Welding Technology
2019-2020
By: Brian Jorgensen

Unit: *Welding Safety*	**Time:** *August*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.
- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Read Chapter 2 Welding Safety Practices in Essentials of Welding and answer the review questions at the end of the Chapter. • Students will complete OSHA 10 Hour online welding safety course of study (Actual OSHA Certification will cost $35 per student) • Expectations of work ethics will be clearly stated along with rewards and penalties.

		• Review the procedure to be followed if an accident occurs complete with instructions for filling out reporting forms. • Students will start working on a class journal that will be updated throughout the semester. The Journal will include the following Items; - Date - Students name - Work performed - Vocabulary and definitions - Time on task - Attendance and punctuality and reasons for late starts or missed days. - Tools used on a daily basis - Comments on skills mastery - Recommendations of improvement for subsequent classes.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• OSHA • Toxic Fumes • Ventilation • Burn Degrees • Fire extinguisher types • Explosive hazards • PPE • Acetylene	• Daily journal checks. • Osha safety module • Answers to review questions in welding text.

	• Argon • Pressure Regulator • Flashback • Explosive Combustion	
Relevance: Welding can be an inherently risky occupation. It is vitally important that these students be impressed upon with the need for sound safety rules and practices. The OSHA safety certification will also give these students a competitive edge in the job market over those students that do not have it.	***Examples:*** • Burn photos • Video of industrial accidents	**Materials Needed:** • OSHA Website • Internet • Miscellaneous office and classroom supplies. • Text book Essentials of Welding • Accident reporting forms
Reflection: It will save time with this unit of instruction if half of the ten-hour session is done as homework and half in class. While this may be the most important unit of the whole class it is also the hardest to keep the student interest in.	**Essential Questions:** • How dangerous is welding? • What makes up my personal protective equipment (PPE)? • What should I do If I have an accident in the shop?	

Unit: *The Science and the Language of Welding.*	**Time:** *August - September*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 2.1 Demonstrate mathematical skills related to work assignments.
WT 2.2 Read and demonstrate understanding of welding terms and definitions from the American Welding Standards Institute (AWSI) and the American Welding Society (AWS) publication A3.0 Standard Welding Terms and Definitions.
WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.
- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Read Chapter 1 Introduction to Welding in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 3 Metals and Their Properties in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 4 Distortion and Stress in Welding in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 6 The Inspection and Testing

		of Welds in Essentials of Welding and answer the review questions at the end of the Chapter.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• To be added to the journal as individual words and terms are introduced • The Goal is to add at least 5 terms per day into journal glossary	• Daily journal checks. • Osha safety module • Answers to review questions in welding text for Chapters 1, 3, 4, and 6
Relevance: Welding is a well regulated industry with its own language it is important for job performance that people involved in this industry have a working understanding of that language.	***Examples:*** • Weldment • Root • Base • Axis • Distortion • Porosity • Inclusion • Stress	**Materials Needed:** • AWS PDF: AWS 3.0/ AWS 3.0:2010 • Internet • Miscellaneous office and classroom supplies. • Text book Essentials of Welding

Reflection:	**Essential Questions:**
It is very easy to get caught up in the vocabulary and the metallurgy of welding but if this happens I guarantee that I will lose the classes interest for the rest of the semester. Give them a start of a working vocabulary and help them to develop it by not using any terms other than those accepted for use by the industry. If students are unfamiliar with a new term encourage them to add it to their glossary.	• How much science do I need to understand to be a good welder? • What does that mean? • Can I use that in a sentence? • How can I best describe what I am seeing with my work?

Unit: *Welds, Symbols and Blueprints*	**Time:** *September*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 2.1 Demonstrate mathematical skills related to work assignments.
WT 2.2 Read and demonstrate understanding of welding terms and definitions from the American Welding Standards Institute (AWSI) and the American Welding Society (AWS) publication A3.0 Standard Welding Terms and Definitions.
WT 3.1 Read and sketch drawings.
WT 3.2 Identify basic weld symbols.
WT 3.3 Identify lines and joints.
WT Perform Cuts using Oxy-fuel and plasma cutting processes.
WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.
- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Read Chapter 8, The Nature of Shop Drawings, in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 9, The Use and Application of Welding Symbols, in Essentials of Welding and answer the review questions at the end of the Chapter. • Given Two Welding Assignments students will complete drawings for the assignments complete with symbols and terminology.

