

Implementation date

Fall 2010

PROGRAM CONCENTRATION:

**Architecture, Construction,
Communications & Transportation**

CAREER PATHWAY:

METALS TECHNOLOGY

COURSE TITLE:

Welding I

PREREQUISITE:

Introduction of Metals

COURSE DESCRIPTION: This course is designed to provide all students with the basic knowledge and safe operating skills needed to demonstrate proper set of equipment in oxyfuel and shielded metal arc welding (SMAW). In oxy-fuel area of study students will create accurate cuts and perform washing and gouging procedures. Students will learn to critique their work pieces by welding codes, identifying imperfections, common test methods, and evaluate setups to determine proper setup of work and equipment. In SMAW students will learn and model proper safety and learn to make judgment calls in selection of electrodes and metal preparation to create beads and fillet welds using various rods. Minimum performance requirements for this course are based on successful student completion according to the American Welding Society (AWS) and the National Center for Construction Education and Research Center (NCCER) Occupation Standards. Students who successfully complete the course in accordance with NCCER standards are eligible for registration with the NCCER National Craft Worker Registry.

CAREERS, WORK ETHICS AND HISTORY OF SMAW AND OXYFUEL WELDING PROCEDURES.

Students will explore different types of careers that are available in the welding industry and list careers they judge as meaningful. Evaluate their own skill level and determine skills needed to reach career choices through research. Students will learn the importance of good work ethics in the workplace and model that behavior. Students will learn the history of SMAW and Oxyfuel welding comparing techniques of the past to modern day techniques and equipment.

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OXYFUEL CUTTING/WELDING

ACCT-WI-1. Students will be able to identify and use oxy-fuel cutting/welding equipment.

- a. Identify and explain the use of oxyfuel cutting equipment.
- b. Set up oxyfuel equipment.
- c. Light and adjust an oxyfuel torch.
- d. Disassemble oxyfuel equipment.
- e. Perform advanced oxyfuel cutting techniques:
 - Straight line and square shapes
 - Piercing and slot cutting
 - Bevels
 - Washing
 - Gouging
- f. Operate a motorized, portable oxyfuel cutting machine.

Academic Standards:

MM4P3. Students will solve problems (using appropriate technology)

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

MM3P5. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

WELDING PROCEDURES

ACCT-WI-2. Students will demonstrate understanding of the importance of welding procedures and how to critique their work.

- a. Identify and explain codes governing welding.
- b. Identify and explain weld imperfections and their causes.
- c. Identify and explain nondestructive examination processes.
- d. Identify common destructive testing methods.
- e. Identify and explain welder qualification tests.
- f. Explain the importance of quality workmanship.

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Academic Standards:

SCSh3. Students will identify and investigate problems scientifically.

- a. Suggest reasonable hypotheses for identified problems.
- b. Develop procedures for solving scientific problems.
- c. Collect, organize and record appropriate data.

SMAW

ACCT-WI-3. Students will learn and model proper safety for SMAW and make meaning of the welding codes, metallurgy, metal preparation, demonstrating their ability to evaluate factors to determine electrode required.

- a. Identify and explain shielded metal arc welding (SMAW) safety.
- b. Identify and explain welding electrical equipment.
- c. Identify and explain arc welding machines.
- d. Explain setting up arc welding equipment.
- e. Set up a machine for welding.
- f. Identify and explain tools for weld cleaning.
- g. Identify factors that affect electrode selection.
- h. Explain the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system.
- i. Identify different types of filler metals.
- j. Explain filler metal traceability requirements and how to use applicable code requirements.
- k. Identify and select the proper electrode for an intended welding task.

Academic Standards:

SPS4. Students will investigate the arrangement of the Periodic Table

- a. Determine the trends of the following:
Location of metals, nonmetals, and metalloids
- b. Use the Periodic Table to predict the above properties for representative elements.

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SMAW

ACCT-WI-4. Students will make stringer beads and/or padding using the Shielded Metal Arc Welding (SMAW) process to the instructor's discretion and satisfaction in the flat position using E-6013, E-6010 or E-7018 electrodes.

- a. Demonstrate a working knowledge of the equipment and the safe operation of the equipment.
- b. Demonstrate knowledge of the equipment needed to perform this task.
- c. Demonstrate proper weld procedures by producing welds in the flat position using E-6013, E-6010 or E-7018 electrodes.

Academic Standards:

MM4P3. Students will solve problems (using appropriate technology)

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

MM3P5. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

SMAW

ACCT-WI-5. Students will make fillet welds using the Shielded Metal Arc Welding (SMAW) process to the instructor's discretion and satisfaction in the flat (1F) and/or horizontal (2F) positions using E-6013, E-6010 or E-7018 electrodes.

- a. Demonstrate a working knowledge of the equipment and the safe operation of the equipment.
- b. Demonstrate knowledge of the equipment needed to perform this task.

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- c. Demonstrate proper weld procedures by producing single and multiple pass fillet welds in the flat or horizontal position on a variety of joints using E-6013, E-6010 and/or E-7018 electrodes.

Academic Standards:

MM4P3. Students will solve problems (using appropriate technology)

- a. Build new mathematical knowledge through problem solving.
- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.
- d. Monitor and reflect on the process of mathematical problem solving.

MM3P5. Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
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Reading Across the Curriculum

Reading Standard Comment

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in context.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

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Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

CTAE-RC-1 Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas
 - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
 - Read both informational and fictional texts in a variety of genres and modes of discourse.
 - Read technical texts related to various subject areas.
- b. Discussing books
 - Discuss messages and themes from books in all subject areas.
 - Respond to a variety of texts in multiple modes of discourse.
 - Relate messages and themes from one subject area to messages and themes in another area.
 - Evaluate the merit of texts in every subject discipline.
 - Examine author's purpose in writing.
 - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
 - Demonstrate an understanding of contextual vocabulary in various subjects.
 - Use content vocabulary in writing and speaking.
 - Explore understanding of new words found in subject area texts.
- d. Establishing context
 - Explore life experiences related to subject area content.
 - Discuss in both writing and speaking how certain words are subject area related.
 - Determine strategies for finding content and contextual meaning for unknown words.

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education

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Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.

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