanities:

PHL-106	Intro to Philosophy	3
PHL-200	Ethics in the Workplace	3
PHL-206	Ethics & Society	3
PHL-210	Ethics and the Health Sciences	3
REL-100	History of World Religions	3
REL-151	Survey of Old Testament	3
REL-152	Survey of New Testament	3
SPA-101	Intro Spanish I	3
SPA-102	Intro Spanish II	3
SPH-103	Oral Communication Skills	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

#### Literature:

ENG-251	American Literature I	3
ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

#### Area III - Natural Science & Mathematics (6-7 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

**Note:** 3 semester hours in MTH must be completed.

#### Mathematics:

MAH-101	Introductory Mathematics I	3
MTH-100	Intermediate Algebra	3
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3
MTH-116	Mathematical Applications	3

#### Natural Sciences:

BIO-101	Introduction to Biology I	4
BIO-102	Introduction to Biology II	4
BIO-103	Principles of Biology I	4
BIO-104	Principles of Biology II	4
BIO-201	Human Anatomy & Physiology I	4

BIO-202	Human Anatomy & Physiology II	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

### Area IV - History, Social & Behavioral Sciences (3 hours):

(Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

#### History:

HIS-101	Western Civilization I	3
HIS-102	Western Civilization II	3
HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

#### Social and Behavioral Sciences:

PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

### Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

#### College Requirements:

ORI-101	Orientation to College	1
ADM-100	Industrial Safety	3
ADM-111	Manufacturing Safety Practices	3
WDT-109	SMAW Fillet/PAC/CAC	3
WDT-119	Gas Metal Arc/Flux Cored Arc Wldg	3
WDT-228	Gas Tungsten Arc Welding	3

#### Welding Electives: (Choose 33 credit hours)

WDT-108	SMAW Fillet/OFC	3
WDT-110	Industrial Blueprint Reading	3
WDT-120	SMAW Groove Theory	3
WDT-122	SMAW Fillet/OFC Lab	3
WDT-123	SMAW Fillet/PAC/CAC Lab	3
WDT-124	Gas Metal Arc/Flux Cored Arc Wldg Lab	3
WDT-125	SMAW Groove Lab	3
WDT-155	GTAW Carbon Pipe Lab	3
WDT-156	GTAW Stainless Pipe Lab	3
WDT-157	Consumable Welding Processes	3
WDT-158	Consumable Welding Processes Lab	3
WDT-167	FCAW Lab	3
WDT-219	Welding Inspection & Testing Theory	3
WDT-221	Pipefitting and Fabrication	3
WDT-257	SMAW Carbon Pipe Lab	3
WDT-268	GTAW Lab	3

#### Elective:

CIS-146	Microcomputer Applications	3
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### Area V Credit Hours: 49

### Total Credit Hours: 65

## Certificate Automotive/Advanced Manufacturing Welding

### General Education Requirements (6 hours)

#### Area I - Written Composition (3 hours)

ENG-100	Vocational Technical English I	3
ENG-101	English Composition I	3
ENG-102	English Composition II	3
ENG-130	Technical Report Writing	3

#### Area II - Humanities & Fine Arts (0 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

**Note:** If SPH-103, SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

#### Arts:

ART-100	Art Appreciation	3
MUS-101	Music Appreciation	3

#### Humanities:

PHL-106	Intro to Philosophy	3
PHL-200	Ethics in the Workplace	3
PHL-206	Ethics & Society	3
PHL-210	Ethics and the Health Sciences	3
REL-100	History of World Religions	3
REL-151	Survey of Old Testament	3
REL-152	Survey of New Testament	3
SPA-101	Intro Spanish I	3
SPA-102	Intro Spanish II	3
SPH-103	Oral Communication Skills *	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

#### Literature:

ENG-251	American Literature I	3
ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

#### Area III - Natural Science & Mathematics (3 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

**Note:** 3 semester hours in MTH must be completed.

#### Mathematics:

MAH-101	Introductory Mathematics I *	3
MTH-100	Intermediate Algebra	3
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3
MTH-116	Mathematical Applications	3

#### Natural Sciences:

BIO-101	Introduction to Biology I	4
BIO-102	Introduction to Biology II	4
BIO-103	Principles of Biology I	4
BIO-104	Principles of Biology II	4
BIO-201	Human Anatomy & Physiology I	4

BIO-202	Human Anatomy & Physiology II	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

### Area IV - History, Social & Behavioral Sciences (0 hours):

(Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

#### History:

HIS-101	Western Civilization I	3
HIS-102	Western Civilization II	3
HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

#### Social and Behavioral Sciences:

PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

\* These courses are required for students without a high school diploma or GED.

