



WELDING CERTIFICATION

An Update for the South Dakota
State Board of Education March 2017

For Implementation Fall 2017

SOUTHEAST
TECH

Southeast Technical Institute
2320 N Career Ave | Sioux Falls, SD 57107

Southeast Technical Institute

Southeast Technical Institute
2320 N Career Avenue
Sioux Falls, SD 57107

Welding Technology

Certificate Options

- Gas Metal Arc Welding
- Shielded Metal Arc Welding
- Flux Core Arc Welding
- Gas Tungsten Arc Welding



Fall 2017

Table of Contents

Contents

Table of Contents.....	3
Executive Summary.....	4
Identification and Description of the Program	5
Objectives and Purpose of the Program	6
Methods of Attaining the Objectives of the Program	7
Description of Labor Market Demands and Wage Data	8
State and National Data.....	8
Student Needs.....	9
Population Served by the Program.....	9
Program Capacity.....	9
Projected Three-Year Budget Plan.....	10
Salaries/Benefits/FTE/Equipment.....	11
Program Competencies and entry and exit points of sub-occupations.....	11
Statement of non-duplication.....	11
Curriculum design and research	12
Program Course List and Semester Layout	12
Welding Certificate Curriculum.....	12
SMAW Curriculum.....	12
GMAW Curriculum	12
FCAW Curriculum.....	12
GTAW Curriculum	12
Program Course List with Description	13
CIP Code	15
Detail for CIP Code 48.0508	15
Appendix A – Letters of Support.....	15

Program Proposal: Welding Technology Certificates

Length of Program: Daytime Cohort: 8 weeks

Evening Cohort: 16 weeks

Capacity: Daytime Cohort: 46/semester

Evening Cohort: 16/semester

Projected Start Date: Fall 2017

Executive Summary

Southeast Technical Institute is proposing the establishment of four Welding Technology Certificates. Each certificate will include programming in one specific welding process and will match curriculum delivered as part of the Welding program currently offered at Southeast Tech. Certificates are offered for individuals seeking basic welding skills and entry into the industry.

Certificates to be offered include:

- Shielded Metal Arc Welding (SMAW)
- Gas Metal Arc Welding (GMAW)
- Flux Core Arc Welding (FCAW)
- Gas Tungsten Arc Welding (GTAW)

The shortage of skilled workers continues to be an issue across South Dakota. Nowhere is this more apparent than in industries employing welders. By segmenting the current Welding curriculum and offering certificates in individual processes (GMAW, SMAW, FCAW, GTAW), Southeast Tech can have a positive impact on this workforce issue in a shorter timeframe than allowed with diploma and degree-granting educational options.

These certificate options will be offered during the evening and as a component of our existing daytime welding program. These certificate options will allow working adults the opportunity to improve their employability by adding a specific, technical skill to their resume. These proposed certificate options will include classroom instruction and hands-on experience with equipment commonly used in various industries across the region. Students will gain experience in a specific welding process, using a variety of materials (steel, stainless steel, aluminum) in all weld positions. Students participating in these

certificate courses will have the opportunity to test for American Welding Society (AWS) certification prior to the end of the program.

Per the Bureau of Labor Statistics, “Welders use hand-welding, flame-cutting, hand soldering, or brazing equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products.” Welders are employed in many regional industries including but not limited to: manufacturing, agriculture and construction. Given a strong regional economy and supporting data from the South Dakota Department of Labor and Regulation, a significant need for welders can be expected to continue for the foreseeable future.

Identification and Description of the Program

The Welding Technology certificate options at Southeast Tech are designed to provide students with the skills required to become productive welders by earning one or more certificates. Students in the certificate options will work towards completion criteria established in the existing Welding program, and will have the opportunity to obtain industry-recognized American Welding Society (AWS) certification in one, or more, of four welding processes: Gas Metal Arc Welding (GMAW), Shielded Metal Arc Welding (SMAW), Flux Core Arc Welding (FCAW) or Gas Tungsten Arc Welding (GTAW).

Curriculum for each certificate will include welding theory covering: power supplies, wire type and diameter, shielding gasses, material influences, weld position and specific skills and knowledge applicable to the individual welding process. Students will receive significant hands-on time in the welding lab applying all aspects of theory and gaining valuable experience on different welding equipment and materials. The Welding Certificates will each be comprised of a one (1) credit lecture and a three (3) credit lab.

