Foundational Courses

TEWT 1000 Introduction to Welding and Cutting **2 Credits / 60 Clock-Hours**

This course will serve students as an introduction to the welding industry. General welding shop safety, thermal cutting processes, basic welding terminology, and arc welding basics will be discussed.

Objectives:
• Demonstrate safety as it relates to welding and manufacturing.
• Perform cuts using thermal cutting processes.
• Identify and define basic welding terminology.
• Demonstrate safe set-up of arc welding equipment.
• Perform basic welds on carbon steel.
• Demonstrate clear communication in the workplace.
• Demonstrate effective workplace habits and attitudes.

TEWT 1010 Measurement Systems **1 Credit / 30 Clock-Hours**

In this course, students gain an understanding of the concepts and implementation of measurement systems used by welding professionals. US customary units, metric units, and utilization of basic measurement tools are discussed.

Objectives:
• Correctly read a tape measure.
• Perform fraction and decimal conversions.
• Perform metric and US customary unit conversions.
• Perform basic trigonometry functions as they relate to welding and fabrication.
• Use basic measurement systems correctly common in the welding industry by applying course concepts.

TEWT 1111 Shielded Metal Arc Welding (SMAW) I **2 Credits / 60 Clock-Hours**

This course teaches the set-up, operation, and practical uses of Shielded Metal Arc Welding. Process advantages and limitations are discussed. Students receive hands-on instruction regarding SMAW standard procedures and best practices in accordance with current industry standards.

Objectives:
• Demonstrate safety and best practices of SMAW-specific welding.
• Setup and operate appropriate SMAW equipment.
• Identify process advantages and limitations.
• Perform 1F and 1G welds with SMAW.
• Perform 2F and 2G welds with SMAW.

TEWT 1112 Shielded Metal Arc Welding (SMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in hands-on uses and practical application of SMAW. Students learn to reason through appropriate electrode diameters, classifications, and appropriate current levels necessary to achieve proficiency in SMAW.

Objectives:
• Describe the advantages and limitations of SMAW.
• Select proper electrode classifications for their appropriate applications.
• Select proper welding current for specified electrode classification and diameter.
• Perform 3F and 3G welds with SMAW.
• Perform 4F and 4G welds with SMAW.

TEWT 1211 Gas Tungsten Arc Welding (GTAW) I **2 Credits / 60 Clock-Hours**

This course teaches set-up, operation, and practical application of GTAW using ferrous steel. Process advantages and limitations will be discussed. Students receive hands-on instruction regarding GTAW standard procedures and best practice in accordance with current industry standards.

Objectives:
• Demonstrate safety and best practices of GTAW-specific welding.
• Setup and operate appropriate GTAW equipment.
• Identify process advantages and limitations.
• Perform 1F, 1G, 2F and 2G welds on ferrous metals using GTAW.
• Perform 3F, 3G, 4F and 4G welds on ferrous metals using GTAW.

TEWT 1212 Gas Tungsten Arc Welding (GTAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of GTAW using non-ferrous metals. Electrode classifications, preparation, and tip geometries are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for GTAW proficiency.

Objectives:
• Describe the advantages and limitations of GTAW.
• Select proper electrode classifications for their appropriate applications.
• Describe electrode classifications along with the appropriate uses and tip configurations.
• Perform 1F and 1G welds on non-ferrous metals with GTAW.
• Perform 2F and 2G welds on non-ferrous metals with GTAW.

TEWT 1311 Gas Metal Arc Welding (GMAW) I **2 Credits / 60 Clock-Hours**

This course teaches set-up, operation, and practical application of GMAW. Process advantages and limitations are discussed. Students receive hands-on instruction regarding GMAW standard procedures and best practice in accordance with industry standards using short-circuiting and axial spray metal transfer modes.

Objectives:
• Demonstrate safety and best practices of GMAW-specific welding.
• Setup and operate appropriate GMAW equipment.
• Identify process advantages and limitations.
• Perform 1F, 1G, 2F and 2G welds using GMAW-S.
• Perform 1F, 1G, and 2F welds using GMAW axial spray transfer.

TEWT 1411 Flux Cored Arc Welding (FCAW) I **2 Credits / 60 Clock-Hours**

This course covers set-up, operation, and practical application of FCAW. Process advantages and limitations are discussed. Students receive hands-on instruction regarding FCAW standard procedures and best practices in accordance with current industry standards.

Objectives:
• Demonstrate safety and best practices of FCAW-specific welding.
• Setup and operate of appropriate FCAW equipment.
• Identify process advantages and limitations.
• Perform 1F and 1G welds with FCAW.
• Perform 2F and 2G welds with FCAW.

Supplemental Courses Varies by Institution

Bridgerland

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1030 Automated Cutting and Welding **1 Credit / 30 Clock-Hours**

The Automated Cutting and Welding course introduces students to CNC Plasma Arc Cutting and welding robotically. Students learn the basics of the CAD, CAM, and CNC and how to use each with a cutting table. The welding robot is introduced.

Objectives:
• Demonstrate automated Plasma Arc Cutting.
• Demonstrate proper nozzle choice and computer settings.
• Design various parts for the Plasma Arc Cutting table.
• Explore robotics use in the welding industry.

TEWT 1040 Welding Inspection and Welding Metallurgy **1 Credit / 30 Clock-Hours**

The Welding Inspection and Welding Metallurgy course introduces students to welding inspection and basic metallurgy. Students will gain a basic understanding of how metals behave during heating and cooling and the microscopic structure of metals and these effects on the weldability.

Objectives:
• Identify differences between ferrous and non-ferrous metals.
• Explain the effects of heat and cooling of metals.
• Demonstrate basic weld puddle dynamics.
• Explain various codes and standards.
• Identify common discontinuities and causes.

TEWT 1134 Shielded Metal Arc Welding (SMAW) III **3 Credits / 90 Clock-Hours**

The Shielded Metal Arc Welding (SMAW) III course teaches intermediate skills in the SMAW process, with an emphasis on open root joints in all positions. Students are introduced to advanced welding skills on mild steel pipe in the 2F, 5F, 2G and 5G positions.

Objectives:
• Identify the technical terms of the V-groove open root welding joint.
• Demonstrate proper preparation and tacking techniques for plate and pipe coupons.
• Demonstrate proper deposit of a root pass on pipe and plate using E6010 electrodes.
• Complete open root welds on plate.
• Complete open root welds on pipe.

TEWT 1232 Gas Tungsten Arc Welding (GTAW) III **3 Credits / 90 Clock-Hours**

The Gas Tungsten Arc Welding (GTAW) III course teaches advanced skill sin the GTAW process with an emphasis on carbon and stainless steel pipe. Students are introduced to sanitary connection welding, GTAW brazing, and open root welding. Titanium and copper welding will be explored.

Objectives:
• Demonstrate proper arc initiation techniques including lift-arc and high frequency.
• Demonstrate appropriate selection of shielding gasses, flow rates, gas lenses, nozzles, trailing shields, as well as appropriate purging techniques.
• Perform GTAW welds on carbon steel pipe.
• Perform sanitary connection welds on stainless steel.
• Perform GTAW braze welds with silicon bronze on carbon steel.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1330 Gas Metal Arc Welding (GMAW) Aluminum and Stainless Steel **1 Credit / 30 Clock-Hours**

The Gas Metal Arc Welding (GMAW) Aluminum and Stainless Steel course teaches students the special challenges that both aluminum and stainless steel pose to welders. Students practice welding on these metals by welding in various joints and positions.

Objectives:
• Explain the characteristics of aluminum and stainless steel and the steps required to weld these metals successfully.
• Set up equipment correctly for welding aluminum and stainless steel.
• Prepare aluminum and stainless steel correctly.
• Complete groove welds on aluminum and stainless steel.
• Complete fillet welds on aluminum and stainless.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1500 Introduction to Other Welding Processes **1 Credit / 30 Clock-Hours**

The Introduction to Other Welding Processes course covers the basics of other commonly used welding processes. Students have the opportunity to practice some of these techniques. This course also introduces students to emerging processes as welding technology is changing rapidly.

Objectives:
• Explain common welding processes.
• Define AWS abbreviations.
• Demonstrate resistance spot welding.
• Demonstrate submerged arc welding.
• Demonstrate plastic welding.
• Explain the fundamentals of laser beam welding, electroslag welding, electrogas welding, and stud welding.

TEWT 1600 Welding Layout and Fabrication **2 Credits / 60 Clock-Hours**

The Welding Layout & Fabrication course emphasizes the proper use of fabrication tools and methods of layout and fabrication. Students learn how to fit and tack weldments and to increase product quality. They practice reading and following plans and welding procedures to create weldments.

Objectives:
• Demonstrate proper care and use of fabrication tools.
• Create a bill of materials.
• Prepare materials.
• Lay out and tack weldments properly.
• Follow plans and welding procedure specifications correctly.
• Inspect completed weldments.
• Demonstrate critical thinking and problem solving when fabricating.

TEWT 1700 Workplace Readiness **1 Credit / 30 Clock-Hours**

The Workplace Readiness course teaches students how to prepare a resume and perform in an interview in the welding industry. This course covers key technical terms and common employment related issues. This course allows students to explore and improve on soft skills needed in the workplace.

Objectives:
• Prepare a quality resume and discuss with the instructor.
• Perform a self-evaluation on employability skills and discuss with the instructor.
• Complete the final welding knowledge test.
• Explore and discuss common interview questions.

TEWT 2012 Welding Special Projects **2 Credits / 60 Clock-Hours**

Students in this course will work with instructors to design and build an instructor approved project using Shielded Metal Arc Welding (SMAW), Flux Core Arc Welding (FCAW), Gas Metal Arc Welding (GMAW), or Gas Tungsten Arc Welding (GTAW) process. Students must define a timeline that will allow for the project to be completed on time, create a three-view blueprint with weld symbols, provide a cost estimate of materials and parts list, build the project to American Welding Society (AWS) Standards, and pass inspection. Student projects must not exceed course time.