**Area V: Pre-Professional/College Requirements:**  
(Courses appropriate to the degree requirements and major of the individual student and electives.)

#### College Requirements:

ORI-101	Orientation to College	1
ADM-100	Industrial Safety	3
ADM-111	Manufacturing Safety Practices	3
WDT-109	SMAW Fillet/PAC/CAC	3
WDT-119	Gas Metal Arc/Flux Cored Arc Wldg	3
WDT-228	Gas Tungsten Arc Welding	3

#### Welding Electives: (Choose 33 credit hours)

WDT-108	SMAW Fillet/OFC	3
WDT-110	Industrial Blueprint Reading	3
WDT-120	SMAW Groove Theory	3
WDT-122	SMAW Fillet/OFC Lab	3
WDT-123	SMAW Fillet/PAC/CAC Lab	3
WDT-124	Gas Metal Arc/Flux Cored Arc Wldg Lab	3
WDT-125	SMAW Groove Lab	3
WDT-155	GTAW Carbon Pipe Lab	3
WDT-156	GTAW Stainless Pipe Lab	3
WDT-157	Consumable Welding Processes	3
WDT-158	Consumable Welding Processes Lab	3
WDT-167	FCAW Lab	3
WDT-219	Welding Inspection & Testing Theory	3
WDT-221	Pipefitting and Fabrication	3
WDT-257	SMAW Carbon Pipe Lab	3
WDT-268	GTAW Lab	3

#### Elective:

CIS-146	Microcomputer Applications	3
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#### Area V Credit Hours: 49

#### Total Credit Hours: 55

**Short Term Certificate**  
**Automotive/Advanced Manufacturing**  
**Welding**  
**Construction SMAW Plate Welding**  
**Concentration**

**Area V: Pre-Professional/College Requirements:**  
 (Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
WDT-108	SMAW Fillet/OFC	3
WDT-109	SMAW Fillet/PAC/CAC	3
WDT-122	SMAW Fillet/OFC Lab	3
WDT-123	SMAW Fillet/PAC/CAC Lab	3

**Total Credit Hours: 13**

**Short Term Certificate**  
**Automotive/Advanced Manufacturing**  
**Welding**  
**Pipe Welding Concentration**

**Area V: Pre-Professional/College Requirements:**  
 (Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
WDT-155	GTAW Carbon Pipe Lab	3
WDT-156	GTAW Stainless Pipe Lab	3
WDT-158	Consumable Welding Processes Lab	3
WDT-257	SMAW Carbon Pipe Lab	3

**Total Credit Hours: 13**

**Short Term Certificate**  
**Automotive/Advanced Manufacturing**  
**Welding**  
**Manufacturing Welding**  
**Concentration**

**Area V: Pre-Professional/College Requirements:**  
 (Courses appropriate to the degree requirements and major of the individual student and electives.)

**College Requirements:**

ORI-101	Orientation to College	1
WDT-110	Industrial Blueprint Reading	3
WDT-119	Gas Metal Arc/Flux Cored Arc Welding	3
WDT-124	Gas Metal Arc/Flux Cored Arc Welding Lab	3
WDT-167	FCAW Lab	3

