

WARREN COUNTY SCHOOL DISTRICT

Planned Instruction

Course Title: Welding Technology

Course Number: 00910(AM) - 00960 (PM)

Suggested Educational Level(s): 10-12

Suggested Periods Per Week: 15 **Length of Period:** 42 minutes

Suggested Length Of Course: 3 years

Units Of Credit (If Appropriate): 3 per year

Date Written: February 15, 2005 **Date Approved:** May 9, 2005

Date Reviewed: Spring 2005 **Implementation Year:** 2005-2006

Teacher Certification Required: Vocational – Welding Technology

Standards Addressed:

Career, Education and Work – 13.1.11A, C, D, 13.2.11A, B, G

Science and Technology – 3.04.10B, 3.04.12B, 3.07.10A

Math – 2.01.08A, 2.02.08B, 2.03.08C, 2.03.11C, 2.04.11E

Reading – 1.2.11

American Welding Society (AWS) Standards

Relationship to Other Planned Instruction:

Prerequisites: Students must be in at least the tenth grade level.

Special Requirements: Students entering the Welding Technology Program must be able to follow all safety instruction and have good eye/hand coordination. Basic mathematic skills will be needed in everyday shop activities. Students are expected to have a very good work ethic.

Writing Team Members: Nate McNett, Welding Technology Instructor, Welding Technology Advisory Team, Mark Lindberg, Teacher Coach.

Standards addressed:

13.1.11A – Analyze career options based on student interest, abilities, aptitudes, and accomplishments.

13.1.11C – Evaluate opportunities for career preparation.

13.2.11B – Analyze and evaluate complex technical tasks using sophisticated processes.

13.2.11G – Analyze the need for manipulative/motor skills.

13.1.11A – Analyze work habits needed to advance within a career.

3.04.10B – Analyze energy sources and transfers of heat.

3.04.12B – Apply and analyze energy sources and conversions and their relationships to heat and temperature.

3.07.10A – Identify and safely use a variety of tools, basic machines, materials, and techniques to solve problems and answer questions.

2.03.08C – Measure angles in degrees and determine relations of angles.

2.03.11A – Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations.

2.04.11E – Demonstrate mathematical solutions to problems.

2.01.08A – Represent and use numbers in equivalent forms.

2.02.08B – Add, subtract, multiply, and divide different kinds of forms of rational numbers.

COURSE DESCRIPTION:

Outline of Content Sequence and Recommended Time:

Students in the Welding Technology Program will learn oxy-acetylene welding, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, flux cored arc welding, and pipe welding. All instruction and student learning activities are aligned with the American Welding Society (AWS) and the American Standard of Testing Material Specifications (ASTM). Following AWS standards, students perform guided bend following the process tests in all positions. These tests expect procedures commonly used in local and national industries. Students learn all the theories related to the above-mentioned welding processes, as well as an introduction to blueprint reading.

Welding Technology is a competency-based program in which students extend their welding process skills and performance each successive year. When students have successfully completed the program, they are able to perform all essential skills associated with the welding processes. Safety is stressed in all welding processes.

Professional attitudes will be developed through the VICA Club and class activities.

Outline of Content Sequence and Recommended Time:

Over the three years of this course, individual instruction and student activity are on-going and developmental in the welding processes given below:

- I. Oxy-acetylene Welding (minimum student time: 9-10 weeks over 3 years)
 - A. Safety
 - B. Setting up equipment and stringer beads
 - C. Welding lap joints
 - D. Welding T-joints
 - E. Welding butt joints
 - F. Welding corner joints
 - G. Brazing lap-joints
 - H. Exit project: trophy
 - I. Use of cutting torch
- II. Shielded Metal Arc Welding (minimum student time: 30 weeks over 3 years)
 - A. Safety
 - B. Setting up equipment
 - C. Creating and welding a pad
 - D. Welding T-joints
 - E. Welding lap-joints
 - F. Welding butt joints
 - G. Welding corner joints
 - H. Welding guided bend tests in all positions. (Note: Students perform tests in all positions over time.)

- III. Gas Tungsten Arc Welding (minimum student time: 25 weeks over 3 years)
 - A. Safety
 - B. Setting up equipment
 - C. Running stringer beads
 - D. Welding lap-joints
 - E. Welding T-joints
 - F. Welding butt joints
 - G. Welding corner joints
- IV. Gas Metal Arc/Robotic Welding (minimum student time: 15 weeks over 3 years)
 - A. Safety
 - B. Setting up equipment
 - C. Welding T-joints
 - D. Welding lap-joints
 - E. Welding butt joints
 - F. Welding corner joints
 - G. Welding guided bend tests (Note: Students perform tests in all positions over time.)
- V. Flux Cored Arc Welding (minimum student time: 15 weeks over 3 years.)
 - A. Safety
 - B. Setting up equipment
 - C. Welding T-joints
 - D. Welding lap-joints
 - E. Welding butt joints
 - F. Welding corner joints
 - G. Welding guided bend tests (Note: Students perform tests in all positions over time.)
- VI. Pipe Welding (minimum student time: 6 weeks over 3 years.)
 - A. Safety
 - B. Setting up equipment
 - C. Welding pipe to plate
 - D. Welding pipe to pipe
 - E. Student competency performance in all positions over a period of time.

The instruction outlined above corresponds with AWS Industry Standards.

Specific Educational Objectives to be Taught:

The student successfully completing welding technology will be able to –

1. safely perform all tasks dealing with the above-named processes.
2. check out all safety procedures for all shop equipment.
3. weld lap-joints using all four welding processes.
4. weld T-joints using all four welding processes.
5. weld butt joints using all four welding processes.

6. weld corner joints using all four welding processes.
7. weld guided bends using all four processes in all positions.
8. weld pipe joints in all four processes.
9. set-up all welding equipment to manufacturer's specifications
10. identify and use all welding consumables in the welding shop area.
11. identify all metals used in welding technology.

Formative Assessments:

- Students complete a competency checklist as they progress through a skill.
- Quizzes and tests

Summative Assessments:

- Guided bend tests in all positions are conducted.
- Final written exam
- Writing assignments
- NOCTI (National Occupational Competency Testing Institute)

Required/Approved Textbooks and Materials:

Book Title: Welding, 5E, Principles and Applications
Publisher: Thomson Delmar Learning
ISBN #: 1401810462
Copyright: 2004
Date of Adoption:

Required Materials: All consumables, components, materials and equipment needed for students to successfully complete the following welding processes: oxy-acetylene welding, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, flux cored arc welding, pipe welding, and plastic welding.

Safety Program for Welding Technology:

Materials needed: safety videos, safety rules handout, and safety posters

Content presentation:

1. Present the welding safety rules. Students will receive a handout.
2. Discuss each rule and the reason for each.
3. Present safety videos to the students.
4. Discuss and reinforce key points in each video.

Additional procedures:

1. Review safety rules
2. Allow question and answer time
3. After students understand and agree to follow the rules, they will sign the “Welding Shop Safety Rules” handout.
4. Students will take the above named handout home for parent signature.
5. Handout will be returned to the instructor.

Application: Students will work safely in the welding shop, following all safety rules and always wearing all personal protective equipment.

Assessment/Evaluation:

1. Students must be able to write all ten shop safety rules.
2. Students will be observed during welding lab work. Any unsafe practice will result in a lower daily grade.

Accommodations/Adaptations:

- More one-on-one instructional time
- More time to complete the objective
- More prompting if needed