Objectives:
• Demonstrate the use of welding skills to create a project.
• Create blueprints.
• Define a timeline for completion.
• Create a cost estimate for materials.

TEWT 2999 Welding Externship **2 Credits / 90 Clock-Hours**

The Welding Externship course develops the practical application of classroom skills in the workplace. It implements real-world work experience using decision-making, critical thinking, and problem-solving skills. Companies will assign projects to the student and provide objective feedback on the student's performance in the workplace. Customized student learning objectives will be developed addressing the individual needs of the company and the career interests of each student. Students who complete this course can apply skills in a real-world setting.

Objectives:
• Create personalized objectives (with supervisor) to be accomplished during the externship.
• Demonstrate competency in all skill areas being evaluated by a supervisor.
• Maintain proper attendance and communication for the duration of the externship.
• Demonstrate ability to receive constructive criticism and improvement suggestions.
• Demonstrate soft skills and technical skills to successfully complete set objectives by the end of the externship.

TEMT 1005 Machining for Manufacturing Trades **3 Credits / 90 Clock-Hours**

This is a course to support manufacturing programs related to machining. It gives students a working overview of industrial machine shop practice. This course is designed to teach principles and techniques of manufacturing processes by learning to operate the lathe and mill. Students will be trained in areas of blueprint reading, hand tools, machining and part inspection, all with the use of manual machines.

Objectives:
• Identify safe practices in a machine shop.
• Identify correct clean up procedures.
• Demonstrate basic layout procedures.
• Reading and interpreting blueprints.
• Safely setup and operate a band saw.
• Safely operate a bench grinder and hand tools.
• Accurately use and read steel rules, micrometers, and calipers.
• Perform safe and effective use of lathes and milling machines.
• Perform basic programming and use controls of a CNC machine.

Davis

TEWT 1008 Welding for Manufacturing **2 Credits / 60 Clock-Hours**

Welding for Manufacturing includes the basic knowledge of Gas Metal Arc Welding (GMAW) and Shielded Metal Arc Welding (SMAW). During this course, you will study welding safety, protection, accident prevention, and troubleshooting. You will practice set-up, operation of equipment, positions, executions, and the workmanship needed for a basic weld.

Objectives:
• Describe oxy fuel cutting process terms.
• Demonstrate proper equipment setup, usage, cleaning, and break-down.
• Discuss and conduct safety inspections of equipment and accessories.
• List and describe oxy fuel cutting equipment.
• Perform setup, lighting, and use of oxy fuel cutting equipment.
• Demonstrate various cutting techniques including straight cuts, beveling, and gouging on various base metals.
• Name key terms for GMAW.
• Make GMAW-S (Short Circuit) Fillet Welds the 2F position.
• Make GMAW-S (Short Circuit) Groove Welds in the 2G position.
• Make GMAW-S (Short Circuit) V Groove Welds in the 2G position.
• List key terms for SMAW.
• Perform Fillet welds on mild carbon steel with E7018 welding.
• Perform Groove welds in the Flat (1G) and horizontal (2G) with 7018.

TEWT 1045 Inspection, Metallurgy, and Blueprints **2 Credits / 60 Clock-Hours**

This course will introduce students to welding symbols and blueprints that welding professionals use. Discussing different welding processes and materials that can be welded. Basic AWS standards and types of nondestructive testing (NDT) and destructive testing will be covered.

Objectives:
• Discuss codes, standards, and types of nondestructive and destructive testing.
• Identify and interpret basic AWS standardized welding symbols, blueprints, and bill of materials.
• Identify parts of a joint, parts of a weld, and how they correspond with blueprints.
• Identify and state various stresses a weld can be subjected to.
• Explain welder qualifications, certification, and welding procedure specifications (WPS).

TEWT 1050 Oxy Fuel Welding and Brazing Lab **2 Credits / 60 Clock-Hours**

Oxy Fuel Welding and Brazing Lab explores how to set oxy-fuel welding (OFW) equipment and select proper torch bodies and tips. In addition, students will study the effects of torch angle, flame height, filler metal size, and welding speed on gas welds and brazing. During this course, students will perform a variety of weld joints in the Flat (1F) position on thin and thick gauge mild steel. Students will also demonstrate welding on a small diameter tube and pipe.

Objectives:
• Define key terms for oxy fuel welding and brazing.
• Explain how to set up and weld mild steel.
• Explain the effects of torch angle, flame height, filler metal size, and welding speed on gas welds.
• Apply directions using key oxy fuel welding and brazing terms.
• Set a torch for welding.
• Explain differences between welding and brazing.
• Perform stringer beads, outside corner joints, butt joints, lap joints, and tee joints.
• Perform welds and brazing on tube or small diameter pipe to plate.

TEWT 1150 Shielded Metal Arc Welding (SMAW) Certification Preparation **1 Credit / 30 Clock-Hours**

In the course, students will use the knowledge gained in previous courses to pass an AWS welder qualification. Instructors will guide students through the intricacies of the AWS D1.1 welder qualification requirements, emphasizing the practical application of welding principles.

Objectives:
• Analyze a welding procedure specification by reading and interpreting its contents.
• Explain the visual acceptance requirements outlined in the AWS D1.1 code.
• Execute welds within the defined parameters stated in the welding procedure specification (WPS).
• Complete the necessary steps to successfully pass the SMAW AWS test according to AWS D1.1 code.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1335 Aluminum Gas Metal Arc Welding (GMAW) **1 Credit / 30 Clock-Hours**

Aluminum Gas Metal Arc Welding students explore how to weld aluminum using the Gas Metal Arc Welding (GMAW) Process. Throughout this course, students will analyze aluminum alloys, elements, temper designations, filler metal selections, and preparation of base metals. Students will also perform Fillets and Grooves in Flat (1G), Horizontal (2F) and Vertical (3F) positions.

Objectives:
• Describe the properties of aluminum.
• Explain how and when to use filler metal selections and demonstrate preparation of base metals.
• Use general guidelines for welding aluminum with the GMAW process.
• Perform fillet and grooves in Flat (1G), Horizontal (2F) and Vertical (3F) positions using the GMAW process.

TEWT 1350 Gas Metal Arc Welding (GMAW) Certification Preparation **1 Credit / 30 Clock-Hours**

In the course, students will use the knowledge gained in previous courses to pass an AWS welder qualification. Instructors will guide students through the intricacies of the AWS D1.1 welder qualification requirements, emphasizing the practical application of welding principles.

Objectives:
• Analyze a welding procedure specification by reading and interpreting its contents.
• Explain the visual acceptance requirements outlined in the AWS D1.1 code.
• Execute welds within the defined parameters stated in the welding procedure specification (WPS).
• Complete the necessary steps to successfully pass the GMAW AWS test according to AWS D1.1 code.

TEWT 1450 Flux Cored Arc Welding Gas Shielded: AWS Certification Preparation **1 Credit / 30 Clock-Hours**

In this course, students will use the knowledge gained in previous courses to pass an AWS welder qualification. Instructors will guide students through the intricacies of the AWS D1.1 welder qualification requirements, emphasizing the practical application of welding principles.

Objectives:
• Analyze a Welding Procedure Specification by reading and interpreting its contents.
• Explain the visual acceptance requirements outlined in the AWS D1.1 code.
• Execute welds within the defined parameters stated in the welding procedure specification (WPS).
• Complete the necessary steps to successfully pass the FCAW-G AWS test according to the AWS D1.1 code.

TEWT 1800 Welding Sculpture I **2 Credits / 60 Clock-Hours**

Welding Sculpture I provides the opportunity to work with instructors to design and build a welding sculpture. Throughout this course, students will use Ferrous and Non-Ferrous metals. The sculpture students design must be an original, creative artwork. Students may use all welding processes to create the sculpture. Students will also document the creation of the sculpture in a notebook with pictures, receipts for materials, concept sketches and anything done in the creation of the sculpture.

Objectives:
• Create a welding sculpture that does not exceed the maximum size of 18” tall X 12” wide X 18” long and 150 pounds.
• Form a welding sculpture that is one continual piece, not multiple unconnected pieces.
• Document steps taken to create the sculpture to include pictures, receipts for materials, concept sketches, and anything done in the creation of the sculpture.

TEWT 1810 Welding Sculpture II **2 Credits / 60 Clock-Hours**

Welding Sculpture II offers additional time for completing the welding sculpture started in Welding Sculpture course. Students will need to continue documenting the creation of the sculpture in a notebook with pictures, receipts for materials, concept sketches, and anything done in the creation of the sculpture.

Objectives:
• Create a welding sculpture that does not exceed the maximum size of 18” tall X 12” wide X 18” long and 150 pounds.
• Form a welding sculpture that is one continual piece, not multiple unconnected pieces.
• Document steps taken to create the sculpture to include pictures, receipts for materials, concept sketches, and anything done in the creation of the sculpture.

TEWT 1820 SkillsUSA Preparation **2 Credits / 60 Clock-Hours**

In the SkillsUSA Preparation course, students will take on the important role of preparing for the chosen competition. The primary objective will be to gain a comprehensive understanding of the technical standards specific to the competition. Through this course, students will actively engage in practicing and refining the essential elements and skills required for the competition. These practice sessions will enable students to develop the necessary expertise and proficiency that can be effectively applied during the live regional, state, or national-level competition.

Objectives:
• Recognize the technical standards for the competition.
• Organize all materials needed to complete the competition.
• Practice skills and elements to be performed in the live competition.

TEWT 1900 Welding Skills Practice **1 Credit / 30 Clock-Hours**

In this course, students will further refine skills previously acquired in the program. Working with an instructor, they will perform projects similar to what is found in industry. This course emphasizes independent work, reflecting the expectations placed on industry professionals.

