Welding – Program Assessment Story

Currently we have three pathways that students can follow. Each pathway ladders into a higher Certificate/Degree level of achievement. The Plate Certificate started in 2023. The Advanced Certificate and Associate in Applied Science have been available for at least 15 years.

FALL FIRST YEAR			
Course	Course Name	Credits	**Prerequisites**
WELD 114W	Intermediate Shielded Metal Arc Welding	8	
WELD 235W	Gas Metal Arc Welding	8	
	Total Semester Credits	16	***3-Month Plate Certificate Complete***

Total Program Credits: 16

WINTER FIRST YEAR			
Course	**Course Name**	**Credits**	**Prerequisites**
WELD 103	**Introduction to Plasma, Carbon Arc, and Fuel Gas Cutting**	**3**	
WELD 224W	**Advanced Shielded Metal Arc Welding**	**8**	**WELD 114W with a minimum grade of "C"**
WELD 226W	**Gas Tungsten Arc Welding**	**8**	
	Total Semester Credits	**19**	
SPRING FIRST YEAR			
Course	**Course Name**	**Credits**	**Prerequisites**
WELD 120	**Beginning Industrial Blueprint Reading**	**2**	
WELD 122	**Blueprint Reading for Welders and Fabricators**	**2**	**WELD 120, DRF 120, DRF 121, or SKDR 101**
WELD 220	**Weld Qualification-Plate**	**4**	**WELD 114W and WELD 235W each with a minimum grade of "C" (2.0)**
	Total Semester Credits	**8**	***9 Month Advanced Pipe Certificate Complete***

Total Program Credits: 43

FALL SECOND YEAR			
Course	Course Name	Credits	Prerequisites
CAD 114	Introduction to CAD	3	CST 103 recommended or basic knowledge of the Windows Operating System
COM 112W	Fundamentals of Oral Communication	3	2.3 HS GPA or any ENG with at least "C"
ENG 111	College Composition I	3	GSP recommendation of ENG 111
MTH 119W	Intermediate Algebra	4	3.0 HS GPA (<10 years ago) or complete GSP
POL 103W	American Politics	3	2.3 HS GPA, or any ENG, or GSP of ENG 111A
	Total Semester Credits	**16**	
WINTER SECOND YEAR			
Course	Course Name	Credits	Prerequisites
ENG 112	College Composition II	3	ENG 111 or equivalent with at least "C"
LW 223W	Wellness in Technical Trades	2	
MTH 121	Plane Trigonometry	3	3.0 HS GPA (<10 years ago) or complete GSP
PHY 101	Applied Physics	4	2.5 HS GPA (<10 years ago), or MTH 095 with at least "C", or complete GSP
SKMT 111	Metals	3	2.3 HS GPA (<10 years ago) or complete GSP
	Total Semester Credits	**15**	***Associate Degree Complete***

Total Program Credits: 74

Here is our Curriculum Map.

PROGRAM CURRICULUM MAP		Program:	WELDING ENGINEERING TECHNOLOGY - ASSOCIATE IN APPLIED SCIENCE													
I = Introduced																
P = Practiced with Feedback		Courses:														
M = Demonstrated at the Mastery Level		WELD	WELD	WELD	WELD	WELD	WELD									
Appropriate for Graduation		103	114	224	226	235	220									
Program Learning Outcomes:																
1	Apply the knowledge gained in the welding program to pass four welding tests (3G-vertical and 4G-overhead using both the GMAW and SMAW processes) to the American Welding Societies D1.1 Structural Welding Code.		I, P			I, P	M									
2	Practice proper safety procedures in practical welding related environments consistent with industrial standards.	I	I, P	P	I, P	I, P	M									
3	Evaluate finished weldments in accordance with AWS D1.1 structural welding code standards.		I	P	I, P	I, P	M									

These are our previous Learning Outcomes.