**Total Credit Hours: 13**

## Course Descriptions Automotive/Advanced Manufacturing Welding

Course #	Course Title	Credit Hours
<b>ADM-100</b>	<b>INDUSTRIAL SAFETY</b> PREREQUISITE: None This course is an introduction to general issues, concepts, procedures, hazards, and safety standards found in industrial environment. This safety course is to make technicians aware of safety issues associated with their changing work environment and attempts to eliminate industrial accidents.	<b>3</b>
<b>ADM-111</b>	<b>MANUFACTURING SAFETY PRACTICES</b> PREREQUISITE: None This course is an introduction to general issues, concepts, procedures, hazards, and safety standards found in an industrial environment. This safety course is to make technicians aware of safety issues associated with their changing work environment and attempt to eliminate industrial accidents. This course will offer credentialing for NCCER Core and OSHA 10 hour.	<b>3</b>
<b>WDT-108</b>	<b>SMAW FILLET/OFC</b> PREREQUISITE: None This course provides the student with instruction on safety practices and terminology in the Shielded Metal Arc Welding (SMAW) process. Emphasis is placed on safety, welding terminology, equipment identification, set-up and operation, and related information in the SMAW process. This course also covers the rules of basic safety and identification of shop equipment and provides the student with the skills and knowledge necessary for the safe operation of oxy-fuel cutting. This is a CORE course.	<b>3</b>
<b>WDT-109</b>	<b>SMAW FILLET/PAC/CAC</b> PREREQUISITE: None This course provides the student with instruction on safety practices and terminology in the Shielded Metal Arc Welding (SMAW) process. Emphasis is placed on safety, welding terminology, equipment identification, set-up and operation, and related information in the SMAW process. This course also covers the rules of basic safety and identification of shop equipment and provides the student with the skills and knowledge necessary for the safe operation of carbon arc cutting and plasma arc cutting. This is a CORE course.	<b>3</b>
<b>WDT-110</b>	<b>INDUSTRIAL BLUEPRINT READING</b> PREREQUISITE: None This course provides students with the understanding and fundamentals of industrial blueprint reading. Emphasis is placed on reading and interpreting lines, views, dimensions, weld joint configurations and weld symbols. Upon completion students should be able to interpret welding symbols and blueprints as they apply to welding and fabrication. This is a CORE course	<b>3</b>
<b>WDT-119</b>	<b>GAS METAL ARC/FLUX CORED ARC WELDING</b> PREREQUISITE: None This course introduces the student to the gas metal arc and flux cored arc welding process. Emphasis is placed on safe operating practices, handling and storage of compressed gasses, process principles, component identification, various welding techniques and base and filler metal identification. This is a CORE course.	<b>3</b>
<b>WDT-120</b>	<b>SMAW GROOVE THEORY</b> PREREQUISITE: None This course provides the student with instruction on joint design, joint preparation, and fit-up of groove welds in accordance with applicable welding codes. Emphasis is placed on safe operation, joint design, joint preparation, and fit-up. Upon completion, students should be able to identify the proper joint design, joint preparation and fit-up of groove welds in accordance with applicable welding codes. This is a CORE course.	<b>3</b>
<b>WDT-122</b>	<b>SMAW FILLET/OFC LAB</b> PREREQUISITE: None This course is designed introduce the student to the proper set-up and operation of the shielded metal arc welding equipment. Emphasis is placed on striking and controlling the arc, and proper fit-up of fillet joints. This course is also designed to instruct students in the safe operation of oxy-fuel cutting. Upon completion, students should be able to make fillet welds in all positions using electrodes in the F-3 groups in accordance with applicable welding code and be able to safely operate oxy-fuel equipment and perform those operations as per the applicable welding code.	<b>3</b>

<b>Course #</b>	<b>Course Title</b>	<b>Credit Hours</b>
<b>WDT-123</b>	<b>SMAW FILLET/PAC/CAC LAB</b> PREREQUISITE: None This course is designed introduce the student to the proper set-up and operation of the shielded metal arc welding equipment. Emphasis is placed on striking and controlling the arc, and proper fit-up of fillet joints. This course is also designed to instruct students in the safe operation of plasma arc and carbon arc cutting. Upon completion, students should be able to make fillet welds in all positions using electrodes in the F-4 groups in accordance with applicable welding code and be able to safely operate plasma arc and carbon arc equipment and perform those operations as per applicable welding code.	<b>3</b>
<b>WDT-124</b>	<b>GAS METAL ARC/FLUX CORED ARC WELDING LAB</b> PREREQUISITE: None This course provides instruction and demonstration using the various transfer methods and techniques to gas metal arc and flux cored arc welds. Topics included are safety, equipment set-up, joint design and preparation, and gases.	<b>3</b>
<b>WDT-125</b>	<b>SMAW GROOVE LAB</b> PREREQUISITE: None This course provides instruction and demonstration in the shielded metal arc welding process on carbon steel plate with various size F-3 and F-4 group electrodes in all positions. Emphasis is placed on welding groove joints and using various F-3 and F-4 group electrodes in all positions. Upon completion, the student should be able to make visually acceptable groove weld joints in accordance with applicable welding codes.	<b>3</b>
<b>WDT-155</b>	<b>GTAW CARBON PIPE LAB</b> PREREQUISITE: None This course is designed to provide the student with the skills in welding carbon steel pipe with gas tungsten arc welding techniques in various pipe weld positions. Upon completion, students should be able to perform gas tungsten arc welding on carbon steel pipe with the prescribed filler metals in various positions in accordance with the applicable code.	<b>3</b>
<b>WDT-156</b>	<b>GTAW STAINLESS PIPE LAB</b> PREREQUISITE: None This course is designed to provide the student with the skills in welding stainless steel pipe with gas tungsten arc welding techniques in various pipe weld positions. Upon completion, students should be able to perform gas tungsten arc welding on stainless steel pipe with the prescribed filler metals in various positions in accordance with the applicable code.	<b>3</b>
<b>WDT-157</b>	<b>CONSUMABLE WELDING PROCESSES</b> PREREQUISITE: None This course provides instruction and demonstration with the consumable welding processes to produce groove and fillet welds in all positions, according to applicable welding codes. Topics include safe operating practices, equipment identification, equipment set-up, correct selection of electrode, current/polarity, shielding gas and base metals.	<b>3</b>
<b>WDT-158</b>	<b>CONSUMABLE WELDING PROCESSES LAB</b> PREREQUISITE: None This course provides instruction and demonstration with the consumable welding processes to produce groove and fillet welds in all positions, according to applicable welding codes. Topics include safe operating practices, equipment identification, equipment set-up, correct selection of electrode, current/polarity, shielding gas and base metals. Upon completion, the student should be able to produce groove and fillet welds using consumable welding processes according to AWS Codes and standards. This course supports CIP Code 48.0508	<b>3</b>
<b>WDT-167</b>	<b>FLUX CORE ARC WELDING LAB</b> PREREQUISITE: None This course provides instruction and demonstration with the flux core arc welding process to produce groove and fillet welds in all positions, according to applicable welding codes. Topics include safe operating practices, equipment identification, equipment set-up, correct selection of filler metals, current/polarity, shielding gas and base metals. Upon completion, the student should be able to produce groove and fillet welds using the FCAW welding process, according to AWS Codes and Standards.	<b>3</b>