Objectives:
• Evaluate and select specific skills to develop further.
• Apply acquired skills and knowledge through hands-on welding exercises, fostering practical expertise.
• Demonstrate welding techniques under the supervision of experienced instructors, ensuring proficiency.
• Employ effective time management strategies to achieve the desired skill level within the allotted course duration.

TEWT 1905 Welding Skills Practice II **1 Credit / 30 Clock-Hours**

Welding Skills Practice II continues to develop the skills gained in the welding program. Students will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. Students are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Further enhance and refine the welding skills acquired during the welding program, focusing on practical application and hands-on practice to build competency.
• Collaborate with the instructor to design and complete one or more welding projects that simulate real-world applications, providing opportunities to apply the acquired skills in industry-relevant scenarios.
• Foster independence and self-reliance in welding techniques and project execution, preparing students to meet the expectations of a competent program completer in the welding industry.

TEWT 1910 Welding Skills Practice III **1 Credit / 30 Clock-Hours**

Welding Skills Practice III continues to develop the skills gained in the welding program. Students will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. Students are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Further enhance and refine the welding skills acquired during the welding program, focusing on practical application and hands-on practice to build competency.
• Collaborate with the instructor to design and complete one or more welding projects that simulate real-world applications, providing opportunities to apply the acquired skills in industry-relevant scenarios.
• Foster independence and self-reliance in welding techniques and project execution, preparing students to meet the expectations of a competent program completer in the welding industry.

TEWT 1915 Welding Skills Practice IV **1 Credit / 30 Clock-Hours**

Welding Skills Practice IV continues to develop the skills gained in the welding program. Students will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. Students are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Further enhance and refine the welding skills acquired during the welding program, focusing on practical application and hands-on practice to build competency.
• Collaborate with the instructor to design and complete one or more welding projects that simulate real-world applications, providing opportunities to apply the acquired skills in industry-relevant scenarios.
• Foster independence and self-reliance in welding techniques and project execution, preparing students to meet the expectations of a competent program completer in the welding industry.

TEWT 1920 Welding Skills Practice V **1 Credit / 30 Clock-Hours**

Welding Skills Practice V continues to develop the skills gained in the welding program. Students will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. Students are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Further enhance and refine the welding skills acquired during the welding program, focusing on practical application and hands-on practice to build competency.
• Collaborate with the instructor to design and complete one or more welding projects that simulate real-world applications, providing opportunities to apply the acquired skills in industry-relevant scenarios.
• Foster independence and self-reliance in welding techniques and project execution, preparing students to meet the expectations of a competent program completer in the welding industry.

TEWT 1925 Welding Skills Practice VI **2 Credits / 60 Clock-Hours**

Welding Skills Practice VI continues to develop the skills gained in the welding program. Students will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. Students are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Further enhance and refine the welding skills acquired during the welding program, focusing on practical application and hands-on practice to build competency.
• Collaborate with the instructor to design and complete one or more welding projects that simulate real-world applications, providing opportunities to apply the acquired skills in industry-relevant scenarios.
• Foster independence and self-reliance in welding techniques and project execution, preparing students to meet the expectations of a competent program completer in the welding industry.

TEWT 2000 Advanced Welding Processes **1 Credit / 30 Clock-Hours**

In Advanced Welding Processes students will learn how to use advanced features of the welding machines. They will learn when these advanced features will be useful while working in the welding industry and how the functions can improve their job performance.

Objectives:
• Explain the benefits and effects of various gas blends.
• Use advanced controls and features of welding equipment.
• Describe common pulse modes and their applications.
• Discuss the effect of frequency, voltage, and amperage.
• Distinguish between the three modes of transfer (short-circuit, globular and spray).

TEWT 2010 Welding Special Projects I **2 Credits / 60 Clock-Hours**

Students in this course will work with instructors to design and build an instructor approved project using Shielded Metal Arc Welding (SMAW), Flux Core Arc Welding (FCAW), Gas Metal Arc Welding (GMAW), or Gas Tungsten Arc Welding (GTAW) process. Students must define a timeline that will allow for the project to be completed on time, create a three-view blueprint with weld symbols, provide a cost estimate of materials and parts list, build the project to American Welding Society (AWS) Standards, and pass inspection. Student projects must not exceed course hours and students must prepay for project materials.

Objectives:
• Discuss and solve basic welding fabrication math problems.
• Demonstrate the proper placement of tack welds.
• Explain how to adjust parts to meet the tolerance.
• Describe how to adjust for weld distortion.
• Lay out and trace parts.
• Assemble and fit up parts for welding by following blueprints.

TEWT 2020 Welding Special Projects II **2 Credits / 60 Clock-Hours**

This course is a continuation of Welding Special Projects I. Students in this course will work with instructors to design and build an instructor approved project using Shielded Metal Arc Welding (SMAW), Flux Core Arc Welding (FCAW), Gas Metal Arc Welding (GMAW), or Gas Tungsten Arc Welding (GTAW) process. Students must define a timeline that will allow for the project to be completed on time, create a three-view blueprint with weld symbols, provide a cost estimate of materials and parts list, build the project to American Welding Society (AWS) Standards, and pass inspection. Student projects must not exceed course hours and students must prepay for project materials.

Objectives:
• Discuss and solve basic welding fabrication math problems.
• Demonstrate the proper placement of tack welds.
• Explain how to adjust parts to meet the tolerance.
• Describe how to adjust for weld distortion.
• Lay out and trace parts.
• Assemble and fit up parts for welding by following blueprints.

TEWT 2030 Welding Special Projects III **2 Credits / 60 Clock-Hours**

This course is a continuation of Welding Special Projects II. Students in this course will work with instructors to design and build an instructor approved project using Shielded Metal Arc Welding (SMAW), Flux Core Arc Welding (FCAW), Gas Metal Arc Welding (GMAW), or Gas Tungsten Arc Welding (GTAW) process. Students must define a timeline that will allow for the project to be completed on time, create a three-view blueprint with weld symbols, provide a cost estimate of materials and parts list, build the project to American Welding Society (AWS) Standards, and pass inspection. Student projects must not exceed course hours and students must prepay for project materials.

Objectives:
• Discuss and solve basic welding fabrication math problems.
• Demonstrate the proper placement of tack welds.
• Explain how to adjust parts to meet the tolerance.
• Describe how to adjust for weld distortion.
• Lay out and trace parts.
• Assemble and fit up parts for welding by following blueprints.

Dixie

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1131 Shielded Metal Arc Welding (SMAW) III **2 Credits / 60 Clock-Hours**

The Shielded Metal Arc Welding (SMAW) III course expands students' competency in hands-on uses and practical application of SMAW. Students learn to reason through appropriate parameters necessary to achieve proficiency in SMAW with open root welds and structural steel multi pass welds. Students demonstrate fillets and grooves with E6010 and E7018 electrodes.

Objectives:
- Test the limitations of SMAW.
- Perform 2F multi pass and 2G open root welds with SMAW.
- Perform 3F multi pass and 3G open root welds with SMAW.

TEWT 1230 Gas Tungsten Arc Welding (GTAW) III **2 Credits / 60 Clock-Hours**

The Gas Tungsten Arc Welding (GTAW) III course expands student competency in hands-on uses and practical application of GTAW using non-ferrous metals with an emphasis on stainless steel. Electrode classifications and base metal preparation are taught. Students learn appropriate parameter selection for welding procedure requirements as necessary for GTAW proficiency.

Objectives:
- Describe the advantages and limitations of GTAW.
- Select proper electrode classifications for their appropriate applications.
- Describe electrode classifications along with the appropriate uses and tip configurations.
- Perform 1F and 1G welds on stainless steel metal with GTAW.
- Perform 2F and 2G welds on stainless steel metal with GTAW.
- Perform 3F Uphill welds on stainless steel metal with GTAW.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
- Describe the advantages and limitations of GMAW.
- Select proper equipment and parameters given welding procedure requirements.
- Describe shielding gas flow rates, composition, and selection.
- Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
- Perform fillets and groove joints with GMAW-P.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1605 Welding Fabrication **2 Credits / 60 Clock-Hours**

The Welding Fabrication course teaches skills needed in fabricating welded metal projects. Students will design and create welded metal projects to demonstrate their knowledge and skills learned in previous courses, SMAW, GMAW, GTAW, and FCAW.

Objectives:
• Demonstrate knowledge of welding processes, principles, measurement skills and choice of materials by fabricating welded metal projects.
• Use SMAW to fabricate a metal project.
• Use GMAW to fabricate a metal project.
• Use GTAW to fabricate a metal project.
• Use FCAW to fabricate a metal project.

TEWT 1710 Career and Workplace Relations **1 Credit / 30 Clock-Hours**

The Career and Workplace Relations course is designed to help students gain insight into how their skills and professionalism enhance relationships between management and coworkers. Instruction includes employment skills such as communication, critical thinking, professional etiquette, team dynamics, and more.

Objectives:
● Identify personal and transferable skills, competencies, and/or abilities.
● Create an industry specific resume, cover letter, thank you letter, reference list, and online presence.
● Demonstrate effective interviewing skills.
● Submit an application for an industry specific position.
● Demonstrate effective use of job search websites.

TEWT 1930 Welding Qualification **2 Credits / 60 Clock-Hours**

The Welder Qualifications course teaches skills needed to pass various welders qualification test for industry certification. Students will create common welding industry test that are used for job qualifications. Students will use and understand the proper documentation common for welder qualification.

Objectives:
• Complete a 2G SMAW Welders Qualification test.
• Complete a 3G SMAW Welders Qualification test.
• Complete the following American Welding Society projects:
• GTAW Mild Steel project.
• GTAW Aluminum project.
• GTAW Stainless Steel project.
• GMAW-S project.
• GMAW Spray Transfer project.
• FCAW-G project.
• GMAW-S project.