		• Add Information to Journals as it is presented and assimilated into the lessons.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• To be added to the journal as individual words and terms are introduced • The Goal is to add at least 5 terms per day into journal glossary	• Daily journal checks. • Answers to review questions in welding text for Chapters 8 and 9 • Completed Drawings • Quiz
Relevance: These lessons will further develop the students understanding of the language used by the industry.	***Examples:*** Any examples that the students identify should be included in the student's glossary.	**Materials Needed:** • AWS PDF: AWS 3.0/ AWS 3.0:2010 • Internet • Miscellaneous office and classroom supplies. • Text book Essentials of Welding

Reflection:	**Essential Questions:**
It is very easy to get caught up in the vocabulary and the metallurgy of welding but if this happens I guarantee that I will lose the classes interest for the rest of the semester. Give them a start of a working vocabulary and help them to develop it by not using any terms other than those accepted for use by the industry. If students are unfamiliar with a new term encourage them to add it to their glossary.	• How do I best convey this information to the rest of my coworkers? • Does my drawing include all of the information that they need to? • Am I including information that is of no use to the user of my drawing? • Does my work conform to standards?

Unit: *Welds, Symbols and Blueprints*	**Time:** *September*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 2.1 Demonstrate mathematical skills related to work assignments.
WT 2.2 Read and demonstrate understanding of welding terms and definitions from the American Welding Standards Institute (AWSI) and the American Welding Society (AWS) publication A3.0 Standard Welding Terms and Definitions.
WT 3.1 Read and sketch drawings.
WT 3.2 Identify basic weld symbols.
WT 3.3 Identify lines and joints.
WT 4.1 Identify and explain the use of ox fuel and plasma cutting equipment.
WT 4.2 Prepare layouts for cutting individual parts.
WT Perform Cuts using Oxy-fuel and plasma cutting processes.
WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.
- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Read Chapter 8, The Nature of Shop Drawings, in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 9, The Use and Application of Welding Symbols, in Essentials of Welding and answer the review questions at the end of the Chapter. • Given Two Welding Assignments students will complete drawings for the assignments complete with symbols and terminology.

		• Add Information to Journals as it is presented and assimilated into the lessons.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• To be added to the journal as individual words and terms are introduced • The Goal is to add at least 5 terms per day into journal glossary	• Daily journal checks. • Answers to review questions in welding text for Chapters 8 and 9 • Completed Drawings • Quiz
Relevance: These lessons will further develop the students understanding of the language used by the industry.	***Examples:*** Any examples that the students identify should be included in the student's glossary.	**Materials Needed:** • AWS PDF: AWS 3.0/ AWS 3.0:2010 • Internet • Miscellaneous office and classroom supplies. • Text book Essentials of Welding

Reflection:	**Essential Questions:**
It is very easy to get caught up in the vocabulary and the metallurgy of welding but if this happens I guarantee that I will lose the classes interest for the rest of the semester. Give them a start of a working vocabulary and help them to develop it by not using any terms other than those accepted for use by the industry. If students are unfamiliar with a new term encourage them to add it to their glossary.	• How do I best convey this information to the rest of my coworkers? • Does my drawing include all of the information that they need to? • Am I including information that is of no use to the user of my drawing? • Does my work conform to standards?

Unit: *Using the Oxy-fuel Torch*	**Time:** *September- October*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 2.1 Demonstrate mathematical skills related to work assignments.
WT 2.2 Read and demonstrate understanding of welding terms and definitions from the American Welding Standards Institute (AWSI) and the American Welding Society (AWS) publication A3.0 Standard Welding Terms and Definitions.
WT 3.1 Read and sketch drawings.
WT 3.2 Identify basic weld symbols.
WT 3.3 Identify lines and joints.
WT 4.1 Identify and explain the use of ox fuel and plasma cutting equipment.
WT 4.2 Prepare layouts for cutting individual parts.
WT Perform Cuts using Oxy-fuel and plasma cutting processes.
WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.
- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Read Chapter 10, Oxy-fuel Gas Welding Equipment, in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 11, Oxy-fuel Gas Welding Practice, in Essentials of Welding and answer the review questions at the end of the Chapter. • Read Chapter 12, Oxy-fuel Gas Cutting of Metals, in Essentials of Welding and answer the review questions at the end of the Chapter.

