

Implementation date

Fall 2010

PROGRAM CONCENTRATION:

**Architecture, Construction,
Communications & Transportation**

CAREER PATHWAY:

METALS TECHNOLOGY

COURSE TITLE:

Machining Operations IV

PREREQUISITE:

Machining Operations III

COURSE DESCRIPTION: This course will provide opportunities for students to pursue more advanced skills on the lathe and milling machine. Course topics include safety, blueprint reading, job planning and management, quality control, and career planning. 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 SkillsUSA are incorporated in the course.

SAFETY

ACCT-MOIV-1. Students will demonstrate the ability to identify the different aspects of machine safety.

- a. List general safety rules for the machining laboratory.
- b. Explain and demonstrate how to clean a machine after each use.

BLUEPRINT READING

ACCT-MOIV-2. Students will demonstrate proficiency in blueprint reading.

- a. Identify material to be used.
- b. Identify unspecified tolerances.
- c. Determine what each note is referring to.
- d. Determine what finishing operations must be done to the part.
- e. Identify relationship to other parts in the assembly.
- f. Identify each line on the print.
- g. Identify specified tolerances.
- h. Identify and interpret specific notes.
- i. Identify order of operations for machining the part.

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.

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JOB PLANNING AND MANAGEMENT

ACCT-MOIV-3. Students will generate job planning sheets for turning and milling projects.

- 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.

ADVANCED LATHE

ACCT-MOIV-4. Students will demonstrate the ability to perform advanced operations on the lathe.

(The following objectives should follow successful completion of the NIMS Turning Between Centers Level I examination and/or the NIMS Turning-Chucking Level I examination.)

- a. Demonstrate centering work in a four jaw chuck using a dial indicator.
- b. Demonstrate offset turning with a four jaw chuck.
- c. Demonstrate steady rest turning and boring.
- d. Demonstrate follower rest turning.
- e. Cut external acme threads.
- f. Rechase internal threads.
- g. Rechase external threads.
- h. Cut internal tapered surfaces.
- i. Cut 60 degree internal threads to a specified class of fit.

Academic standards:

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- b. Solve problems that arise in mathematics and in other contexts.
- c. Apply and adapt a variety of appropriate strategies to solve problems.

MM4A2. Students will use the circle to define the trigonometric functions.

- a. Understand and apply the six trigonometric functions of general angles in standard position.
- b. Find values of trigonometric functions using points on the terminal sides of angles in the standard position.
- c. Understand and apply the six trigonometric as functions of arc length on the unit circle.

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

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- 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.

ADVANCED MILLING MACHINE

ACCT-MOIV-5. Students will demonstrate the ability to perform advanced operations on the milling machine.

(The following objectives should follow successful completion of the NIMS Milling Level I examination.)

- a. Demonstrate index milling.
- b. Demonstrate chamfering by angled cutter or tilting the head.
- c. Check cutting fluid level.
- d. Calculate feeds and speeds for various materials.
- e. Align milling machine fixtures and attachments. f. Demonstrate proper use of a T-slot cutter.
- f. Demonstrate proper use of a Woodruff keyseat cutter

Academic standards:

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- c. Apply and adapt a variety of appropriate strategies to solve problems.

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CAREER PLANNING

ACCT-MOIV-6. Students will demonstrate the ability to proficiently plan for a career in the machining field.

- a. Prepare a list of companies that hire machinists.
- b. Write a resume.
- c. Conduct mock job interviews.
- d. Prepare a tentative career path for the next ten years.

Academic Standards:

SSEF6. The student will explain how productivity, economic growth, and future standards of living are influenced by investment in factories, machinery, new technology, and the health, education, and training of people.

- a. Define productivity as the relationship of inputs to outputs.
- b. Give illustrations of investment in equipment and technology and explain their relationship to economic growth.
- c. Give examples of how investment in education can lead to a higher standard of living.

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

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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

- 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

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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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