Mountainland

TEWT 1001 Introduction to Welding and Cutting II **1 Credit / 30 Clock-Hours**

This course will cover advanced cutting and fitting methods commonly used in the welding industry. Students will work with blueprints, cut lists, and common tools to construct a widget.

Objectives:
• Demonstrate the ability to cut and fit C channel.
• Recognize different temperatures used to cut on thick and thin materials.
• Perform cuts on ½ inch thick plate or thicker materials.
• Cut out a widget, following a specific blueprint.

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1132 Shielded Metal Arc Welding (SMAW) III **3 Credits / 90 Clock-Hours**

This course follows the AWS Sense Program for SMAW. Students will be required to pass a comprehensive written and practical exam, as well as attempt a welding qualification test using the SMAW process.

Objectives:
• Perform a 1G – 4G, and pass bends on each assignment.
• Correctly read a blueprint to complete a widget that meets the Sense practical testing requirements.
• Pass the SMAW AWS Sense written test with 80% or higher, within 3 attempts.
• Attempt a D1.1 3G structural steel qualification test.
• Cut out a widget, following a specific blueprint.

TEWT 1231 Gas Tungsten Arc Welding (GTAW) III **2 Credits / 60 Clock-Hours**

Gas Tungsten Arc Welding is an advanced level course for welding students. This course will test students on their knowledge of GTAW by utilizing the AWS GTAW Sense Level 1 test. Heat considerations and basic metallurgy will be taught.

Objectives:
• Pass the GTAW AWS Sense test with 80% or higher, within 3 attempts.
• Pass the non-ferrous widget, in accordance with AWS standards.
• Perform 1F and 1G welds on non-ferrous metals.
• Perform 2F and 2G welds on non-ferrous metals.

TEWT 1315 Gas Metal Arc Welding (GMAW) II **3 Credits / 90 Clock-Hours**

This course expands student competency in hands-on uses and practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for GMAW proficiency. Pulsed-spray (GMAW-P) metal transfer mode and Metal Cored wire will be introduced. Students will be tested on their knowledge of GMAW using the AWS S.E.N.S.E Practical Performance Test and written exam.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.
• Build and weld the AWS Sense Widget.
• Pass the GMAW AWS Sense written test with 80% or higher, within 3 attempts.
• Perform 1F, 2F, and 3F downhill welds with Pulsed Metal Cored.
• Perform 2G Vee and a 3G Vee downhill with Pulsed Metal Cored.

TEWT 1413 Flux Cored Arc Welding (FCAW) II **3 Credits / 90 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency. Students will be tested on their knowledge of FCAW by utilizing the AWS FCAW S.E.N.S.E Level 1 test. Following a blueprint, students build a widget using FCAW -G and FCAW-SS welding processes. Students will also take a practical qualification test that will follow the AWS D1.1 Structural Steel Code standards.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.
• Pass the FCAW AWS Sense test with 80% or higher, within 3 attempts.
• Build and weld the AWS Sense Widget.
• Attempt the AWS D1.1 Structural Steel FCAW bend test.

TEWT 1511 Submerged Arc Welding (SAW) **1 Credit / 30 Clock-Hours**

This course covers set-up, operations and practical application of SAW. Process advantages and limitations will be discussed. Students will receive hands-on instruction regarding SAW standard procedures and best practice in accordance with current industry standards.

Objectives:
• Demonstrate competency of SAW-specific welding safety concerns and best practices.
• Demonstrate competency of appropriate SAW equipment setup and operations.
• Identify process advantages and limitations.
• Perform a 1G Vee weld with a backing strip on solid wire.
• Perform a 1 G Vee weld with a back weld on metal cored wire.
• Perform a 1G Rotated pipe weld.

Ogden-Weber

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1040 Welding Inspection and Welding Metallurgy **1 Credit / 30 Clock-Hours**

The Welding Inspection and Welding Metallurgy course introduces students to welding inspection and basic metallurgy. Students will gain a basic understanding of how metals behave during heating and cooling and the microscopic structure of metals and these effects on the weldability.

Objectives:
• Identify differences between ferrous and non-ferrous metals.
• Explain the effects of heat and cooling of metals.
• Demonstrate basic weld puddle dynamics.
• Explain various codes and standards.
• Identify common discontinuities and causes.

TEWT 1060 Related Equipment **2 Credits / 60 Clock-Hours**

Students are taught how to use various pieces of equipment in the shop. Shears, bandsaws, iron workers, rollers, press brakes.

Objectives:
• Safely operate each of the following pieces of equipment:
• Shear and iron worker.
• Pipe/tubing bender.
• Plate roller.
• Bandsaw.
• Press brake.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1520 Metal Finishing **1 Credit / 30 Clock-Hours**

This course will cover training and techniques in metal finishing principles such as, grinding, sanding, personal protective equipment and safety practices.

Objectives:
• Properly use personal protective equipment.
• Demonstrate proper safety practices.
• Demonstrate grinding and sanding techniques.

TEWT 1720 Industry Prep **1 Credit / 30 Clock-Hours**

This course will cover basic welding terminology to include Welding Procedure Specifications (WPS), and Procedure Qualification Record (PQR). This course will explore tools and best practices for a successful job search and interview.

Objectives:
• Define welding terminology and certification processes.
• Interpret technical drawings and symbols.
• Demonstrate industry-specific job-seeking skills.

TEWT 1935 Endorsements **2 Credits / 60 Clock-Hours**

This course will cover company-specific standards for Welding Procedure Specifications (WPS) and Procedure Qualification Record (PQR) endorsements.

Objectives:
• Obtain a company welding endorsement (WPS) in at least one of the following processes:
• GMAW.
• GTAW.
• SMAW.
• FCAW.
• GMAW Pulse.

TEWT 2130 Projects **2 Credits / 60 Clock-Hours**

This course covers production welding skills, fabrication, math, blueprint reading and other essential skills.

Objectives:
• Complete at least one welding project in each of the following processes:
• GMAW.
• GTAW.
• SMAW.
• FCAW.

Salt Lake

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1040 Welding Inspection and Welding Metallurgy **1 Credit / 30 Clock-Hours**

The Welding Inspection and Welding Metallurgy course introduces students to welding inspection and basic metallurgy. Students will gain a basic understanding of how metals behave during heating and cooling and the microscopic structure of metals and these effects on the weldability.

Objectives:
• Identify differences between ferrous and non-ferrous metals.
• Explain the effects of heat and cooling of metals.
• Demonstrate basic weld puddle dynamics.
• Explain various codes and standards.
• Identify common discontinuities and causes.

TEWT 1055 Oxy Fuel **1 Credit / 30 Clock-Hours**

Learn practical skills using the oxy-acetylene welding process on carbon steel and understand Oxy-Acetylene equipment and flame adjustment. Upon completion of this course students have a better understanding of how to read and manipulate the weld puddle as related to other welding processes. Students will perform oxy-acetylene, fusion and braze welding.

Objectives:
• Demonstrate safe shop and process practices.
• Perform equipment set-up and proper flame adjustment.
• Demonstrate fusion welding on low carbon steel.
• Demonstrate braze welding on low carbon steel.

TEWT 1133 Shielded Metal Arc Welding (SMAW) III **2 Credits / 60 Clock-Hours**

Continued practice in welding skills using the Shielded Metal Arc Welding process on carbon steel. Instruction in safe practices and theory of Shield Metal Arc Welding are continued. Introduction to welder performance qualification practical skills development in welding groove welds. Preparatory to and including welder qualification testing experience.

Objectives
• Identify the technical terms of the V-groove open root welding joint.
• Demonstrate the ability to follow welding procedure specifications.
• Complete open root welds on plate.
• Execute practical weld tests and welder performance qualification.
• Critique welds to a quality standard.
• Perform 3G and 4G qualification tests.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1333 Gas Metal Arc Welding (GMAW) III **2 Credits / 60 Clock-Hours**

Continued practice in welding skills using the Gas Metal Arc Welding process on carbon steel. Instruction in safe practices and theory of Gas Metal Arc Welding are continued. Introduction to welder performance qualification practical skills development in welding groove welds. Preparatory to and including welder qualification testing experience.

Objectives
• Identify the technical terms of the V-groove open root welding joint.
• Demonstrate the ability to follow welding procedure specifications.
• Complete open root welds on plate.
• Execute practical weld tests and welder performance qualification.
• Critique welds to a quality standard.
• Perform 3G and 4G qualification tests.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1430 Flux Cored Arc Welding (FCAW) III **2 Credits / 60 Clock-Hours**

Continued practice in welding skills using the Flux Cored Arc Welding process on carbon steel. Instruction in safe practices and theory of Flux Cored Arc Welding are continued. Introduction to welder performance qualification practical skills development in welding groove welds. Preparatory to and including welder qualification testing experience.

Objectives
• Identify the technical terms of the V-groove open root welding joint.
• Demonstrate the ability to follow welding procedure specifications.
• Complete open root welds on plate.
• Execute practical weld tests and welder performance qualification.
• Critique welds to a quality standard.
• Perform 3G and 4G qualification tests.

TEWT 1901 Welding Skill Practice I **1 Credit / 30 Clock-Hours**

Welding Skill Practice continues to develop the skills gained in the welding program. You will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. You are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Complete projects using industry specific tasks to prepare for a specific company in industry.

TEWT 1906 Welding Skill Practice II **1 Credit / 30 Clock-Hours**

Welding Skill Practice II continues to develop the skills gained in the welding program. You will work with the instructor to complete one or more projects that are applicable to the skills needed in the welding industry. You are expected to work independently as per expectations of a program completer in the industry.