Course #	Course Title	Credit Hours
<b>WDT-219</b>	<b>WELDING INSPECTION AND TESTING THEORY</b> PREREQUISITE: None This course provides the student with inspection skills and knowledge necessary to evaluate welded joints and apply quality control measures as needed. Emphasis is placed on interpreting welding codes, welding procedures, and visual inspection methods. Upon completion, students should be able to visually identify visual acceptable weldments as prescribed by the code or welding specification report.	<b>3</b>
<b>WDT-221</b>	<b>PIPEFITTING AND FABRICATION</b> PREREQUISITE: None This course provides the student with skills and practices necessary for fabricating pipe plans using pipe and fittings. Emphasis is placed on various pipe fittings to include various degree angles. Upon completion, students should be able to fit various pipe fittings, and cut and fabricate tees, and assorted angles.	<b>3</b>
<b>WDT-223</b>	<b>BLUEPRINT READING FOR FABRICATION</b> PREREQUISITE: WDT-110 This course provides a student with advanced skills in identifying and interpreting lines, views, dimensions, notes, bill of materials, and the use of tools of the trade. Emphasis is placed on figuring dimensional tolerances, layout and fitting of different component parts. Upon course completion, a student should be able to interpret, layout, and fabricate from blueprints to given tolerances.	<b>3</b>
<b>WDT-228</b>	<b>GAS TUNGSTEN ARC WELDING</b> PREREQUISITE: None This course provides a student with the knowledge needed to perform gas tungsten arc welds using ferrous and/or non-ferrous metals, according to applicable welding codes. Topics include safe operating practices, equipment identification and set-up, correct selection of tungsten type, polarity, shielding gas and filler metals. Upon completion, a student should be able to identify safe operating practices, equipment identification and setup, correct selection of tungsten type, polarity, shielding gas, filler metals, and various welds on ferrous and/or non-ferrous metals, using the gas tungsten arc welding process according to applicable welding codes.	<b>3</b>
<b>WDT-257</b>	<b>SMAW CARBON PIPE LAB</b> PREREQUISITE: None This course is designed to provide the student with the skills in welding carbon steel pipe with shielded metal arc welding techniques in various pipe weld positions. Upon completion, students should be able to perform shielded metal arc welding on carbon steel pipe with the prescribed electrodes in various positions in accordance with the applicable code.	<b>3</b>
<b>WDT-268</b>	<b>GTAW LAB</b> PREREQUISITE: None This course provides student with skills needed to perform gas tungsten arc welds using ferrous and/or non-ferrous metals, according to applicable welding codes. Topics include safe operating practices, equipment identification and set-up, correct selection of tungsten type, polarity, shielding gas and filler metals. Upon completion, a student should be able to identify safe operating practices, equipment identification and setup, correct selection of tungsten type, polarity, shielding gas, filler metals, and various welds on ferrous and/or non-ferrous metals, using the gas tungsten arc welding process according to applicable welding codes.	<b>3</b>