

You are about to view a presentation on Welding Technology, a one year Tech Prep class available to high school 11th and 12th grade students. By successfully completing the class you can earn elective credits toward high school graduation. If certain circumstances are fulfilled, you can also earn WSCC or FSU college credits.

To view the slides, wait for the entire file to load (watch the progress in the lower left side of the window), then use your arrow keys to move ahead or back up.

If you wish to get a closer look at this class, contact your school counselor to set up a shadowing visit.

In Welding Technology, as in all Tech Prep classes, both girls and boys are welcome.

Is This You?

The following is a description of the aptitudes, abilities, skills and personal characteristics that match the profile of a person ideally suited for a career in the welding technology career field.

The purpose of this description is to assist you with the important task of finding a match between your qualities and the qualities required of a person working in this field.

By no means are the following to be viewed as finely honed skills the student must possess as a prerequisite for selecting this course. Rather, they are abilities/qualities that you recognize in yourself or that you believe can be further matured by your participation in this class.

Aptitudes/Abilities/Skills

Good math ability – is needed for accurate measuring in linear and angular units – a basic knowledge of geometry is helpful

Good spatial relations – the ability to visualize an object in one's mind's eye – can mentally rotate this visualized object, knowing what it looks like on all sides – can visualize what a two-dimensional drawing (blueprints/plans) will look like in three dimensions and vice versa

Good mechanical ability

Good communication skills – is able to understand and follow written and verbal instructions – can verbally communicate well with the supervisor, fellow workers, contractors, architects, suppliers, subcontractors, etc.

Personal Characteristics

Likes to work with hands, hand tools, and machinery – possesses eye-hand coordination

Is a patient worker – welding is not done well in haste – the emphasis is on quality work

Demonstrates analytical skills and is detail oriented in assessing work specifications and welding – can work within precise limits or standards of accuracy

Likes to be able to see the physical results of his/her labor – it is important to see the work develop from the idea stage to the completed product

Doesn't mind getting dirty

Possesses the willingness to function as member of a team of workers

Successfully completing one or two years of Welding Technology opens a number of doors for the student. Welding know how is a great asset to a person who wants to work in the machine trades, automotive repair, or heavy equipment repair fields. A good student would also be qualified for an entry level welding position in area industries. A two-year student could articulate as many as 10 credits while a 1-year student could articulate as many as 6 credits to WSCC's associate degree program in welding.

Welding Technology





Jessica, a student from Bear Lake High School, is practicing free hand oxyfuel cutting.

Wire Feed Welding



In industry, arc welding with wire feed welders is largely replacing oxyfuel welding. Therefore, students in Tech Prep will get plenty of practice with this newer technology.

The student is doing TIG arc welding on an aluminum sled which will be used by EMT personnel to remove injured people from hard to get to locations – places accessible only by ATVs. TIG stands for Tungsten Inert Gas. With this method of welding, electricity flows from a sharp tungsten tip to the aluminum being welded, in a shroud of pure argon gas, which prevents air (with its impurities) from contaminating the weld. An aluminum welding rod supplies additional metal that melts and flows together with the molten aluminum at the point where the heat is applied.



This is what the tip looks like. The argon gas flows around it, shielding the weld until it is solid.

Students also learn how to do MIG arc welding. This is done with wire a feed welder where the heat that melts the metal is supplied by electricity flowing down the wire, again shrouded by argon gas. The wire, as it makes contact, becomes part of the weld. Both TIG and MIG arc welding can be done on aluminum or stainless steel. MIG welding on aluminum requires an aluminum wire while MIG welding on stainless steel requires a stainless wire.



CNC Flame/Plasma Cutter

The Computer

Numerical Controlled flame/plasma cutter enables students to cut complex designs out of sheet steel. Students in the CAD class design the figure to be cut and write the program for the computer that guides the flame/plasma cutter.



These are three of the many figures designed in CAD and cut out on the CNC Flame/Plasma Cutter in the welding lab. Kokopelli is of stainless steel while the other two are of mild steel.



Hydraulic Press



Motorcycle Stand



Engine Stand



These are some of the projects students built for the annual Michigan Industrial Technology Education Society competition. With the exception of the stainless Tyrannosaurus Rex, the students took their projects home with them at year's end.

Some students take Welding Technology class because they intend to earn their living as welders. Others take the class because they want to learn the skills for their own personal use. Then there are others whose career goals center around automotive technology, heavy equipment repair, diesel maintenance, industrial repair, etc., and realize that welding skills would be important additional skills to have.

Whatever your reasons, if you're serious about learning how to weld, you can accomplish that in our Tech Prep class. If you want to be here and want to work hard to improve yourself, we'd love to have you. Again, as stated in slide #1, for more information, contact your school counselor.