Objectives:
• Complete projects using industry specific tasks to prepare for a specific company in industry.

TEWT 2011 Welding Special Projects I **1 Credit / 30 Clock-Hours**

Students will work with instructors to design and build an instructor approved project using Previously learned welding processes. Students must define a timeline with instructor, that will allow for the project to be completed on time, create a three-view blueprint with weld symbols, provide a cost estimate of materials and parts list, and pass inspection. Students must supply materials.

Objectives:
• Demonstrate the use of welding skills to create a project.
• Create blueprints.
• Define a timeline for completion.
• Create a cost estimate for materials.

TEWT 2021 Welding Special Projects II **1 Credit / 30 Clock-Hours**

Students will work with instructors to design and build an instructor approved project using Previously learned welding processes. Students must define a timeline with instructor, that will allow for the project to be completed on time, create a three-view blueprint with weld symbols, provide a cost estimate of materials and parts list, and pass inspection. Students must supply materials.

Objectives:
• Demonstrate the use of welding skills to create a project.
• Create blueprints.
• Define a timeline for completion.
• Create a cost estimate for materials.

Snow

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1070 Welding Inspection and Testing **3 Credits / 90 Clock-Hours**

The Welding Inspection and Testing course introduces students to welding inspection and Weld testing. Students will gain a basic understanding of AWS standards and visual inspection techniques. Student will practice common destructive testing methods.

Objectives:
• Explain methods of non-destructive inspection.
• Demonstrate basic weld inspection and testing.
• Explain various codes and standards.
• Identify common discontinuities and causes.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1610 Metal Fabrication I **3 Credits / 90 Clock-Hours**

The Metal Fabrication I course teaches student to take a project from concept to completed part. Students will design, cut, form and weld projects utilizing various equipment and welding processes.

Objectives:
• Demonstrate basic design and dimensioning.
• Develop a written project plan.
• Outline equipment and processes.
• Calculate cost and material required.
• Use various equipment to fabricate a metal project.

TEWT 1615 Metal Fabrication II **3 Credits / 90 Clock-Hours**

The Metal Fabrication II course builds from principles learned in Metal Fabrication II and allows student to further develop skills to take a project from concept to completed part in order to prepare them for a Fabrication environment. Students will design, cut, form and weld projects utilizing various equipment and welding processes.

Objectives:
• Demonstrate basic design and dimensioning.
• Develop a written project plan.
• Outline equipment and processes.
• Calculate cost and material required.
• Use various equipment to fabricate a metal project.

TEWT 2100 Specialized Shielded Metal Arc Welding (SMAW) I **3 Credits / 90 Clock-Hours**

The Specialized Shielded Metal Arc Welding (SMAW) I course teaches intermediate skills in the SMAW process, with an emphasis on joints applying to structural and pipe applications in multiple positions. Students are introduced to advanced welding skills on heavy plate and mild steel pipe.
This course expands students' competency in hands-on uses and practical application of SMAW. Students learn to reason through appropriate parameters necessary to achieve proficiency in SMAW with open root welds and multi pass welds. Students demonstrate fillets and grooves with E6010 and E7018 electrodes.

Objectives:
• Identify the technical terminology.
• Demonstrate proper preparation and tacking techniques for plate and pipe coupons.
• Demonstrate proper technique utilized in multi-pass welds.
• Complete welds on plate.
• Complete welds on pipe.

TEWT 2110 Specialized Shielded Metal Arc Welding (SMAW) II **3 Credits / 90 Clock-Hours**

The Specialized Shielded Metal Arc Welding (SMAW) II course teaches advanced skills in the SMAW process, with an emphasis on joints applying to field applications. Students refine and demonstrate advanced welding skills on heavy plate or mild steel pipe.
This course expands students' competency in hands-on uses and practical application of SMAW. Students learn to reason through appropriate parameters necessary to achieve proficiency in SMAW with open root welds and structural steel multi pass welds. Students demonstrate fillets and grooves with E6010 and E7018 electrodes.

Objectives:
• Utilize the technical terminology.
• Demonstrate proper preparation and tacking techniques for plate and pipe coupons.
• Demonstrate proper technique utilized in multi-pass welds.
• Complete welds on plate or pipe.

TEWT 2200 Specialized Gas Tungsten Arc Welding (GTAW) I **3 Credits / 90 Clock-Hours**

Specialized Gas Tungsten Arc Welding I is an Intermediate level course for welding students. This course expands students experience with differing machine parameters and various materials.

Objectives:
• Perform welds on various metals.
• Perform welds on multiple material thicknesses.
• Perform welds in out of position scenarios.

TEWT 2210 Specialized Gas Tungsten Arc Welding (GTAW) II **3 Credits / 90 Clock-Hours**

Specialized Gas Tungsten Arc Welding (GTAW) II course expands student competency in hands-on uses and practical application of GTAW using various metals with an emphasis on precision work. Students learn appropriate parameter selection for welding procedure requirements as necessary for GTAW proficiency.

Objectives:
• Describe the advantages and limitations of GTAW.
• Select proper electrode classifications for their appropriate applications.
• Describe electrode classifications along with the appropriate uses and tip configurations.
• Perform multiple welds with GTAW.
• Perform welds on varying material thicknesses.

TEWT 2300 Specialized Gas Metal Arc Welding (GMAW) I **3 Credits / 90 Clock-Hours**

The Specialized Gas Metal Arc Welding (GMAW) I is an intermediate course that teaches students the special challenges that various materials, joint types and positions to welders. Students practice welding on these metals by welding in various joints and positions.

Objectives:
• Explain the characteristics of aluminum and stainless steel and the steps required to weld these metals successfully.
• Set up equipment correctly for welding aluminum and stainless steel.
• Prepare aluminum and stainless steel correctly.
• Complete groove welds on aluminum and stainless steel.
• Complete fillet welds on aluminum and stainless.

TEWT 2310 Specialized Gas Metal Arc Welding (GMAW) II **3 Credits / 90 Clock-Hours**

The Specialized Gas Metal Arc Welding (GMAW) II is an advanced course that emphasizes on processes and applications pertaining to a manufacturing environment. Students gain experience working with various materials, joint types and positions. Students practice welding on these metals by welding in various joints and positions.

Objectives:
• Explain the characteristics of aluminum and stainless steel and the steps required to weld these metals successfully.
• Set up equipment correctly for welding aluminum and stainless steel.
• Prepare aluminum and stainless steel correctly.
• Complete groove welds on aluminum and stainless steel.
• Complete fillet welds on aluminum and stainless.

TEWT 2400 Specialized Flux Cored Arc Welding (FCAW) I **3 Credits / 90 Clock-Hours**

This intermediate course expands students experience with FCAW welding process utilizing various joint types and positions.

Objectives:
• Weld various joints and material thicknesses.
• Understand application and limitations of FCAW processes.

TEWT 2410 Specialized Flux Cored Arc Welding (FCAW) II **3 Credits / 90 Clock-Hours**

This Advanced course will allow students to expand their experience in FCAW processes pertaining to an industrial application.

Objectives:
• Perform multipass welds.
• Perform qualification tests.
• Understand application and limitations of FCAW processes.

Southwest

TEWT 1004 Advanced Thermal Cutting and Brazing **1 Credit / 30 Clock-Hours**

This course continues with oxygen and fuel gas (oxy fuel) cutting and brazing systems as well as Carbon Arc Cutting and Plasma Arc Cutting systems, specifically safety. Students will continue to practice oxy fuel cutting.

Objectives:
• Perform safety inspection of equipment and accessories and proper set up and shut down techniques.
• Utilize charts to identify proper tip selection and gas working pressures.
• Demonstrate carburizing, neutral, and oxidizing flames.
• Identify the basic components, safety concerns, and properly set up Carbon Arc Cutting (CAC).
• Identify the basic components, safety concerns, and properly set up Plasma Arc Cutting (PAC) power source.

TEWT 1045 Inspection, Metallurgy, and Blueprints **2 Credits / 60 Clock-Hours**

This course will introduce students to welding symbols and blueprints that welding professionals use. Discussing different welding processes and materials that can be welded. Basic AWS standards and types of nondestructive testing (NDT) and destructive testing will be covered.

Objectives:
• Discuss codes, standards, and types of nondestructive and destructive testing.
• Identify and interpret basic AWS standardized welding symbols, blueprints, and bill of materials.
• Identify parts of a joint, parts of a weld, and how they correspond with blueprints.
• Identify and state various stresses a weld can be subjected to.
• Explain welder qualifications, certification, and welding procedure specifications (WPS).

TEWT 1135 Shielded Metal Arc Welding (SMAW) III **2 Credits / 60 Clock-Hours**

Continued practice in welding skills using the Shielded Metal Arc Welding process on carbon steel. Instruction in safe practices and theory of Shield Metal Arc Welding are continued. Introduction to welder performance qualification practical skills development in welding groove welds. Preparatory to and including welder qualification testing experience.

Objectives
• Perform open root welds for examination and destructive testing.
• Inspect welds for quality and common defects.
• Demonstrate safe field work practices.
• Prepare and fit-up joints using basic and advanced techniques.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1450 Flux Cored Arc Welding Gas Shielded: AWS Certification Preparation **1 Credit / 30 Clock-Hours**

In this course, students will use the knowledge gained in previous courses to pass an AWS welder qualification. Instructors will guide students through the intricacies of the AWS D1.1 welder qualification requirements, emphasizing the practical application of welding principles.

Objectives:
• Analyze a Welding Procedure Specification by reading and interpreting its contents.
• Explain the visual acceptance requirements outlined in the AWS D1.1 code.
• Execute welds within the defined parameters stated in the welding procedure specification (WPS).
• Complete the necessary steps to successfully pass the FCAW-G AWS test according to the AWS D1.1 code.