Program Learning Outcomes:		When to Assess	What Direct and Indirect Evidence to Collect	Who Will Collect the Evidence	How Evidence will be Assessed
1	**Apply the knowledge gained in the welding program to pass four welding tests (3G-vertical and 4G-overhead using both the GMAW and SMAW processes)**	Every Year	Destructive Tested Weldments	Instructor	According to A.W.S. D1.1 Code
2	**Practice proper safety procedures in practical welding related environments consistent with industrial standards.**	Spring 2014		Instructor	
3	**Evaluate finished weldments in accordance with AWS D1.1 structural welding code standards.**	Spring 2015		Instructor	

Outcome 1: Apply the knowledge gained in the welding program to pass four practical welding tests. The tests are 3G(vertical) and 4G(overhead) using Shielded Metal Arc Welding(SMAW) and Gas Metal Arc Welding(GMAW) processes.

<u>This is our available data collected to assess this outcome in 2014/2015</u>. This was the only outcome assessed.

Forty-Five students took 180 original tests. 150 tests passed on the first attempt (83%). Twenty tests were passed on the second attempt(94% total pass rate). Four students passed the alternate test(97% total pass rate). Six failed the alternate test(3%).

The Standard/Objective for 2014 was to have 80% of all students pass on their first attempt and a total of 90% pass on their second attempt**.** We were successful this year.

Here is the collected data from 2015/2016. Only Outcome #1 was assessed.

Outcome 1: Apply the knowledge gained in the welding program to pass four practical welding tests. The tests are 3G(vertical) and 4G(overhead) using Shielded Metal Arc Welding(SMAW) and Gas Metal Arc Welding(GMAW) processes.

Forty-Seven students took 188 original tests. 173 tests passed on the first attempt(92%). Fifteen tests passed on the second attempt(100% total pass rate). No students attempted the alternate test.

The Standard/Objective for 2015 was to have 80% of all students pass on their first attempt and a total of 90% pass on their second attempt**.** We were successful this year.

Assessment Change 2018

After the 2015/2016 Academic year we wanted to improve our methods of assessing students. We gathered input from all of our full and part-time staff, advisory board, area employers, and students. We began offering the guidelines of the American Welding Society's (AWS) SENSE (Schools Excelling through National Skills Education) Program. Students had a choice to do this. To get the certification students had to pass 5 on-line knowledge-based tests along with their four practical weld tests. Some students chose to just get the four practical welding certifications without the endorsement from the AWS. We also changed the GMAW process to the FCAW (Flux Cored Arc Welding) process to reflect AWS procedures and local demand from employers.

The AWS SENSE standards require practical welding tests in the 2G (horizontal) and 3G positions. This differed from the 3G(vertical) and 4G(overhead) testing we had administered in the past. We changed outcomes and objectives in WELD 114, WELD 235, and WELD 220 to mirror this testing position change.

Here is the collected data from 2018. Only Outcome 1 was assessed thoroughly. We did a pilot Asessment on Learning Outcome #2.

Outcome 1: Apply the knowledge gained in the welding program to pass four practical welding tests. The tests are 2G(horizontal) and 3G(vertical) using Shielded Metal Arc Welding(SMAW) and Flux Cored Arc Welding(FCAW) processes.

Twenty-one students took 84 original tests. Seventy-six tests were passed on the first try (90%). Eight tests were passed on the second try so 100% of our students passed their four tests.

The Standard/Objective for 2018 was to have 80% of all students pass on their first attempt and a total of 90% pass on their second attempt**.** We were successful this year.

Here is the Program Learning Outcome #2 that deals with Safety: **Practice proper safety procedures in practical welding related environments consistent with industrial standards.**

As a pilot assessment 7 out of 10 students passed the AWS Safety exam this year. Three students chose to not take the Safety Exam.

We learned in 2018 that industry values the AWS endorsement on student credentials. We began to consider making the AWS endorsement mandatory for our graduates.

Here is data collected from 2019. Only Learning outcome #1 was Assessed.

