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Fall 2010

**PROGRAM CONCENTRATION:**

**Architecture, Construction,  
Communications & Transportation**

**CAREER PATHWAY:**

**METALS TECHNOLOGY**

**COURSE TITLE:**

**Welding IV**

**PREREQUISITE:**

**Welding III**

**COURSE DESCRIPTION:** The goal of this course is to provide all students with the basic knowledge and safe operating skills in the use of Flux Core Arc Welding equipment to produce fillet welds. This course will also provide all students with the basic knowledge and safe operating skills in the Introduction to Gas Tungsten Arc Welding equipment. This course should enable students to gain the knowledge and hands on skills to build upon skills previous obtained through earlier course studies in the welding pathway, leading toward students' career plans after leaving high school. 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, ETHICS, AND HISTORY OF FLUX CORE ARC WELDING AND GAS TUNGSTEN ARC WELDING**

Students will explore careers in the field of flux core arc welding and gas tungsten arc welding, the different applications and sciences involved in working with materials of different structure and molecular composition, and work ethics required in those career areas.

#### **FCAW Safety and Setup**

**ACCT-WIV-1. Students will understand and setup the FCAW equipment in a safe and correct manner.**

- a. Identify the different parts of the FCAW and set up the machine so that it is in working order.
- b. Demonstrate knowledge of the FCAW equipment.
- c. Demonstrate safe operational skill of the FCAW equipment.

#### ***Academic Standards:***

**SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.**

- a. Follow correct procedures for use of scientific apparatus.
- b. Demonstrate appropriate techniques in all laboratory situations.

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- c. Follow correct protocol for identifying and reporting safety problems and violations.

**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.

**FCAW**

**ACCT-WIV-2. Students will produce flat (F1) and horizontal (F2) fillet welds using the FCAW welding process.**

- a. Demonstrate the ability to make fillet welds in the flat (1F) and horizontal (2F) position on material provided by the instructor.
- b. Compare and evaluate both single and multiple pass welds in this position.
- c. Identify weld defects and the causes of these defects during the FCAW welding process.

*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.

**FCAW**

**ACCT-WIV-3. Students will produce vertical (F3) fillet welds using FCAW process.**

- a. Demonstrate the ability to make fillet welds in the vertical (F3) position on material provided by the instructor.
- b. Compare and evaluate both single and multiple pass welds in this position
- c. Identify weld defects and the causes of these defects during the FCAW welding process.

**Academic Standards:**

**SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.**

- a. Follow correct procedures for use of scientific apparatus.
- b. Demonstrate appropriate technique in all laboratory situations.
- c. Follow correct protocol for identifying and reporting safety problems and violations.

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**SCSh3. Students will identify and investigate problems scientifically.**

- a. Suggest reasonable hypotheses for identified problems.
- b. Develop procedures for solving scientific problems.
- c. Develop reasonable conclusions based on data collected.
- d. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.

**MM1P1. 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.

**GTAW**

**ACCT-WIV-4. Students will demonstrate understanding of Gas Tungsten Arc Welding.**

- Identify equipment setup for carbon steel
- Student will demonstrate GTAW welding of stringer beads in the flat position.

*Academic Standards:*

**SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.**

- a. Follow correct procedures for use of scientific apparatus.
- b. Demonstrate appropriate technique in all laboratory situations.
- c. Follow correct protocol for identifying and reporting safety problems and violations.

**SCSh3. Students will identify and investigate problems scientifically.**

- a. Suggest reasonable hypotheses for identified problems.
- b. Develop procedures for solving scientific problems.
- c. Develop reasonable conclusions based on data collected.
- d. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.

**SPS4. Students will investigate the arrangement of the Periodic Table.**

- a. Determine the trends of the following:
  - Number of valence electrons
  - Types of ions formed by representative elements
  - Location of metals, nonmetals, and metalloids
  - Phases at room temperature
- b. Use the Periodic Table to predict the above properties for representative elements.

**MM1P1. 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.

**MM1P3. Students will communicate mathematically.**

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- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.

**MM2P4. Students will make connections among mathematical ideas and to other disciplines.**

- a. Recognize and use connections among mathematical ideas.
- b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
- c. Recognize and apply mathematics in contexts outside of mathematics.

**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.

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

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- 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 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

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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.