TEWT 1620 Fabrication Tools **1 Credit / 30 Clock-Hours**

This course introduces students to common place power and hand tools used for fabrication on welding shops. It will give students the knowledge they need to use these tools and the confidence to operate this equipment.

Objectives:
• Demonstrate correct use of hand tools.
• Perform mechanical cutting operations to specified requirements.
• Perform grinding and finishing operations.
• Execute basic bending tasks to dimensional standards.
• Complete a final project to assess mastery of all competencies as components of a whole outcome.

Tooele

TEWT 1041 Blueprint Application for Welding **1 Credit / 30 Clock-Hours**

This course prepares students to interpret and apply welding symbols commonly used in the welding and fabrication industries. Emphasis is placed on understanding and using these symbols in real-world welding applications.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Recognize basic line types used in mechanical drawings.
• Interpret blueprint specifications to determine the correct materials, including metal type and width, for welding applications.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1336 Aluminum Gas Metal Arc Welding **1 Credit / 30 Clock-Hours**

This course teaches Aluminum Gas Metal Arc Welding. Students explore how to weld aluminum using the Gas Metal Arc Welding (GMAW) Process. Throughout this course, you will analyze aluminum alloys, elements, temper designations, filler metal selections, and preparation of base metals.

Objectives:
• Demonstrate safety and best practices when operating aluminum GMAW.
• Perform fillet welds 1F, 2F, and 3F positions.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1440 FCAW Self-Shielded Welding **2 Credits / 60 Clock-Hours**

This course teaches student competency in hands-on and practical application of the Flux Core Arc Welding (FCAW) self- shielded welding process. Students will learn the basic setup and operation of the FCAW self-shielded process. Using the FCAW self-shielded process, students will also be taught how to weld in the flat, horizontal, vertical, positions.

Objectives:
• Demonstrate safety and best practices when operating FCAW self-shielded welding.
• Demonstrate proper set-up and operation of the FCAW self-shielded equipment.
• Perform 1F, 2F, and 3F welds on ferrous metals.
• Perform 1G, and 2G welds on ferrous metals.

TEWT 1531 CNC Cutting and Operation **2 Credits / 60 Clock-Hours**

This course teaches the basic operations of CNC cutting systems. Students will learn CNC safety and basic operation of CNC cutting systems.

Objectives:
• Demonstrate safety and best practices when operating CNC cutting systems.
• Properly set-up and operate the CNC cutting system.
• Identify the X, Y, and Z axis.
• Perform basic cuts using the CNC cutting system.

TEWT 1560 Robotic Welding **2 Credits / 60 Clock-Hours**

This course teaches students competency in the hands-on and practical application of robotic cobot welding technology. Students will learn the basic setup and operation of a robotic welding arm, including safety protocols and best practices. Using the robotic welding arm, students will develop skills in setting up and performing various welds, calibrating gas flow rates, and adjusting movement speed. Additionally, students will gain experience in executing straight and circular welds.

Objectives:
• Demonstrate safety and best practices when operating a robotic welder arm.
• Properly set-up and operate the robotic cobot welder arm.
• Perform a variety of welds and positions using a cobot robotic welder arm.

TEWT 1631 Sheet Metal Fabrication and Welding **2 Credits / 60 Clock-Hours**

This course teaches student competency in hands-on and practical application for sheet metal fabrication. Students learn appropriate methods of cutting and forming basic sheet metal parts. Students will weld metal parts into an object following prefabricated designs.

Objectives:
• Demonstrate safety and best practices when working with sheet metal.
• Properly set-up and operate the manual sheer and hand tools for sheet metal cutting and shaping.
• Properly set-up and operate the Box and Pan Brake.
• Perform accurate cuts using the manual sheer and hand tools.
• Perform accurate bends using the Box and Pan Brake.
• Perform various welds on sheet metal.
• Follow and build prefabricated designs using sheet metal.

TEWT 1801 Welding Sculpture I **2 Credits / 60 Clock-Hours**

Welding Sculpture I provides the opportunity to work with instructors to design and build a welding sculpture. Throughout this course, you will use ferrous and Non-Ferrous metals. The sculpture you design must be an original, creative artwork. You may use all welding processes to create your sculpture. You will also document the creation of the sculpture in a notebook with pictures, receipts for materials, concept sketches and anything done in the creation of the sculpture.

Objectives:
• Use ferrous and non-ferrous metals to create a sculpture of artwork for SkillsUSA competition.
• Use various welding processes learned to create the sculpture.

TEWT 1811 Welding Sculpture II **2 Credits / 60 Clock-Hours**

Welding Sculpture II offers additional time for completing the welding sculpture started in the Welding Sculpture I course. You will need to continue documenting the creation of the sculpture in a notebook with pictures, receipts for materials, concept sketches, and anything done in the creation of the sculpture.

Objectives:
• Complete the welding sculpture.
• Create documentation of the project, complete with pictures, receipts, and sketches.

Uintah Basin

TEWT 1320 Gas Metal Arc Welding II/Flux Cored Arc Welding II **3 Credits / 90 Clock-Hours**

This advanced welding course is designed for students to develop and refine students' skills in Gas Metal Arc Welding (GMAW) and Flux Cored Arc Welding (FCAW). It emphasizes proficiency in the 3F (vertical fillet) and 4F (overhead fillet) positions and prepares students to perform weld tests in the 3G (vertical groove) and 4G (overhead groove) positions in accordance with the AWS D1.1 Structural Welding Code.
Students will gain hands-on experience in producing high-quality welds and learn to evaluate their work through destructive bend testing to ensure compliance with industry standards. This course emphasizes precision, adherence to professional welding codes, and the application of welding techniques for structural projects.

Objectives:
• Perform 3F and 4F welds with GMAW.
• Perform 3F and 4F with FCAW welds.
• Perform 3F and 3G welds with GMAW.
• Perform 4F and 4G welds with GMAW.
• Inspect and evaluate weld quality through destructive bend testing.

TEWT 1660 Fabrication **2 Credits / 60 Clock-Hours**

This course equips students with the foundational skills and knowledge needed for success in the welding and fabrication industry. Students will learn to accurately interpret blueprints, perform welding-related math, and demonstrate essential job-seeking skills tailored to the profession.
Through hands-on practice, students will gain proficiency in basic fabrication layout techniques and learn to create detailed blueprints for their projects. The course culminates in the design and construction of fabrication projects based on the blueprints developed by the students, emphasizing precision, creativity, and the practical application of learned skills.

Objectives:
• Read and interpret blueprints.
• Solve basic welding fabrication math problems.
• Create blueprints for a fabrication project.
• Demonstrate basic layout techniques to prepare materials for cutting, welding, and assembly.
• Follow plans and welding procedure specifications correctly.
• Identify and select appropriate materials for various welding and fabrication tasks based on the project requirements.
• Create a resume for an industry specific position.

USU-Eastern

TEWT 1020 Welding Symbols and Print Reading **2 Credits / 60 Clock-Hours**

This course teaches students to interpret prints and drawings including welding symbols used in the welding and fabrication industries. Engineering drawings are introduced as the medium by which the engineer, project manager, and/or draftsman communicates instructions to production welding personnel.

Objectives:
• Identify various American Welding Society (AWS) welding symbols.
• Identify basic line types used in mechanical drawings.
• Demonstrate basic sketching techniques and object representations.
• Create alternate views from existing views.
• Use drawing notes, specifications, title blocks, and bills of materials correctly.

TEWT 1075 Welding Inspection **3 Credits / 90 Clock-Hours**

This course introduces students to the requirements, skills, and fundamental knowledge required to become a welding inspector. Critical emphasis will be preparation for students to eventually take the Certified Welding Inspector (CWI) exam through the American Welding Society (AWS).

Objectives:
• Demonstrate a thorough understanding of the expectations, necessary professional qualifications, and responsibilities of a CWI.
• Identify basic welding-specific codes, specifications, standards, and their appropriate applications within the United States, including AWS D1.1, AWS A3.0, ASME Section IX, and API 1104.
• Develop an understanding of correct welding terminology, welding joint geometry, and welding symbols used in industry in accordance with AWS standards.
• Develop an understanding of common non-destructive evaluation (NDE) processes used by welding inspectors in industry, including Penetrant Testing (PT), Magnetic Particle Testing (MT), Radiographic Testing (RT), Ultrasonic Testing (UT), and Eddy Current Testing (ET).
• Develop an understanding of common destructive testing methods used by welding inspectors in industry, including bend testing, hardness testing, fillet-weld break testing, tensile testing, nick-break testing, and macro-etch testing.
• Identify common weld and base metal discontinuities, and develop an understanding of effective evaluation, prevention, and repair methods.
• Develop an understanding of common inspection tools and gages used by a welding inspector.
• Develop an understanding of the common welding qualification documents used by an inspector, including Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR), Welder Performance Qualification Records (WPQR), Mill Test Reports (MTR), and Standard Welding Procedure Specifications (SWPS).
• Perform one or more weld inspections utilizing visual inspection tools and determine acceptability in accordance with provided visual inspection acceptance criteria.
• Perform Penetrant Testing (PT).
• Perform Magnetic Particle Testing (MT).

TEWT 1080 Welding Metallurgy **3 Credits / 90 Clock-Hours**

This course introduces students to the study of ferrous metals, and how welding processes affect metal properties and microstructure. Topics of discussion will include steel manufacturing, grain structures, heat-treating processes, mechanical properties of metals, iron-carbon phase diagrams, and destructive testing.

