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Fall 2010

PROGRAM CONCENTRATION:

**Architecture, Construction,
Communications & Transportation**

CAREER PATHWAY:

METALS TECHNOLOGY

COURSE TITLE:

Machining Operations I

Prerequisite:

Introduction to Metals

The metals technology curriculum, Metals I This course will provide opportunities for students to acquire introductory skills on the lathe and milling machine, equipment used in the trade, attributes of successful machinists, industry credentialing, and career opportunities. Course topics include safety, measuring instruments, blueprint reading, and maintenance. Practical experience will be gained in the proper use and maintenance of hand tools, the pedestal grinder, the drill press, and band saws, 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.

Additional topics address quality control, environmental protection, and housekeeping. Co-curricular activities of Skills USA are incorporated in the course. Students who successfully complete the course are eligible to enroll in Machining Operations II

SAFETY

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

- a. List general safety rules for the machining laboratory
- b. Identify the location of the following: fire extinguisher(s), eye wash station, first aid kit, emergency electrical shutoff(s)
- c. Describe the types of fires possible in a machining environment and identify the appropriate fire extinguisher for each type of fire
- d. Demonstrate the use of a fire extinguisher
- e. Demonstrate basic first aid to stop bleeding and prevent shock
- f. Describe the procedure for obtaining outside emergency medical response
- g. Demonstrate emergency shutoff procedures
- h. Demonstrate shop evacuation procedures
- i. Identify location of Material Safety and Data Sheets (MSDS)

MEASURING INSTRUMENTS

ACCT-MOI-2. Students will measure with the following to specific tolerances

- a. Measure work pieces with a 6 inch Standard rule
- b. Measure work pieces with a 12 inch Standard rule
- c. Measure work pieces 0-1” Micrometer
- d. Measure work pieces with dial and vernier calipers
- e. Use a dial indicator

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Academic Standards:

- MM2P1. Students will solve problems (using the appropriate technology.)**
- Build new mathematical knowledge through problem solving.
 - Solve problems that arise in mathematics and in other contexts.
 - Apply and adapt a variety of appropriate strategies to solve problems.

BLUEPRINT READING

ACCT-MOI-3. Students will identify and illustrate the following information on blueprints.

- Identify title block and tell what information it contains.
- Identify basic blueprint symbols and lines.

Academic Standards:

MM1G1. Students will investigate properties of geometric figures in the coordinate plane.

- Determine the distance between two points.
- Determine the distance between a point and a line.
- Determine the midpoint of a segment.
- Understand the distance formula as an application of the Pythagorean theorem.
- Use the coordinate plane to investigate properties of and verify conjecture related to triangles and quadrilaterals.

PEDESTAL GRINDER

ACCT-MOI-4. Students will demonstrate the ability to properly set up and use the pedestal grinder.

- Inspect and clean a pedestal grinder.
- Inspect and position eye shields and tool rests.
- Dress grinding wheels.
- Sharpen center punches and chisels
- Sharpen drill bits.

DRILL PRESS

ACCT-MOI-5. Students will demonstrate the ability to properly set up and use the drill press.

- Inspect and clean drill press.
- Mount and secure work piece.
- Calculate proper RPMs on the drill press.
- Demonstrate center drilling.
- Drill pilot holes.
- Drill blind holes.

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- g. Drill through holes.

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.
- 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.

LATHE OPERATIONS

- ACCT-MOI-6. Students will perform the following operations using the lathe.**
 - a. Identify the parts of an engine lathe
 - b. Check oil reservoirs and cutting fluid levels
 - c. Calculate feeds and speeds for various materials and material diameters
 - d. Set up a lathe for various feeds and speeds.
 - e. Grind general lathe cutting tools with a pedestal grinder.
 - f. Demonstrate set-up and alignment of the tool post.
 - g. Demonstrate set-up of the three-jaw chuck.
 - h. Perform facing operations.
 - i. Perform center drilling operations

Academic Standards:

- MM4P1. Students will solve problems (using the appropriate technology)**
 - b. Build new mathematical knowledge through problem solving.
 - 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.

MILL OPERATIONS

- ACCT-MOI-7. Students will perform the following operations using the milling machine.**

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- a. Identify the parts of a milling machine.
- b. Check oil reservoirs and cutting fluid levels.
- c. Calculate feeds and speeds for various materials and material diameters.
- d. Set up a mill for various feeds and speeds.
- e. Use an edge finder to find the edge of a part.
- f. Perform center drilling operations.
- g. Perform countersinking operations.
- h. Perform drilling operations.
- i. Perform Taping operations.

Academic Standards:

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

- d. Build new mathematical knowledge through problem solving.
- e. Solve problems that arise in mathematics and in other contexts.
- f. 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.

MACHINERY MAINTENANCE

ACCT-MTM-8. Students will perform the following maintenance procedures

- a. Perform incidental and preventative maintenance on a milling machine, lathe, pedestal grinder, and drill press.
- b. Fill out the history form for tracking maintenance
- c. Report maintenance problems to the teacher

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

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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
 - 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.

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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.

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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