

Implementation date

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PROGRAM CONCENTRATION:

**Architecture, Construction,
Communications & Transportation**

CAREER PATHWAY:

METALS TECHNOLOGY

COURSE TITLE:

Machining Operations III

PREREQUISITE:

Machining Operations II

COURSE DESCRIPTION: This course will provide opportunities for students to continue skills development 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-curricula activities of Skills USA are incorporated in the course. They may also apply for the following national credentials: NIMS Turning between Centers Level I, NIMS Turning-Chucking Level I, and NIMS Milling Level I.

SAFETY

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

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

BLUEPRINT READING

ACCT-MOIII-2. Students will devise sketches of various machined parts.

- a. Sketch sectional views of simple and complex machined parts.
- b. Sketch a half sectional view of a complex machined part.

Academic standards:

MM3G1. Students will investigate the relationships between lines and circles.

- a. Find equations of circles.
- c. Find the equation of a tangent line to a circle at a given point.
- d. Solve a system of equations involving a circle and a line.

INTERMEDIATE LATHE

ACCT-MOIII-4. Students will demonstrate the ability to properly setup and use the lathe.

- a. Perform knurling operations.
- b. Demonstrate setup of a draw-in collet chuck.
- c. Demonstrate cutting a taper using taper attachment.
- d. Demonstrate cutting a taper using compound rest.
- e. Demonstrate parting operations.

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- f. Cut external UNF and UNC right hand and left hand threads to a specified class of fit.
- g. Deburr threads with a thread file.
- h. k. Complete NIMS Turning Between Centers Level I project.
- i. l. Complete NIMS Turning-Chucking Level I project.

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.

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

- b. Understand and apply the six trigonometric functions of general angles in standard position.
- c. Find values of trigonometric functions using points on the terminal sides of angles in the standard position.
- d. 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.

- 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.

INTERMEDIATE MILLING MACHINE

ACCT-MOIII-5. Students will demonstrate the ability to properly setup and use the vertical milling machine.

- a. Indicate head for X and Y axis alignment.
- b. Align milling machine vise using dial indicator.
- c. Align milling machine fixtures and attachments.
- d. Locate work with center finder, edge finders, and indicators.
- e. Mill a keyway.
- f. Mill a chamfer.
- g. Complete NIMS Milling Level I project.

Academic standards:

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- b. Solve problems that arise in mathematics and in other contexts.

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

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QUALITY CONTROL

ACCT-MOIII-6. Students will judge machined parts to determine their quality.

- 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 parts.

MACHINERY MAINTENANCE

ACCT-MOIII-7. Students will demonstrate the ability to perform maintenance on the lathe milling machine.

- a. Perform incidental and preventative maintenance on machine shop equipment.
- 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

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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

- 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.

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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.

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.

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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.