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Fall 2010

PROGRAM CONCENTRATION:	**Architecture, Construction, Communications & Transportation**
CAREER PATHWAY:	**METALS TECHNOLOGY**
COURSE TITLE:	**Sheet Metal VI**
PREREQUISITE:	**Sheet Metal V**

COURSE DESCRIPTION: This course identifies and explains the importance of shop production and organization. This course includes the development of skills use in fabrication principles dealing with louvers, dampers, hoods, ventilators, and access doors used for air balance in various system designs. Minimum performance requirements for this course are based on successful student completion according to the National Center for Construction Education and Research (NCCER) Occupation Standards. Students who successfully complete the course in accordance with the NCCER standards are eligible for registration with the NCCER National Craft Worker Registry.

SHOP PRODUCTION AND ORGANIZATION

ACCT-SMVI-1 Students will demonstrate the ability to maximize shop production in safe and orderly manner.

    a. Outline the procedure necessary for planning the workday.
    b. Identify the factors that affect speed, efficiency, and minimum waste of material.
    c. Describe methods of utilizing scrap metal.
    d. Explain how shop assignment procedures are organized.
    e. Outline a typical job planning and production flow for a sheet metal production shop.
    f. Describe how to coordinate sheet metal work with other trades.
    g. Explain how to project manpower and material costs.
    h. Identify a procedure for utilizing manpower effectively.
    i. Describe the role relationships between the supervisory and production staff for a typical sheet metal shop operation.

LOUVERS, DAMPERS, AND ACCESS DOORS

ACCT-SMVI-2 Students will demonstrate proficiency layout and fabricating various types of louvers, dampers, and access doors.

    a. Explain the purpose of selected louvers, dampers, and access doors.
    b. Describe the procedures necessary for fabrication of selected louvers, dampers, and access doors.
    c. Demonstrate competence in the layout, development, and fabrication of selected louvers, dampers, and access doors.

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Academic Standards:

MM1G1. Students will investigate properties of geometric figures in the coordinate plane.
a. Determine the distance between two points.
b. Determine the distance between a point and a line.
c. Determine the midpoint of a segment.
d. Understand the distance formula as an application of the Pythagorean theorem.
e. Use the coordinate plane to investigate properties of and verify conjecture related to triangles and quadrilaterals.

MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.
a. Determine the sum of interior and exterior angles in a polygon.
b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.
c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).
d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.
e. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.

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.

MM2G3. Students will understand the properties of circles.
a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.
b. Understand and use properties of central, inscribed, and related angles.
c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.
d. Justify measurements and relationships in circles using geometric and algebraic properties.

MM2G4. Students will find and compare the measures of spheres.
a. Use and apply surface area and volume of a sphere.
b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.

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COMPREHENSIVE REVIEW

ACCT-SMVI-3 Students will demonstrate the ability to select and use parallel line development, radial line development, and triangulation in the fabrication of various sheet metal fittings.

    a. Demonstrate understanding of parallel line development, radial line development, and triangulation as the three development methods for laying out sheet metal patterns.

    b. Demonstrate skill in the layout and fabrication of selected sheet metal fittings by using the most suitable development method.

    c. Develop knowledge of shortcuts in fabrication.

Academic Standards:

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

    f. Determine the distance between two points.

    g. Determine the distance between a point and a line.

    h. Determine the midpoint of a segment.

    i. Understand the distance formula as an application of the Pythagorean theorem.

    j. Use the coordinate plane to investigate properties of and verify conjecture related to triangles and quadrilaterals.

MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.

    f. Determine the sum of interior and exterior angles in a polygon.

    g. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.

    h. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).

    i. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.

    j. Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid.

MM2G1. Students will identify and use special right triangles.

    c. Determine the lengths of sides of 30°-60°-90° triangles.

    d. Determine the lengths of sides of 45°-45°-90° triangles.

MM2G3. Students will understand the properties of circles.

    e. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.

    f. Understand and use properties of central, inscribed, and related angles.

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    g. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.

    h. Justify measurements and relationships in circles using geometric and algebraic properties.

MM2G4. Students will find and compare the measures of spheres.

    c. Use and apply surface area and volume of a sphere.

    d. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.

FUME AND EXHAUST SYSTEMS DESIGN

ACCT-SMVI-4 Students will demonstrate the ability to lay out, fabricate, and install fume or exhaust systems according to codes and specifications.

a. Describe how to interpret codes and specifications pertaining to selected fume or exhaust systems.

b. Select appropriate materials for fabrication of identified exhaust or fume systems or components.

c. Lay out, fabricate, and install selected fume or exhaust systems or components.

Academic Standards:

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

    a. Determine the distance between two points.

    b. Determine the distance between a point and a line.

    c. Determine the midpoint of a segment.

    d. Understand the distance formula as an application of the Pythagorean theorem.

    e. Use the coordinate plane to investigate properties of and verify conjecture related to triangles and quadrilaterals.

MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.

    a. Determine the sum of interior and exterior angles in a polygon.

    b. Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.

    c. Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).

    d. Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.

    e. Find and use points of concurrency in triangles: incenter, orthocenter,

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circumcenter, and centroid.

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.

MM2G3. Students will understand the properties of circles.
      a. Understand and use properties of chords, tangents, and secants as an application of triangle similarity.
      b. Understand and use properties of central, inscribed, and related angles.
      c. Use the properties of circles to solve problems involving the length of an arc and the area of a sector.
      d. Justify measurements and relationships in circles using geometric and algebraic properties.

MM2G4. Students will find and compare the measures of spheres.
      a. Use and apply surface area and volume of a sphere.
      b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.

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:
      Reading in all curriculum areas

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- 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 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.

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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.