Technical Preparation Partnership

Course Syllabus

Course Title: Welding Technology

Instructor: Dan Nelson

Classroom Number: 243/245

Office Phone: (231) 845-6211 ext. 3236

Office Number: 245D

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Recommended Classes: Basic Math, Metal Shop, Physical Science, and English

**Textbook/Supplemental Readings: Welding Principles and Application 4th Edition
Hobart Institute of Welding Technology
Oxyacetylene Welding, Cutting and Brazing Training Workbook**

Course Description: The Welding Technology program is made up of lecture and laboratory instruction in basic oxyacetylene and arc welding. Even though lecture is part of instruction, greater emphasis is placed on “hands-on” laboratory experiences in welding. Instruction includes basic safety, principles, and introduction to flat and vertical positions with mild steel and low hydrogen electrodes is studied and practiced in the laboratory. In addition, operation and application of arc welding, oxyacetylene welding, and brazing and cutting will be experienced. Students must pass a welding metal break test for all laboratory projects. Students who wish to take a second year of Welding Technology must have the instructor’s approval.

Program CIP Code: 48.0508

PSN: 15385

Job Titles Requiring Further Training:

Entry Level Positions with H.S. (Vocational) Training:

Laser Technician

Welder

Mechanical Engineering

Welding Machine Operator

Metallurgical Technician

Robotics Technician

Manufacturing Engineer

Robotics Engineer

Course Objective	Student Outcome	Time	Industrial Strategies	Evaluations	Standards/ Benchmarks	National Skill Standards
Oxyacetylene Welding	Students will learn and demonstrate basic safety principles, operation, and application of oxyacetylene welding, safety and health of welder in Oxyfuel cutting and welding objectives.	3 weeks	Technical lecture and hands-on lab activities	Written test and actual demonstration	ELA-S1-HS-1 +2	AWS
Oxyfuel gases and filler metals	Students will demonstrate an understanding of chemical reactions that take place in any oxyfuel flame and the advantages and disadvantages of different fuel gases. They will demonstrate ability to choose correct filler metals and explain what conditions affect the selection of filler metals.	6 weeks	Explain, demonstrate and describe metals and gases through lecture and hands-on lab activities	Written test and lab assignments	SCI-IV-HS-S2 ELA-S1-HS-1	AWS
Soldering, brazing, and braze welding	Students will demonstrate an understanding of the advantages and disadvantages of liquid phase bonding. They will be able to properly clean, assemble, and perform required practice joints. They will understand the functions of fluxes in making proper liquid-solid phase bonded joints.	3 weeks	Define terms, explain, demonstrate, and describe procedures and properties	Written test and lab demonstrations	ELA-S1-HS-1 SCI-IV-HS-1-2 SCI-IV-S2-HS-7	AWS

Flame cutting	Students will learn how the flame-cutting process works, how to properly set-up and use an oxyfuel gas cutting torch and make a variety of cuts.	1 weeks	Demonstration and lecture	Written test and lab demonstration projects	ELA-S1-HS-1	AWS
Remediation	Student will have the opportunity to retake any/all lab projects for grade improvement.	1 week			ELA-S1-HS-1 SCI-IV-HS-S-4-6	
Shielded metal arc welding basic	Students will learn the difference in welding with each of the 3 type of current and identify welding machines according to their type. Student will demonstrate an understanding of how to select and set the welding current. They will also learn how to safely set-up an arc welding station.	4 weeks	Explain, identify and demonstrate hands-on	Written test and lab demonstration	ELA-HS-1 SCI-IV-HS-1-4-5-6	AWS
Shielded metal arc welding of plate	Students will learn how to set the welding amperage correctly. They will understand the effect of changing the arc length on a weld. Students will gain knowledge of how to control the weld bead contour during welding by using the proper weave pattern, how to control undercut, overlap, porosity and slag inclusions, and, they will learn the effect of electrode angle on a weld.	8 weeks	Demonstration and hands-on	Written test and lab demonstration	ELA-S1-HS-1	AWS

Advanced shielded metal arc welding	Students will gain the knowledge to make multiple pass welds in all positions, how to make an open and closed root weld, and to identify the types and parts of groove welds. They will also understand how to use a hot pass to clean a weld.	4 weeks	Demonstration and lecture	Bend Test Destructive Test		AWS
Prepare & take articulation test Oxyfuel welding	Students will be prepared to take the test for articulation.	1 week	Review			
Prepare & take articulation test Basic arc welding	Student will be prepared to take the test for articulation.	1 week	Review			
Plasma arc cutting torch	Students will be introduced to the safe operation of the plasma arc cutting torch.	1 week	Demonstration	6" Clean cut straight	SCI-IV-S2-HS-7	
CNC cutting table	Students will be given a brief overview of computerized cutting.	1 week	Hands-on project with pen & paper using computer and hands-on project using plasma arc	1 design picked by student	SCI-IV-S4-HS-5	
Shop clean	Students will assist in cleaning and equipment repair. They will upgrade projects and hand in equipment.	1 week				

Dan Nelson
Tech Prep Welding Instructor