

Welding Engineering Technology

(A Division of the Mechanical Engineering Department)



Greg Roach, Department Chair
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<http://www.byui.edu/mechanical-engineering>

The Welding Engineering Technology Program offers the following degree, minor and cluster options:

- 4 – Year Bachelor of Science in Welding Engineering Technology (473)
- 4 – Year Bachelor of Science in Welding Fabrication and Technology Management (474)
- 2 – Year Associate of Applied Science in Welding Fabrication and Technology (374)
- Minor in Welding Fabrication and Technology (217)
- Cluster in Welding (6302), Cluster in Fabrication (6303)

Welding Engineering Technology (473)

The Welding Engineering Technology BS degree prepares students for professional careers in a wide range of welding industries including: shipbuilding, agriculture, heavy equipment, automotive, aerospace, motorized recreation equipment, industrial equipment, material handling, welding equipment, etc. Welding engineers may be involved in a variety of activities such as design, automation, inspection, quality, problem solving, improving manufacturing efficiencies, sales, trouble-shooting, etc. The Welding Engineering Technology degree requires students who enjoy a hands-on approach as well as the challenge of engineering. Students in Welding Engineering Technology will learn the science and language of welding and engineering so that they will be able to span the gap between design and manufacturing. The Welding Engineering Technology BS degree is available on the Fall/Winter and Winter/Spring tracks.

Student Outcomes

1. Apply practical knowledge of mathematics, science, engineering, and technology to engineering technology issues. [Engineering Fundamentals]
2. Implement industrial safety practices and guidelines. [Safety]
3. Design, model, and fabricate components using modern CAD/CAM and other software tools and appropriate manufacturing processes. [CAD/CAM Tools]
4. Function well within a multi-disciplinary team. [Team Work]
5. Demonstrate weld process skill and selection. [Welding Processes]
6. Identify common welding discontinuities and their potential causes and remedies. [Discontinuities]
7. Communicate effectively in both oral and written formats. [Communication]
8. Understanding of welding codes, standards and quality control. [Inspection and Codes]
9. Understand weldability of common metals. [Weldability]
10. Develop sound understanding of welding sciences. [Welding Sciences]
11. Apply project management skills to the execution of a project. [Project Management]
12. Develop familiarity with industry automation principles and practices. [Automation]

Welding Fabrication and Technology Management (474)

The Welding Fabrication and Technology Management BS degree prepares graduates for career opportunities in managing the operations of welding-related businesses and industries including manufacturers, welding equipment producers, suppliers, technical sales, marketing, and other technology-oriented companies. It is also a great preparation for becoming a business owner or entrepreneur. The Welding Fabrication and Technology Management BS degree is available on the Fall/Winter and Winter/Spring tracks.

Student Outcomes

Student Outcomes for the Welding Fabrication and Technology Management Program:

1. Gain critical competencies in finance, marketing, supply chain management, or entrepreneurship management. [Management]
2. Implement industrial safety practices and guidelines. [Safety]
3. Be proficient at exhibiting leadership. [Leadership]
4. Function well within a multi-disciplinary team. [Team Work]
5. Demonstrate weld process skill and selection. [Welding Processes]
6. Identify common welding discontinuities and their potential causes and remedies. [Discontinuities]
7. Communicate effectively in both oral and written formats. [Communication]
8. Understanding of welding codes, standards and quality control. [Inspection and Codes]
9. Show integrity in professional and personal settings. [Integrity]
10. Develop sound understanding of welding sciences [Welding Sciences]
11. Proficiently use spreadsheets to do analysis for making business decision. [Spreadsheets]
12. Develop familiarity with industry automation principles and practices. [Automation]

Welding

Brigham Young University-Idaho 2016-2017

Welding Fabrication and Technology (374)

This 2-year associate program provides hands-on training in welding and manufacturing processes. The curriculum includes a solid foundation in welding theory, manufacturing processes, and material science. This program develops skills and is designed for employment in the welding, manufacturing, or fabrication industries. The associate program in Welding Fabrication and Technology is available on the Fall/Winter and Winter/Spring tracks.

General Information

Mathematics and physical sciences are critical components of any manufacturing technology curriculum. The normal entry-level mathematics class for the welding programs is Pre-Calculus (FDMAT 109) or College Algebra (FDMAT 110). Entering freshman students should consult with their advisor to ensure they are beginning with the mathematics course for which they are prepared. Students with weak mathematics skills are advised to enroll in a preparatory mathematics course to strengthen their skills. The normal entry-level chemistry course is Introduction to General Chemistry (CHEM 101).

It is imperative that students develop and follow a plan of study that will allow them to complete all the required courses within the credit hour limits. Students should consult with their advisor/mentor early to make sure their educational plan is correct. Sample curriculum flow charts can be found on the department web page at

<http://www2.byui.edu/MechEng/>.