These certificate options will be offered to both day and evening students. As shown in table 1.0 below, students attending the daytime cohort(s) will have the opportunity to earn two certificates in each of the two semesters included in the Welding Diploma program offered at Southeast Tech. Evening cohort students will have the opportunity to earn one welding certificate per semester. Students attending either cohort can earn up to four academic certificates. All students may also test for AWS certification in each of the four welding processes (SMAW, GMAW, FCAW, GTAW).

Table 1.0 Certificate Options by Cohort

Semester	Fall 2017		Spring 2018		Fall 2018		Spring 2019	
Weeks	1-8	9-16	1-8	9-16	1-8	9-16	1-8	9-16
Day	SMAW	GMAW	FCAW	GTAW	SMAW	GMAW	FCAW	GTAW
Evening	SMAW		GMAW		FCAW		GTAW	

Objectives and Purpose of the Program

The primary objective of these certificate options is to increase the number of qualified welders for the agriculture, construction, manufacturing and transportation industries. This objective will be met by providing an education that prepares the graduate to be employed as a welder for manufacturing positions, contractors, service and repair facilities, dealerships or as small-business owners.

Objectives of all certificate options include:

- Demonstrate proper plate welding position
- Demonstrate safe and proper use of hand and power tools
- Perform correct electrode/wire selection.
- Understand and identify welding terms and definitions.
- Safely identify welding power sources accessories and components.
- Demonstrate proper shielding gas safety, selection, setup and operation.
- Demonstrate proper groove weld fit-up and use of nomenclature.
- Demonstrate proper fillet weld fit-up and use of nomenclature.
- Demonstrate a working knowledge of AWS D1.1 groove weld visual inspection criteria.
- Demonstrate a working knowledge of AWS D1.1 fillet weld visual inspection criteria.
- Perform and complete weld procedures for welding topics and lab activities.
- Safely set-up and operate welding power sources.
- Perform proper visual inspection of weld shielding gas regulators and flow meters.
- Identify proper joint design and weld types
- Demonstrate a working knowledge of ferrous material mechanical and physical properties and identification.
- Demonstrate a working knowledge of non-ferrous material mechanical and physical properties and identification.

In addition to the objectives listed above, objectives for individual certificates include:

SMAW:

- Demonstrate basic welding fundamentals for the SMAW process.
- Demonstrate a working knowledge of SMAW applications including construction, heavy construction and agricultural equipment.

GMAW:

- Demonstrate basic welding fundamentals for the GMAW process.
- Demonstrate a working knowledge of GMAW applications including manufacturing, automotive and other industrial applications.

FCAW:

- Demonstrate basic welding fundamentals for the FCAW process.
- Demonstrate a working knowledge of FCAW applications including manufacturing and other automated welding procedures.

GTAW:

- Demonstrate basic welding fundamentals for the GTAW process.
- Demonstrate a working knowledge of GTAW applications including the automotive, artistic and other applications requiring precision and increased aesthetic appeal.

Methods of Attaining the Objectives of the Program

The Welding Technology Certificate program will be offered traditionally, during the day and evening, at Southeast Technical Institute.

Southeast Technical Institute will accept up to 16 students for an evening cohort, beginning in the Fall Semester of 2017. Daytime cohorts have capacity for 23 students in each of two sections for a (daytime) total of 46. The marketing campaign to recruit students will include a comprehensive media mix as well as high school visits, college fairs and on-campus recruiting activities.

Description of Labor Market Demands and Wage Data

State and National Data

Wage and employment data for welders are not delineated by weld process. All state and national data presented here are intended to reflect the industry as a whole as opposed to any specific sector of the industry. No evidence has been found to indicate that one process or credential has significantly more or less industry value as compared to other processes or credentials.

Mean wage and employment estimates for this occupation:

Table 2.0 National Wage Estimates

Employment	Mean Hourly Wage	Mean Annual Wage
386,240	\$19.70	\$40,970

From the Occupational Employment Statistics page of the Bureau of Labor Statistics website: (<http://www.bls.gov/oes/current/oes514121.htm>)

Table 3.0 South Dakota Wage Estimates

Employment	Mean Hourly Wage	Mean Annual Wage
3280	\$16.90	\$34,930

From the Occupational Employment Statistics page of the Bureau of Labor Statistics website: (<http://www.bls.gov/oes/current/oes514121.htm>)

Table 4.0 National Employment Projections

National	Employment		Percent Change
	2014	2024	
Welders, Cutters, Solderers and Brazers	397,900	412,300	+4%

Table 5.0 South Dakota Employment Projections

South Dakota	Employment		Percent Change
	2014	2024	
Welders, Cutters, Solderers and Brazers	3,250	3,660	+13%

Projected Annual Job Openings refers to the average annual job openings due to growth and net replacement. National Data Source: [Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections](#)

Student Needs

This program will provide students with an opportunity to enter an expanding industry that has many different entry points, areas for growth, and training that meets industry need. The majority of students in the certificate program will enter as an entry-level welder. The additional skills obtained in the diploma program will provide graduates the opportunity to become a lead welder or supervisor.