Objectives:
• Develop an understanding of basic ferrous and nonferrous metallurgy.
• Develop an understanding of basic chemistry concepts as they pertain to metallurgy including atoms, molecules, compounds, elements, grains, crystals, solutions, and alloys.
• Identify the most commonly used hardness-testing methods for metallurgy, including: Brinell, Rockwell, Vickers, Knoop, and superficial.
• Perform Rockwell hardness testing on a variety of material microstructures.
• Develop an understanding of commonly used steel manufacturing processes.
• Develop an understanding of basic material properties concepts as they pertain to metallurgy including ductility, strength, hardness, malleability, toughness, and percent elongation.
• Identify how common alloying elements affect a material's microstructure and mechanical properties.
• Identify basic crystalline grain structures that exist in carbon steel including body-centered cubic (BCC), face-centered cubic (FCC), hexagonal close-packed (HCP), and body-centered tetragonal (BCT).
• Demonstrate the ability to interpret the iron-carbon phase diagram as well as the common phases and properties of phases that exist in carbon steel including ferrite, austenite, pearlite, cementite, martensite and their common combinations.
• Develop an understanding of metallurgical sample preparation for various destructive and non-destructive testing methods.
• Demonstrate an understanding of common heat-treatment processes including quenching, tempering, annealing, and normalizing.
• Identify common surface-hardening techniques including carburizing, nitriding, cold-working, and localized heating.
• Prepare a metallurgical sample for visual analysis utilizing a metallurgical sample polisher.
• Observe various material microstructures utilizing a microscope.

TEWT 1140 Shielded Metal Arc Welding (SMAW) Theory **2 Credits / 60 Clock-Hours**

This is a SMAW-specific welding theory course. Students will develop in-depth theoretical knowledge of the SMAW process including definitions, process advantages and limitations, electrode types and classifications, SMAW power sources, causes and solutions for SMAW discontinuities, and process troubleshooting.

Objectives:
• Define the Shielded Metal Arc Welding (SMAW) process in detail.
• Identify SMAW process fundamentals.
• Identify SMAW process advantages and limitations.
• Demonstrate an understanding of SMAW electrodes including appropriate uses, types of flux coatings, how electrodes function, slag formation, and electrode classifications in accordance with the most current AWS standards.
• Define SMAW principles of operation.
• Demonstrate an understanding of constant-current volt-amp response curves commonly used for SMAW.
• Define the various affects of current, arc length, electrode manipulation, work angle, and travel angle on a molten weld pool using SMAW.
• Demonstrate an understanding of SMAW's shielding sources.
• Demonstrate an understanding of polarity, duty-cycle, and open-circuit voltage as they pertain to SMAW.
• Identify common causes and solutions to arc blow.
• Demonstrate an understanding of surfacing welds and their applications including cladding, buildup, hard-facing, and buttering.

TEWT 1240 Gas Tungsten Arc Welding (GTAW) Theory **2 Credits / 60 Clock-Hours**

This is a GTAW-specific welding theory course. Students will develop in-depth theoretical knowledge of the GTAW process including definitions, process advantages and limitations, electrode types and classifications, GTAW power sources, causes and solutions for GTAW discontinuities, and process troubleshooting.

Objectives:
• Define the Gas Tungsten Arc Welding (GTAW) process in detail.
• Identify GTAW process fundamentals.
• Become familiar with the equipment and torch components necessary for GTAW including collets, collet bodies, gas lenses, nozzles, and electrodes.
• Demonstrate a thorough understanding of polarity, including: the ability to select the correct polarity based on welding application, advantages and limitations of each polarity type, and how polarity affects electrode current capacity.
• Identify GTAW process advantages and limitations.
• Demonstrate an understanding of GTAW electrodes including appropriate uses, tip geometries, sizing based on polarity and current, how tip geometry affects the weld pool, grinding techniques, and electrode classifications in accordance with the most current AWS standards.
• Demonstrate an understanding of constant-current volt-amp response curves commonly used for GTAW.
• Define the various affects of current, arc length, electrode manipulation, work angle, and travel angle on a molten weld pool using GTAW.
• Identify arc-initiation techniques.
• Demonstrate an understanding of GTAW shielding requirements including appropriate shielding gasses, appropriate flow rates, lamellar flow, and purging.
• Identify weld discontinuities common to GTAW, and develop strategies to minimize, eliminate, and/or repair them.

TEWT 1312 Gas Metal Arc Welding (GMAW) II **2 Credits / 60 Clock-Hours**

This course expands students' competency in the practical application of GMAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection as necessary for GMAW proficiency. The pulsed-spray (GMAW-P) metal transfer mode will be introduced.

Objectives:
• Describe the advantages and limitations of GMAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F, 3G, 4F, and 4G welds with GMAW-S.
• Perform fillets and groove joints with GMAW-P.

TEWT 1340 Gas Metal Arc Welding (GMAW) and Flux-Cored Arc Welding (FCAW) Theory **2 Credits / 60 Clock-Hours**

This is a GMAW and FCAW welding theory course. Students develop in-depth theoretical knowledge of the GMAW and FCAW processes including definitions, advantages, limitations, electrode classifications, power sources, causes and solutions for GMAW and FCAW discontinuities, and process troubleshooting.

Objectives:
• Define the Gas Metal Arc Welding (GMAW) process in detail.
• Define the Flux Cored Arc Welding (FCAW) process in detail.
• Identify GMAW and FCAW process fundamentals and principles of operation.
• Become familiar with the equipment and torch components necessary for GMAW and FCAW, including wire feeders, drive rolls, contact tips, gas diffusers, and nozzles.
• Demonstrate an understanding of GMAW and FCAW electrodes including appropriate uses, common sizes, manufacturing standards, and electrode classification in accordance with the most current AWS standards.
• Demonstrate an understanding of constant-voltage volt-amp response curves commonly used for GMAW and FCAW.
• Define the various effects of voltage, current, arc length, wire feed speed, electrode manipulation, work angle, and travel angle on a molten weld pool using GMAW and FCAW.
• Identify and explain metal transfer modes, including short-circuiting, globular, and axial spray.
• Become familiar with pulsed-waveform transfer modes and their appropriate uses.
• Identify and explain the FCAW-G and FCAW-S variations of FCAW.
• Demonstrate an understanding of GMAW shielding requirements, including appropriate shielding gasses, commonly used binary gas mixtures, appropriate flow rates, flowmeters, and regulators.
• Identify weld discontinuities common to GMAW and FCAW, and develop strategies to minimize, eliminate, and/or repair them.

TEWT 1412 Flux Cored Arc Welding (FCAW) II **2 Credits / 60 Clock-Hours**

This course expands student competency in hands-on uses and practical application of FCAW. Shielding gas composition, selection, and appropriate flow rates are discussed. Students learn appropriate parameter selection for welding procedure requirements as necessary for FCAW proficiency.

Objectives:
• Describe the advantages and limitations of FCAW.
• Select proper equipment and parameters given welding procedure requirements.
• Describe shielding gas flow rates, composition, and selection.
• Perform 3F and 3G welds with FCAW.
• Perform 4F and 4G welds with FCAW.

TEWT 1545 Advanced Pipe Welding **5 Credits / 150 Clock-Hours**

An advanced course for students who will pursue a career in petroleum pipeline welding. Pipe layout, fitting, and welding techniques will be taught extensively. Students will also learn proper use of pipeline-specific welding and cutting equipment, and industry-specific testing methods.

Objectives:
• Become familiar with the safety aspects associated with pipe welding and general fabrication shop safety issues. Each student must complete a written safety test, at 80% or above, before being allowed to work in the shop.
• Demonstrate competency in downhill pipe welding techniques using SMAW with a variety of electrode classifications and diameters.
• Perform full-penetration groove welds on pipe, with a minimum diameter of 20”, in the 5G position.
• Demonstrate pipe-welding competency using GTAW, GMAW, and FCAW.
• Demonstrate the ability to lay out, flame-cut, prepare, tack, and weld a pipe branch using pipe with a minimum diameter of 8”.
• Demonstrate a hands-on ability to properly layout, fit-up, and prepare open-root pipe joints for welding with various processes in the 1G, 2G, 5G, and 6G positions.
• Demonstrate the ability to use OFC pipe beveling equipment to prepare beveled pipe grooves on pipe with a minimum diameter of 12”.
• Be familiar with current industry trends and best practices in the specific field of pipe welding.
• Demonstrate an ability to pass industry-specific testing criteria for pipe welding employment.

TEWT 1550 Related Welding Processes **5 Credits / 150 Clock-Hours**

This course instructs students in advanced fusion joining and brazing. Submerged-arc welding, laser welding, resistance welding, metal forming, brazing, soldering, and CNC cutting will be studied and performed. Theory instruction on electron beam welding and explosion welding will be included.

Objectives:
• Demonstrate an understanding of welding shop safety. Students must pass the program-standard safety exam with a minimum 80% prior to participating in lab activities.
• Demonstrate an ability to perform submerged-arc welding (SAW). One v-groove weld with backing, using plate with a minimum thickness of 1”, and validated using bend testing (two side bends) is required.
• Demonstrate an ability to perform resistance spot welding (RSW).
• Demonstrate an ability to perform stud welding (SW).
• Demonstrate an ability to perform manual brazing and induction brazing.
• Demonstrate an ability to perform soldering.
• Demonstrate an ability to perform laser beam welding (LBW).
• Demonstrate an ability to perform CNC thermal cutting.
• Demonstrate an ability to perform forging.
• Identify the advantages and limitations of SAW, RSW, SW, brazing, soldering, LBW, CNC thermal cutting, and forging.
• Identify essential variables of SAW, RSW, SW, brazing, soldering, LBW, CNC thermal cutting, and forging.
• Describe appropriate industrial applications for SAW, RSW, SW, brazing, soldering, LBW, CNC thermal cutting, and forging.

TEWT 1650 Practical Fabrication and Layout **5 Credits / 150 Clock-Hours**

Students will propose and fabricate projects of their own design. Instructional emphasis will also include project planning, material procurement, and effective time management as it relates to fabrication. Students will gain experience utilizing a variety of fabrication tools and equipment.