AAS in Welding Fabrication and Technology (374)

AAS in Welding Fabrication and Technology (374)			
Core Courses	<i>cont. from previous column</i>	Electives	Program Notes:
<i>Take these courses:</i>		<i>Take 4 credits</i>	
CHEM 101 3	PH 105 4	B 101 3	<ul style="list-style-type: none"> • No Double Counting of Major Courses • Students must maintain a minimum grade of C- in their major courses
CHEM 101L 1	WELD 170 3	B 301 3	
ME 101 1	WELD 224 3	B 361 3	
ME 172 3	WELD 243 3	ECEN 150 3	
ME 231 2	WELD 329 3	ME 272 3	
ME 231L 1	34	ME 299 1	
ME 250 3	<i>Take 5 credits</i>	ME 331 3	
ME 250L 1	FDMAT 110 3	ME 398R 1	
ME 332 3	MATH 109 5	WELD 338 3	
<i>cont. in next column</i>	MATH 111 2	4	
	5		
Credit Requirements:		Tracks Available:	
Foundations	17	Fall-Winter	Yes
Major	43	Winter-Spring	Yes
Total	60	Spring-Fall	No

BS in Welding Engineering Technology (473)

BS in Welding Engineering Technology (473)				
Core Courses	<i>cont. from previous column</i>	<i>Take 1 course:</i>	Interdisciplinary Courses	Program Notes:
<i>Take these courses:</i>		CHEM 101 3	<i>Take 1 course:</i>	<ul style="list-style-type: none"> • No Double Counting - No Grade Less Than C- for Major Courses
MATH 330 3	EDMAT 112 4	CHEM 105 3	IDS 398R 1-3	
ME 101 1	WELD 170 3		ME 398R 1	
ME 142 3	WELD 224 3	<i>Take 1 course:</i>		
ME 172 3	WELD 243 3	ECEN 150 3	<i>Take 1 course:</i>	
ME 201 3	WELD 329 3	ME 305 3	IDS 499 2	
ME 202 3	WELD 350 3		ME 340 3	
ME 231 2	WELD 480 3		2	
ME 231L 1	51			
ME 331 or WELD 338 3				
ME 332 3				
ME 250 3				
ME 250L 1				
<i>cont. in next column</i>				
Credit Requirements:		Tracks Available:		
Foundations	40	Fall-Winter	Yes	
Major	60	Winter-Spring	Yes	
Elective	20	Spring-Fall	No	
Total	120			

Welding

Brigham Young University-Idaho 2016-2017

BS in Welding Fabrication and Technology Management (474)				
Entry Courses <i>Take these courses your first 2 semesters:</i> ME 172 3 ME 231 2 ME 231L 1 WELD 170 3 <hr style="width: 50px; margin-left: 0;"/> 9	Core Courses <i>Take these courses:</i> ACCTG 180 3 B 101 3 B 301 3 B 321 3 B 341 3 B 361 3 CHEM 101 3 ECON 150 3 MATH 111 2 <i>cont. in next column</i>	<i>cont. from previous column</i> MATH 221A 3 ME 250 3 ME 332 3 PH 105 4 WELD 224 3 WELD 243 3 WELD 329 3 WELD 338 3 WELD 350 3 WELD 480 3 <hr style="width: 50px; margin-left: 0;"/> 57	Supplemental Courses <i>Take 1 course:</i> B 398R 1-3 ME 299 1 ME 398R 1 <hr style="width: 50px; margin-left: 0;"/> 1	Program notes: • No Double Counting of Major Courses • Students must maintain a minimum grade of C- in their major courses
Credit Requirements:			Tracks Available:	
	Foundations 40 Major 67 Elective 13 <hr style="width: 50px; margin-left: 0;"/> Total 120		Fall-Winter Yes Winter-Spring Yes Spring-Fall No	

Minor in Welding Fabrication and Technology (217)		
Core Courses <i>Take these courses:</i> ME 231 2 ME 231L 1 WELD 170 3 WELD 224 3 WELD 243 3 WELD 329 3 WELD 480 3 <hr style="width: 50px; margin-left: 0;"/> 18	Technical Electives <i>Take 6 credits:</i> CHEM 101 3 CHEM 101L 1 FDMAT 110 3 MATH 111 2 ME 172 3 ME 250 3 ME 332 3 WELD 338 3 WELD 350 3 <hr style="width: 50px; margin-left: 0;"/> 6	Program Notes: • No Double Counting of Minor Courses • Students must maintain a minimum grade of C- in their minor courses
Credit Requirements:		Tracks Available:
	Total 24	Fall-Winter Yes Winter-Spring Yes Spring-Fall No

Welding Technology Concentration (D 148)			
Core Courses <i>Take these courses:</i> WELD 170 3 WELD 224 3 WELD 243 3 WELD 329 3 WELD 338 3 WELD 350 3 WELD 480 3 ME 250 3 ME 250L 1 <hr style="width: 50px; margin-left: 0;"/> 25	<i>Take 1 course:</i> CHEM 101 3 CHEM 105 4 <hr style="width: 50px; margin-left: 0;"/> 3 <i>Take 1 course:</i> ECEN 150 3 ME 305 3 <hr style="width: 50px; margin-left: 0;"/> 3	Interdisciplinary Courses <i>Take 1 course:</i> IDS 398R 1-3 ME 398R 1 <hr style="width: 50px; margin-left: 0;"/> 1 <i>Take 1 course:</i> IDS 499 2 ME 340 3 <hr style="width: 50px; margin-left: 0;"/> 2	Program Notes: • No Double Counting of Concentration Courses • No Grade Less Than C- for Concentration Courses
Credit Requirements:			Tracks Available:
	Total 34		Fall-Winter Yes Winter-Spring Yes Spring-Fall No