		• Demonstrate how to use the ventilation equipment in the school shop. • Demonstrate an understanding of and the use of Oxy-fuel cutting and heating equipment located in the school shop by performing the following tasks: - Straight cuts on 1/8” plate - Plunge cut on 1/8” plate - Cut straight edge on 1/8” plate - Straight cuts on ¼” plate - Plunge cut on ¼” plate - Cut straight edge on ¼” plate - Straight cuts on 3/8” plate - Plunge cut on 3/8” plate - Cut straight edge on 2/8” plate • Perform the above tasks in accordance with safety guidelines. • Add Information to Journals as it is presented and assimilated into the lessons.

Prior Knowledge Needed	Vocabulary	Assessments
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• To be added to the journal as individual words and terms are introduced • The Goal is to add at least 5 terms per day into journal glossary	• Daily journal checks. • Answers to review questions in welding text for Chapters 10, 11, and 12 • Ventilation demonstration. • Check the assigned cuts to make sure they meet industry standards. • Observe students so that they are following OSHA Safety Guidelines. • Quiz
Relevance: This is the first time that students will use equipment that is used by the welding industry.	***Examples:*** Any examples that the students identify should be included in the student's glossary.	**Materials Needed:** • Oxy-fuel torch and tanks • PPE • Internet • Miscellaneous office and classroom supplies. • Text book Essentials of Welding
Reflection: This unit starts the transition from the classroom to the shop environment. Make sure that the safety training that they have had to this point if foremost in their minds.	**Essential Questions:** • Am I going to be a safety hazard to myself or my coworkers? • Do I know beyond a doubt how to use this equipment? • Where are all of my sparks going? • Have I checked my surroundings for fire hazards?	

Unit: *Weld Preparation*	**Time:** *October*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 2.1 Demonstrate mathematical skills related to work assignments.
WT 2.2 Read and demonstrate understanding of welding terms and definitions from the American Welding Standards Institute (AWSI) and the American Welding Society (AWS) publication A3.0 Standard Welding Terms and Definitions.
WT 5.1 Prepare Base metal for various welding practices.
WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.
- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Demonstrate how to use a grinder in a manner that is both safe for me as well as those working around me. • Clean metal for oxidation, oils, and other contaminants so that it is ready to weld. • Demonstrate an understanding of when metal should be gapped, beveled, backed, or overlapped • Perform the above tasks in accordance with safety guidelines.

		• Add Information to Journals as it is presented and assimilated into the lessons.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• To be added to the journal as individual words and terms are introduced • The Goal is to add at least 5 terms per day into journal glossary	• Check metal to insure it is ready to start. • Observe students so that they are following OSHA Safety Guidelines.
Relevance: This is the first time that students will use equipment that is used by the welding industry.	***Examples:*** Any examples that the students identify should be included in the student's glossary.	**Materials Needed:** • Scrap metal • Shop tools • Grinders • PPE • Welding equipment

Reflection:	**Essential Questions:**
This lesson will introduce grinding as a preparation tool the sparks that these grinders generate can travel up to 15'. It is important to impress upon the students that these sparks are in reality very hot pieces of iron flying through the air at high speeds, and that they are responsible if their spark streams injure themselves or someone else.	• Am I going to be a safety hazard to myself or my coworkers? • Do I know beyond a doubt how to use this equipment? • Where are all of my sparks going? • Have I checked my surroundings for fire hazards?

Unit: *Finally I get to WELD (SMAW)*	**Time:** *November - December*

Standards Taught

WT 1.1 Identify and demonstrate proper industry safety standards.
WT 2.1 Demonstrate mathematical skills related to work assignments.
WT 2.2 Read and demonstrate understanding of welding terms and definitions from the American Welding Standards Institute (AWSI) and the American Welding Society (AWS) publication A3.0 Standard Welding Terms and Definitions.
WT 3.1 Read and sketch drawings.
WT 3.2 Identify basic weld symbols.
WT 3.3 Identify lines and joints.
WT 4.1 Identify and explain the use of ox fuel and plasma cutting equipment.
WT 4.2 Prepare layouts for cutting individual parts.
WT 5.1 Prepare base metal for various welding processes.
WT 6.1 Identify and Understand SMAW equipment and setup.
WT 6.2 Define and understand the application of different Shielded Metal Arc (SMAW) electrodes.
WT 6.3 Demonstrate knowledge of Shielded Metal Arc Welding (SMAW) Process.
WT 7.1 Demonstrate knowledge of weld quality.