The addition of an evening cohort will provide expanded opportunities and additional flexibility for students needing an alternative to conventional scheduling of technical education classes. Providing off-peak class times allows incumbent workers the opportunity to obtain valuable skills and expand their employability.

Population Served by the Program

Southeast Technical Institute will recruit students from a variety of backgrounds, including both traditional and non-traditional. It is anticipated that this program will attract students directly out of high school in addition to those who are unemployed, underemployed and those wanting to make a career change.

Program Capacity

The current Welding Technology program consists of two cohorts per year, each with an enrollment of up to 23 students per cohort. Capacity is dictated by facility space and the ability of instructors and lab specialists to safely and effectively manage students in a shop setting.

The addition of the Welding Technology Certificate will allow the addition of an evening cohort (see Table 6.0). This cohort will be limited to 16 students per semester in order to facilitate the safe operation of the welding lab with a single faculty member.

The certificate capacity for the academic year will include day and evening cohorts for a total potential of 124 certificates annually (see table 7.0).

Table 6.0 Certificate Capacity by Cohort

Semester	Fall 2017		Spring 2018	
Weeks	1-8	9-16	1-8	9-16
Day	SMAW (46)	GMAW (46)	FCAW (46)	GTAW (46)
Evening	SMAW (16)		GMAW (16)	

Table 7.0 Certificate Capacity by Academic Year

Starting Semester	Delivery Format	Certificate Capacity
Fall 2017	Traditional/Day & Evening	124/Year

Projected Three-Year Budget Plan

The following budget projections (Table 8.0) apply to the evening cohorts only. Daytime certificate cohorts are a component of the existing Welding Technology program.

Table 8.0 Budget Projections for Evening Welding Certificate Cohorts

BUDGET PROJECTIONS			
Year	2017-2018	2018-2019	2019-2020
Adjunct Faculty	\$6,120	\$6,303	\$6,492
Benefits	\$2,020	\$2,080	\$2,142
Lab Consumables	\$12,800	\$13,184	\$13,579
Instructional Materials	\$1,280	\$1,318	\$1,357
Totals	\$22,220	\$25,885	\$23,570

Salaries/Benefits/FTE/Equipment

The daytime certificate options will be offered as a component of our existing daytime welding program and will have no effect on budget.

The evening Welding Technology Certificate cohorts will be taught by current Welding faculty acting in an adjunct role.

No additional personnel or equipment will be required.

Program Competencies and entry and exit points of sub-occupations

Daytime cohort Students will be accepted each fall semester with completion occurring in October and December of the fall semester. Spring semester completion of certificate classes will occur in March and May.

Evening cohort entry points will be at the beginning of each semester (August and January) with exit points coinciding with the end of each semester (December and May).

First Entry Point: Fall 2017 (August)

First Exit Point: Fall 2017 (October)

Students completing the program will receive a Welding Technology Certificate and, pending successful completion of testing, an American Welding Society (AWS) certification in the process designated for that certificate class.

Statement of non-duplication

Southeast Technical Institute is expanding the certificate options within the current Welding program. No curriculum is being changed and as such, no additional duplication is being created.

Curriculum design and research

Curriculum for the Welding Technology Certificate will stack within the Welding Technology Diploma program currently offered at Southeast Technical Institute. This curriculum follows the guidelines of the AWS Sense program and utilizes material supplied by the Hobart Institute. All inspection criteria are sourced from AWS code and done in accordance with AWS procedures.

Program Course List and Semester Layout

Welding Certificate Curriculum

SMAW Curriculum

Course Number	Course Name	Credits
WLD 103	Welding Theory I	1
WLD 103L	Welding Theory I Lab	3

GMAW Curriculum

Course Number	Course Name	Credits
WLD 104	Welding Theory II	1
WLD 104L	Welding Theory II Lab	3

FCAW Curriculum

Course Number	Course Name	Credits
WLD 153	Welding Theory III	1
WLD 153L	Welding Theory III Lab	3

GTAW Curriculum

Course Number	Course Name	Credits
WLD 154	Welding Theory IV	1
WLD 154L	Welding Theory IV Lab	3