Welding Predefined Clusters																																																	
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Course Descriptions**Credits*****WELD 100 Introduction to Welding****(1:0:2:0)**

Total Course Fees: \$60.00

This class is a basic awareness and career exploration course. It is designed to teach students about welding and how to perform a successful weld on steel. They will also be introduced to career opportunities in the welding and welding engineering fields. Some of the course time will be spent in the classroom, while some will be spent working in the lab with small groups.

(Fall, Winter, Spring)

WELD 170 Welding Science and Allied Processes**(3:2:4:0)**

Formerly: WELD 101

Total Course Fees: \$95.00

BYU-I has two 4-year bachelor degrees related to welding. WELD 170 is the first of the carefully constructed courses to provide adequate knowledge in the science of welding, offering the university graduate confidence to enter industry with the tools needed to be successful. Much is happening at the atomic level during welding. In order to be an effective welding engineer, an understanding of welding vocabulary, joints, symbols, processes, parameters, materials, defects, quality, electricity, welding equipment, allied processes, as well as the basics of how to weld are mandatory. Additional time will be spent on understanding what career paths are available to the welding engineering enthusiast. Lab time is used to clarify and embrace the science presented in the classroom. The lecture period is where the bulk of understanding will come as the student begins exploration of this phenomenal degree.

(Fall, Spring)

WELD 224 Welding Engineering I**(3:2:4:0)**

Formerly: WELD 123

Total Course Fees: \$35.00

Prerequisites: WELD 170

This course is constructed to expand the student's knowledge in the science of welding and to provide a firm foundation of welding engineering principles needed to be successful. This course is intended to provide the student with an advanced understanding of the welding arc, allied processes, symbols, defects, equipment, and to provide a firm understanding of welding techniques & parameters. Lab time will be used to enforce lecture topics, deep dives into advanced understanding of the welding arc and enhance the welding skills of the student.

(Fall, Spring)

WELD 243 Welding Engineering II**(3:2:4:0)**

Formerly: WELD 120

Total Course Fees: \$60.00

Prerequisites: WELD 224

Famous for high quality welds, gas tungsten arc welding is one of the mainstay processes of welding. This course is designed to give the student a deep understanding of the science behind GTAW. Exploration of tungsten, shielding gasses, material identification, and parameters will be covered. In lab, there will be hands on training of the GTAW process where the student will be required to hone hand-eye coordination while learning how to produce sound welds on steel, stainless steel, and aluminum. Emphasis will be given on understanding how to manipulate the process in order to achieve exceptional quality. In addition to learning GTAW, modern welding power supplies in general will be discussed in depth. Power wave forms, both current and voltage, what types of power supplies are available, and their applications will be studied.

(Fall, Spring)

WELD 329 Welding Codes, Certification & Inspection**(3:2:4:0)**

Formerly: WELD 229

Prerequisite: WELD 224

This course provides an understanding of industry codes, standards and specifications, and how they are applied to ensure quality welding processes, procedures & examination techniques are applied. Welder certification and inspection techniques are a critical part of the overall weld quality plan and must be understood to ensure the welds will meet applicable quality standards and service intent. Topics include: PQR, WPS, WPQ, certification, qualification, testing, nondestructive examination techniques and inspection.

(Winter)

WELD 338 Welding Automation**(3:2:3:0)**

Prerequisite: WELD 243

Course instruction will include a combination of lecture and lab activities to emphasize the set-up and operation of basic welding automation systems. Students will analyze and compare the effects of welding parameters, process & techniques. Exercises will include safety, positioning, basic programming, advanced systems functionality, and automation best practices. Students will be required to set-up, program, troubleshoot, and operate various automation systems.

(Winter, Spring)

WELD 350 Physical Metallurgy**(3:2:3:0)**

Prerequisite: WELD 170 and ME 250

A study of physical metallurgy of metals with application to welding. Topics include: structure of metals, phase diagrams and phase transformations, strengthening mechanisms, heat treating, heat-affected zone, weldability, solidification principles and testing of metals.

(Winter)

WELD 480 Welding Fabrication**(3:2:4:0)**

Formerly: WELD 280

Prerequisites: WELD 243 and WELD 329

A comprehensive course designed to integrate the core knowledge base of WELD courses. Students will utilize skills and techniques acquired in previous courses to concept, design, build, inspect & manufacture specific projects. Additional topics of weld distortion, tooling, fixturing, GD&T, weld design, cost estimation, project management and design for manufacturing will be addressed.

(Winter)