Because of Equipment Limitations
The Following Advanced Welding Standards are Taught Concurrently

AWT 4.1 Identify and understand GMAW equipment and setup.
AWT 4.2 Demonstrate Gas Metal Arc Welding (GMAW) on steel.

WT 9.1 Students will follow the following ethical practices of the manufacturing industry:

- Complete assignments efficiently and on time.
- Be aware of the importance of attendance.
- Utilize principles of time management.

- Present a positive attitude.
- Work well with peers/supervisor.
- Be prepared for work assignments.

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Each student will be given ample time to master the skill of striking and maintaining an arc. • Identify what information that the numbers on electrodes mean and perform welds with at least four different electrodes to learn their weld characteristics. • Read Chapters 15, Shielded Metal Arc Welding Process and Equipment, in Essentials of Welding and answer the questions at the end of the chapter.

		• Read Chapters 16, Shielded Metal Arc Welding Electrodes, in Essentials of Welding and answer the questions at the end of the chapter. • Read Chapters 19, Gas Metal Arc Welding Process and Equipment in Essentials of Welding and answer the questions at the end of the chapter. • Read Chapters 20, Gas Metal Arc Welding Gasses and Electrodes, in Essentials of Welding and answer the questions at the end of the chapter. • Students will create a bad weld example pad that demonstrates the following - Perfect weld - To fast - To slow - To high - To low - To much current - To little current - To much voltage - To little voltage • Students will be required to perform the following welds in the F1, F3, and F4 positions utilizing both the SMAW and GMAW processes: - 3-layer pad - Butt weld - Filet weld

		- T weld • Students will prepare metal, weld and cut coupons for destructive bend testing created in the F1 position using ¼" Plate as per industry standards. • Students will manufacture the product that is identified for sale by the Entrepreneurship class at the Corsica High School. • Students will update their journals on a daily basis.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.	• To be added to the journal as individual words and terms are introduced • The Goal is to add at least 5 terms per day into journal glossary	• Daily journal checks. • Answers to review questions in welding text for Chapters in the Welding Text • Completed welds • Observe students so that they are following OSHA Safety Guidelines. • Finished project
Relevance: This lesson is designed to show the need for workers in this career path.	***Examples:*** Any examples that the students identify should be included in the student's glossary.	**Materials Needed:** • Computers • Internet • Glossary

Reflection:	**Essential Questions:**
By assigning this as the final test for this class students end the semester thinking about potential careers.	• Do I know what career I want to enter into? • Have I done a good job of preparing myself for what comes next?

Unit: *Welding Careers*	**Time:** *Final Test*
Standards Taught	
WT 8.1 Research career opportunities in the manufacturing/welding fields.	

Differentiation/Assessment:	**Classroom Management and Environment:**	**What will the students be doing?**
Students who needed the extra help received guided notes, extra individual practice, and shortened tests.	*The classroom is set up in a "regular class room" like setting. The desks are in rows with space between students so concentration can be maintained. Overall the environment is structured and has rules and procedures in place. The shop is set up similar to a small welding shop with tools and equipment similar to what they will use when employed in the industry. The environment and presentation of the class is designed to mimic the work environment of industry related businesses.*	• Students will perform the following tasks as their final test for this class. - Present two samples of welds that they have made for feedback from someone employed in the welding industry. - Find five job openings in the welding manufacturing field within a 50-mile circumference of Corsica. • Research one welding career choice and

		prepare a report that reveals the following - Salary - Health concerns - Job outlook - Education requirements - Average age of workers - Advancement opportunities.
Prior Knowledge Needed	**Vocabulary**	**Assessments**
There are no prerequisites for students to participate in this class, second semester freshman shop class is recommended so that they will have been exposed to general shop safety practices and rules.		• Completed Assignments
Relevance: Welding can be an inherently risky occupation. It is vitally important that these students be impressed upon with the need for sound safety rules and practices. The OSHA safety certification will also give these students a competitive edge in the job market over those students that do not have it.	***Examples:*** • Burn photos • Video of industrial accidents	**Materials Needed:** • OSHA Website • Internet • Miscellaneous office and classroom supplies. • Text book Essentials of Welding • Accident reporting forms

Reflection:	**Essential Questions:**
It will save time with this unit of instruction if half of the ten-hour session is done as homework and half in class. While this may be the most important unit of the whole class it is also the hardest to keep the student interest in.	• How dangerous is welding? • What makes up my personal protective equipment (PPE)? • What should I do If I have an accident in the shop?