

Implementation date

Fall 2010

**PROGRAM CONCENTRATION:**

**Architecture, Construction,  
Communications & Transportation**

**CAREER PATHWAY:**

**METALS TECHNOLOGY**

**COURSE TITLE:**

**Machining Operations II**

**PREREQUISITE:**

**Machining Operations I**

**COURSE DESCRIPTION:** This course will provide opportunities for students to acquire introductory skills on the lathe and milling machine. Course topics include safety, blueprint reading, job planning and management, quality control, and machinery maintenance. Performance standards for this course are based on National Institute for Metalworking Skills (NIMS) national standards for the topics of lathe and milling machine. Co-curricular activities of Skills USA are incorporated in the course. Students who successfully complete this course are eligible to enroll in Machining Operations III and/or Machining Operations IV.

### **SAFETY**

**ACCT-MOII-1. Students will demonstrate safety in the machining lab and classroom.**

- a. Demonstrate general safety rules for the machining laboratory.
- b. Demonstrate the specific safety rules applicable to the machine shop equipment.

### **BLUEPRINT READING**

**ACCT-MOII-2. Students will compose blueprints.**

- a. Define orthographic projection.
- b. Sketch the top, front, and side views of simple machined parts.
- c. Illustrate proper dimensioning.

**Academic standards:**

**MM2G1. Students will identify and use special right triangles.**

- a. Determine the lengths of sides of 30 -60 -90 triangles.
- b. Determine the lengths of sides of 45 -45 90 triangles.

**MM2P1. Students will solve problems (using the 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.

### **JOB PLANNING AND MANAGEMENT**

**ACCT-MOII-3. Students will generate job planning sheets for lathe and milling machine projects.**

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- a. Develop a process plan and sequence of operations for a part requiring turning.
- b. Develop a process plan and a sequence of operations for a part requiring milling.
- c. Complete a materials list and identify required tools, fixtures, and cutting fluids for a machining operation.

**Academic standards:**

**MM2P1. Students will solve problems (using the 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.

**SPS7. The students will relate transformations and flow of energy within a system.**

- b. Investigate molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation.

**SPS8. Students will determine relationships among force, mass, and motion.**

- a. Calculate velocity and acceleration.
- c. Calculate amounts of work and mechanical advantage using simple machines.

**BASIC LATHE**

**ACCT-MOII-4. Students will demonstrate the ability to properly set up and use the lathe.**

- a. Perform countersinking operations.
- b. Perform drilling operations.
- c. Perform filing operations on a lathe.
- d. Demonstrate set-up of the quick change tool holder.
- e. Center drill work piece for turning between centers.
- f. Perform turning operations to specified tolerances.
- g. Perform boring operations.
- h. Perform counterboring operations.

**Academic standards:**

**MM2P1. Students will solve problems (using the appropriate technology)**

- a. Build new mathematical knowledge through problem solving.
- d. Solve problems that arise in mathematics and in other contexts.
- e. Apply and adapt a variety of appropriate strategies to solve problems.

**SPS7. The students will relate transformations and flow of energy within a system.**

- b. Investigate molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation.

**SPS8. Students will determine relationships among force, mass, and motion.**

- a. Calculate velocity and acceleration.

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- c. Calculate amounts of work and mechanical advantage using simple machines.

### **BASIC MILL**

**ACCT-MOII-5. Students will demonstrate the ability to properly set up and use the vertical milling machine.**

- a. Set up and dial in a vise.
- b. Identify milling cutters used in vertical milling.
- c. Demonstrate reaming operations.
- d. Demonstrate boring operations.
- e. Demonstrate end milling operations.
- f. Demonstrate face milling operations.
- g. Square a work piece to specified tolerances.

**Academic standards:**

**SPS7. The students will relate transformations and flow of energy within a system.**

- b. Investigate molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation.

**SPS8. Students will determine relationships among force, mass, and motion.**

- a. Calculate velocity and acceleration.
- c. Calculate amounts of work and mechanical advantage using simple machines

**MM2P1. Students will solve problems (using the 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.

### **QUALITY CONTROL**

**ACCT-MOII-6. Students will judge lathe and milling machine parts to determine the quality of the parts.**

- a. Develop an inspection plan.
- b. Select required measuring instruments.
- c. Inspect a part produced on a lathe.
- d. Inspect a part produced on a milling machine.
- e. Complete a written inspection report to include a decision to accept or reject the part.
- f. Describe inspection procedures, results, and decisions.

**Academic standards:**

**MM4P1. Students will solve problems (using the appropriate technology)**

- a. Build new mathematical knowledge through problem solving.
- c. Apply and adapt a variety of appropriate strategies to solve problems.

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## **MACHINERY MAINTENANCE**

**ACCT-MOII-7. Students will demonstrate the ability to perform preventive maintenance on the lathe and milling machine.**

- a. Perform incidental and preventative maintenance on a lathe and a milling machine.
- b. Report problems that are beyond the scope of authority.
- c. Fill out the history form for tracking maintenance.

## **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 learning. Students encounter a variety of informational as well as fictional texts, and 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:***

### **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.

### **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.

### **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.

### **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 skills in expressing and interpreting information.

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**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.