Table 9.0 Semester Layout

Semester	Fall 2017		Spring 2018		Fall 2018		Spring 2019	
Weeks	1-8	9-16	1-8	9-16	1-8	9-16	1-8	9-16
Day	WLD 103/L	WLD 104/L	WLD 153/L	WLD 154/L	WLD 103/L	WLD 104/L	WLD 153/L	WLD 154/L
Evening	WLD 103/L		WLD 104/L		WLD 153/L		WLD 154/L	

Program Course List with Description

Catalog Descriptions

WLD 103

In this welding lecture class the students are introduced to the Shielded Metal Arc Welding (SMAW) process. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 103L

In this welding lab students will perform welding using the SMAW welding process. Welding will be performed in all positions with various joint designs and weld configurations. In addition, welding will be performed on ferrous and nonferrous sheet and plate material in a variety of material thicknesses. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 104

In this welding lecture class the students are introduced to the Gas Metal Arc Welding (GMAW) process. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 104L

In this welding lab students will perform welding using the GMAW welding process. Welding will be performed in all positions with various joint designs and weld configurations. In addition, welding will be performed on ferrous and nonferrous sheet and plate material in a variety of material thicknesses. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also

introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 153

In this welding lecture class the students are introduced to the Flux Core Arc Welding (FCAW) process. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 153L

In this welding lab students will perform welding using the FCAW welding process. Welding will be performed in all positions with various joint designs and weld configurations. In addition, welding will be performed on ferrous and nonferrous sheet and plate material in a variety of material thicknesses. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 154

In this welding lecture class the students are introduced to the Gas Tungsten Arc Welding (GTAW) process. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

WLD 154L

In this welding lab students will perform welding using the GTAW welding process. Welding will be performed in all positions with various joint designs and weld configurations. In addition, welding will be performed on ferrous and nonferrous sheet and plate material in a variety of material thicknesses. Students will learn the safe setup, shutdown and proper operation of welding power sources. Also introduced in this class are proper wire/electrode selection, shielding gas selection, basic metallurgy and welder maintenance.

CIP Code

Detail for CIP Code 48.0508

Title: Welding Technology/Welder.

Definition: A program that prepares individuals to apply technical knowledge and skills to join or cut metal surfaces. Includes instruction in arc welding, resistance welding, brazing and soldering, cutting, high-energy beam welding and cutting, solid state welding, ferrous and non-ferrous materials, oxidation-reduction reactions, welding metallurgy, welding processes and heat treating, structural design, safety, and applicable codes and standards.

Appendix A – Letters of Support

See attached



November 30th, 2016

Marie-Émilie Doucet
Human Resources Manager
Marmen Energy
1820 North Plum Avenue
Brandon, SD 57005

Lon Hird
Director of Academic Support
Southeast Technical Institute
2320 North Career Avenue
Sioux Falls, 57107

Dear Lon,

Marmen Energy is writing to show our support for Southeast Technical Institute's proposed Academic Certification Program for the Welding program. We have hired numerous graduates with experience from the welding program and continue to work with Southeast on an ongoing basis to improve the welding program to better fit the needs of the industry.

Marmen Energy has collaborated with Southeast Technical Institute, specifically the Welding Program and instructors since we built the company in South Dakota. We understand the importance of great students in this market and the importance of providing great jobs for the state of South Dakota.

As with any industry, innovation and experience is key. That is why we want to express our encouragement to progress with the Academic Certification process. We consider our partnership a win/win and look forward to support innovation in the welding program as well as all industries we serve.

Sincerely,

A handwritten signature in blue ink, appearing to read "Marie-Émilie Doucet", is written over a light blue circular stamp. The signature is fluid and cursive, with a long, sweeping tail that extends to the right.

Marie-Émilie Doucet



To Whom It May Concern:

11-01-2016

Harvard Integrations was made aware of the proposal by Southeast Technical Institute to establish Welding Technology Certificates.

I would like you to be aware of our support for this proposal.

Southeast Technical Institute takes their role as a business partner to the community they serve seriously. Harvard Integrations has been a representative of the Welding Advisory Committee for several years now. Southeast Tech makes every effort to solicit feedback from the employers, via these meetings. There is always good information exchanged as they try to assist with filling the holes in the local workforce. With an unemployment figure of 1.9%, it is a challenge to try and find skilled labor. It is our belief that if this new program is implemented, it will help many employers in the area. The chance for the students to test for AWS certification is an added level of comfort that they will be ready for the workforce.

Please feel free to reach out to me with any questions you may have. I will be glad to assist however I can.

Best Regards,

Cindy Krekelberg
HR Manager