Objectives:
• Demonstrate essential fabrication techniques including measuring, squaring, clamping, layout, and fixturing during the process of project completion.
• Demonstrate an ability to thoroughly brainstorm, plan, create sketches/prints, propose, and fabricate a welded project to completion.
• Demonstrate an ability to utilize arc welding and thermal cutting equipment during fabrication.
• Utilize a variety of common fabrication tools and equipment to complete fabricated projects including bandsaws, drill presses, angle grinders, bench grinders, ironworkers, press-brakes, and common fabrication hand tools.
• Demonstrate effective distortion control techniques during fabrication.
• Identify common structural shapes utilized in fabrication.
• Become familiar with common material identification methods including magnetism, spark testing, and others.
• Become familiar with appropriate practice for performing weld repairs on vehicles and vehicle frames.
• Create and/or revise a professional resume and cover-letter in accordance with welding industry recommended practices.

TEWT 1730 Professional Vocational Leadership **2 Credits / 60 Clock-Hours**

This course facilities student participation in SkillsUSA welding competitions. SkillsUSA goals and objectives will be discussed. Students will learn common strategies and skills necessary for successful participation in the SkillsUSA Welding, Welding Fabrication, and Welding Sculpture contests.

Objectives:
• Become familiar with the SkillsUSA vocational leadership program.
• Become a student member of SkillsUSA.
• Develop an understanding of the SkillsUSA philosophy beyond the scope of competitions.
• Develop an understanding of practical welding competition practices including print reading conformity, WPS conformity, scoring criteria, judging procedures, and project order of assembly.
• Identify competition best-practices utilizing contest scoring criteria as a guiding principle.
• Develop an understanding of how welding contests are organized, facilitated, and administered.
• Demonstrate the ability to use the skills learned in the class to participate in multiple mock-welding contests amongst the entire class.

TEWT 1815 Welding Sculpture **3 Credits / 90 Clock-Hours**

A project-based course designed to introduce students to artistic and sculptural welding. Oxy-fuel cutting and plasma cutting for sculptural welding applications will be taught, as well as forging. We will also explore art theory, including elements and principles of design.

Objectives:
• Demonstrate proficiency in oxy-fuel cutting and plasma-arc cutting.
• Develop a basic knowledge of forging.
• Demonstrate knowledge in principles and elements of design and implement them in your projects.
• Become familiar with the safety aspects associated with welding and general fabrication shop safety issues. Each student must complete a written safety test, at 80% or above, before being allowed to work in the shop.
• Demonstrate ability to use equipment setup, welding technique on steel, and bending, cutting, and shaping metal using a variety of methods in order to create artistic sculptures.
• Demonstrate competency in material preparation and finishing (grinding, sanding, oxidizing for aesthetic purposes, clear coating).
• Demonstrate an ability to design and sketch a project, create a written plan, and weld a sculptural project to fit the requirements of a rubric.
• Learn how to source materials for projects in a sustainable and cost-effective way.

TEWT 2140 Advanced Shielded Metal Arc Welding (SMAW) **5 Credits / 150 Clock-Hours**

This course instructs advanced techniques for full-penetration welds in open-root configurations and with backing. Instruction emphasizes preparing students for performance qualification. Lecture includes SMAW theory review, electrical concepts, and welding power sources including motor-generator, engine-generator, inverter, transformer-rectifier, and AC transformer.

Objectives:
• Demonstrate an understanding of welding shop safety. Students must pass the program-standard safety exam with a minimum 80% prior to participating in lab activities.
• Develop a thorough understanding of welding-specific electrical concepts including duty cycles, welding polarities, open-circuit voltage, alternating current versus direct current output, and constant current versus constant voltage volt-amp response curves.
• Identify the common welding power-source types including motor-generator, engine-generator, inverter, transformer-rectifier, and AC transformer. Describe the advantages, limitations, and common/appropriate uses for each.
• Describe and demonstrate an understanding of the electrode classification system specified by the most current AWS specification for low-alloy SMAW electrodes.
• Demonstrate the ability to prepare bend-test specimen in accordance with AWS qualification standards.
• Perform full-penetration groove welds on plate, with backing, using E7018 electrodes in the flat, horizontal, vertical, and overhead positions. A minimum of one plate in each position listed will be assigned and validated using bend-testing (two side-bends each).
• Perform full-penetration groove welds on plate, without backing (open-root), using E6010 and E7018 electrodes in the flat, horizontal, vertical, and overhead positions. A minimum of one plate in each position listed will be assigned and validated using bend-testing (two side-bends each).
• Demonstrate an ability to tack open-root pipe joints appropriately in accordance with industry standards to ensure full-penetration root passes on open-root pipe groove welds.
• Perform full-penetration groove welds on pipe in the open-root configuration in the 1G, 2G, 5G, and 6G positions. A minimum of one pipe coupon, with an outside diameter not less than 6”, in each position listed is required.
• Perform a performance qualification test in the 3G position utilizing an AWS Standard WPS (SWPS).
• Demonstrate an ability to use mechanized OFC equipment to perform straight cuts and bevels (utilizing a track torch), and orbital/circumferential cuts on pipe (pipe beveller).

TEWT 2240 Advanced Gas Tungsten Arc Welding (GTAW) — 5 Credits / 150 Clock-Hours

This course instructs students in advanced GTAW uses and applications such as welding titanium, copper, and GTAW brazing. Students perform welds using advanced power source features on inverter-type power sources. Students perform welds using rotary positioners, back-purges, and fixtures.

Objectives:
• Demonstrate an understanding of welding shop safety. Students must pass the program-standard safety exam with a minimum 80% prior to participating in lab activities.
• Demonstrate an ability to describe, assemble/disassemble, and troubleshoot GTAW torch components including collets, collet-bodies, gas lenses, and nozzles
• Demonstrate an ability to correctly size gas lenses and nozzles in accordance with shielding requirements based on welding application.
• Identify the advantages and limitations of gas-cooled and water-cooled GTAW torches
• Demonstrate an understanding of welding polarity and describe the proper applications for each polarity type as they apply to GTAW.
• Describe how polarity affects electrode selection and current capacity.
• Describe, in detail, the most current AWS standard for GTAW electrodes, their proper applications, appropriate tip configurations, and correct grinding techniques.
• Describe the proper selection of shielding gasses, correct shielding gas flow rates, and backing-shields, trailing-shields, and purging techniques.
• Describe the differences and appropriate uses of the most common arc-initiation techniques, including high-frequency, lift-arc, and pilot arc.
• Perform GTAW welds utilizing a pulsed waveform on an inverter-type power supply.
• Utilize GTAW to perform full-penetration groove welds, with backing and in open-root configurations, on steel, stainless steel, and aluminum.
• Utilize GTAW to perform welds on titanium.
• Utilize GTAW to perform welds on copper.
• Perform GTAW brazing using silicon-bronze filler metal.
• Perform full-penetration groove welds using fixtures and back-purges on stainless steel.
• Perform circumferential welds on pipe utilizing GTAW and a rotary positioner.
• Perform full-penetration groove welds on stainless pipe or tubing with a minimum diameter of 1.5”.
• Interpret and demonstrate an ability to correctly utilize an AWS Standard WPS (SWPS).
• Perform a performance qualification test in the 3G position utilizing an AWS Standard WPS (SWPS).

TEWT 2340 Advanced Gas Metal Arc Welding (GMAW) and Flux-Cored Arc Welding (FCAW) **5 Credits / 150 Clock-Hours**

This course will instruct students on advanced techniques for full-penetration welds in open-root configurations and with backing. Instruction emphasizes preparing students for performance qualification. The lecture includes a theory review, the weldability of commonly welded metals, and cost-effective welding principles.

Objectives:
• Demonstrate an understanding of welding shop safety. Students must pass the program-standard safety exam with a minimum 80% prior to participating in lab activities
• Develop an understanding of the factors that affect welding costs, including: weldability, joint geometries, welding process, electrode and operator efficiencies, and welding procedure-mandated requirements such as post-weld heat treatments (PWHT).
• Calculate costs of weldments using real world examples.
• Develop an understanding of how automated and mechanized welding applications reduce weld costs.
• Identify common industry practices that increase overall welding costs and develop strategies to mitigate or eliminate those factors.
• Perform full-penetration groove welds on plate, with backing, in the 1G, 2G, 3G, and 4G positions using both GMAW -P and FCAW-G. A variety of at least four plates, with a minimum plate thickness of 3/8”, of the configurations listed will be assigned and validated using bend-testing (two side-bends each).
• Perform full-penetration groove welds on plate, without backing (open-root configuration), in the 1G, 2G, 3G, and 4G positions using GMAW-S for the root pass and GMAW-P or FCAW-G for the fill and cap passes. A minimum one plate in each position listed will, with a minimum plate thickness of 3/8”, will be assigned and validated using bend-testing (two side-bends each).
• Perform a full-penetration v-groove with backing using FCAW-G on material not less than 1” and validate acceptability using visual inspection and bend-testing (two side-bends required).
• Perform a full-penetration v-groove with backing using GMAW-P on material not less than 1” and validate acceptability using visual inspection bend-testing (two side-bends required).
• Demonstrate an ability to tack open-root pipe joints appropriately in accordance with industry standards to ensure full-penetration root passes on open-root pipe groove welds.
• Demonstrate the ability to prepare bend-test specimen in accordance with AWS standards.
• Perform full-penetration groove welds on pipe in the open root-configuration in the 1G, 2G, 5G, and 6G positions. At least one pipe, with an outside diameter not less than 6”, in each position listed is required.
• Perform a performance qualification test in the 3G position utilizing an AWS Standard WPS (SWPS).
• Perform GMAW welds on aluminum base material in the 1F/G and 2F/G positions.
• Perform mechanized or automated GMAW welding.