Outcome 1: Apply the knowledge gained in the welding program to pass four practical welding tests. The tests are 2G(horizontal) and 3G(vertical) using Shielded Metal Arc Welding(SMAW) and Flux Cored Arc Welding(FCAW) processes.

Forty Eight students took 192 original tests. One hundred and sixty four were passed the first time(85%). Twenty-one students passed their second time taking a test(96% total after 2nd attempt). Seven tests were not passed.

The Standard/Objective for 2019 was to have 80% of all students pass on their first attempt and a total of 90% pass on their second attempt**.** We were successful this year.

We learned this year that the changes we made to our courses helped with students passing their 2G welding test at a high rate. We also learned that more students were choosing to opt into the AWS endorsement. Thirty one out of 48 students passed their AWS SENSE Certification. We decided to make this mandatory in the future and it also allows us to assess Learning Outcome #2 and #3 in a meaningful way.

We do not have data from 2020 due to Covid.

Here is our new plan that began in 2021. Prior to that AWS Certification was a choice for the student. Starting in 2021 we made this mandatory.

	Program Learning Outcomes:	When to Assess	What Direct and Indirect Evidence to Collect	Who Will Collect the Evidence	How Evidence will be Assessed
1	Apply the knowledge gained in the welding program to pass four welding tests (2G-horizontal and 3G-vertical using both the GMAW and SMAW processes)	Every Year	Destructive Tested Weldments	Instructor	According to A.W.S. D1.1 Code
2	Practice proper safety procedures in practical welding related environments consistent with industrial standards.	Spring 2021		AWS	Receive 100% on AWS Safety Test
3	Evaluate finished weldments in accordance with AWS D1.1 structural welding code standards.	Spring 2023		Instructor	Instructor

Here is our data from 2021. We assessed Learning Outcomes #1 and #2.

Outcome 1: Apply the knowledge gained in the welding program to pass four practical welding tests. The tests are 2G(horizontal) and 3G(vertical) using Shielded Metal Arc Welding(SMAW) and Flux Cored Arc Welding(FCAW) processes.

Twenty-five students took 95 original tests. Seventy-nine tests were passed on the first try(83%). Thirteen tests were passed on the second try(96%).

The Standard/Objective for 2021 was to have 80% of all students pass on their first attempt and a total of 90% pass on their second attempt**.** We were successful this year.

Outcome #2: Practice proper safety procedures in practical welding related environments consistent with industrial standards. We assess this with student success passing the AWS exam.

Twenty-one out of 25 students passed the exam(84%).

We did not set a standard for this.

Here is our data from 2022. We assessed Learning Outcome #1 and #2.

Outcome 1: Apply the knowledge gained in the welding program to pass four practical welding tests. The tests are 2G(horizontal) and 3G(vertical) using Shielded Metal Arc Welding(SMAW) and Flux Cored Arc Welding(FCAW) processes.

Forty-seven students took 181 original tests. One hundred fifty-four were passed on the first try(85%). Twenty-four were passed on the second try(98%).

The Standard/Objective for 2022 was to have 80% of all students pass on their first attempt and a total of 90% pass on their second attempt**.** We were successful this year.

Outcome #2: Practice proper safety procedures in practical welding related environments consistent with industrial standards. We assess this with student success passing the AWS exam.

Twenty-seven out of 30 students passes the AWS Safety Exam with 100% accuracy(90%). We have no data on 17 students due to issues with the AWS website and organization.

We did not set a standard for this.

Conclusion

Our students now receive a credential from the AWS which is recognized throughout the world. It also lets us test our Program Learning Outcome regarding safety by a widely recognized third party. It also aligns our testing positions (2G instead of 4G) to the most common within the welding industry to get an entry-level job. There are many similarities between 3G and 4G welding. Horizontal welding (2G) requires a more thorough understanding of fundamental weld techniques that we felt would increase foundational knowledge for our students. These are the benefits of changing that we gathered from our partners in the community and college that drove our decision.