

Implementation date
Fall 2008

SCSh5. Students will demonstrate the computation and estimation skills data and developing reasonable scientific explanations.

MM3P1. Students will solve problems (using appropriate technology).

MM3P2. Students will reason and evaluate mathematical arguments.

MM3P3. Students will communicate mathematically.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

ELAALRC2 The student participates in discussions related to curricular learning in all subject areas.

ELAALRC3 The student acquires new vocabulary in each content area and uses it correctly.

ENGR-EP-2. Students will identify the six simple machines and explain how each is able to change the value for force and distance in the work relation.

- a. Describe what is meant by mechanical advantage and explain how it is determined by using force and distance in the work equation.
- b. Identify the six simple machines.
- c. Identify two ways of determining the mechanical advantage of a machine.
- d. Solve problems involving simple machines, input and output forces, and mechanical advantage.
- e. Describe the relationship of force and speed when either is changed by the advantage of a mechanical device.

ACADEMIC STANDARDS:

SP1. Students will analyze the relationships between force, mass, gravity, and the motion of objects

SP3. Students will evaluate the forms and transformations of energy.

MM1P1. Students will solve problems (using appropriate technology).

MM1P4. Students will make connections among mathematical ideas and to other disciplines.

MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.

MM1A3. Students will solve simple equations.

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SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills data and developing reasonable scientific explanations.

MM3P1. Students will solve problems (using appropriate technology).

MM3P3. Students will communicate mathematically.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

MM3P5. Students will represent mathematics in multiple ways.

ELAALRC2. The student participates in discussions related to curricular learning in all subject areas.

ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.

ELAALRC4. The student establishes a context for information acquired by reading across subject areas.

ENGR-EP-3. Students will differentiate between fluid power systems and apply the laws that govern each.

- a. Explain what is meant by fluid power.
- b. Explain how the volume of a gas varies with the changes in pressure and temperature.
- c. Describe how a fluid is able to transfer force as well as change the relationship between force and distance or speed.
- d. Solve mathematical problems involving changes in pressure, temperature, and volume in fluid power systems.

ACADEMIC STANDARDS:

SP3. Students will evaluate the forms and transformations of energy.

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SPS5. Students will compare and contrast the phases of matter as they relate to atomic and molecular motion.

MM1P1. Students will solve problems (using appropriate technology).

MM1P4. Students will make connections among mathematical ideas and to other disciplines.

MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.

MM1A3. Students will solve simple equations.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh5. Students will demonstrate the computation and estimation skills data and developing reasonable scientific explanations.

SCSh6. Students will communicate scientific investigations and information clearly.

MM3P1. Students will solve problems (using appropriate technology).

MM3P3. Students will communicate mathematically.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.

ELAALRC4. The student establishes a context for information acquired by reading across subject areas.

ENGR-EP-4. Students will differentiate between AC and DC circuits and apply Ohm's Law to Series, Parallel, and Series/Parallel circuits as well as state Kirchoff's Law.

- a. Differentiate between accelerating current and direct current.
- b. Explain differences between series, parallel, and series-parallel circuits.
- c. Define voltage, current, and resistance.
- d. Calculate current, voltage, and resistance in a circuit by using Ohm's Law.
- e. Define Kirchoff's Law.

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ACADEMIC STANDARDS:

SP5. Students will evaluate relationships between electrical and magnetic forces.

SPS10. Students will investigate the properties of electricity and magnetism.

MM1P1. Students will solve problems (using appropriate technology).

MM1P4. Students will make connections among mathematical ideas and to other Disciplines

MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.

MM1A3. Students will solve simple equations.

MM2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills data and developing reasonable scientific explanations.

MM3P1. Students will solve problems (using appropriate technology).

MM3P3. Students will communicate mathematically.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

ELAALRC2. The student participates in discussions related to curricular learning in all subject areas.

ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.

ELAALRC4. The student establishes a context for information acquired by reading across subject areas.

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ENGR-EP-5. Students will describe the basic components of a small engine and explain the difference between a 4-stroke and 2-stroke engine.

- a. Describe the four-stroke engine operation and explain the purpose of each.
- b. Explain the concept of valve timing.
- c. Compare the lubrication system in a four-cycle engine to the system of a two-cycle engine.
- d. Describe the two-stroke engine operation and explain the principles of two-cycle operation.
- e. List the advantages and disadvantages of two-cycle and four-cycle engines.
- f. Disassemble and reassemble a basic small engine.

ACADEMIC STANDARDS:

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SP1. Students will analyze the relationships between force, mass, gravity, and the motion of objects.

SP3. Students will evaluate the forms and transformations of energy.

MM1P1. Students will solve problems (using appropriate technology).

MM1P4. Students will make connections among mathematical ideas and to other disciplines.

MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.

MM1A3. Students will solve simple equations.

MM2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills data and developing reasonable scientific explanations.

MM3P1. Students will solve problems (using appropriate technology).

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MM3P2. Students will reason and evaluate mathematical arguments.

MM3P3. Students will communicate mathematically.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

MM3P5. Students will represent mathematics in multiple ways.

ELAALRC2. The student participates in discussions related to curricular learning in all subject areas.

ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.

ELAALRC4. The student establishes a context for information acquired by reading across subject areas.

STEM Standards (Common to all Engineering & Technology Courses)

Nature of Technology

ENGR-STEM-1. Students will recognize the systems, components, and processes of a technological system.

- a. Describe the core concepts of technology.
- b. Identify the relationships among technologies along with connections to contemporary issues.
- c. Apply lifelong learning strategies necessary to understand the characteristics and scope of technology.

ACADEMIC STANDARDS:

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

SCSh7. Students analyze how scientific knowledge is developed.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

Technology and Society

ENGR-STEM-2. Students will identify the impact of engineering and technology within global, economic, environmental, and societal contexts.

- a. Describe the social, economic, and environmental impacts of a technological process, product, or system.

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- b. Demonstrate ethical and professional behavior in the development and use of technology.
- c. Explain the influence of technology on history and the shaping of contemporary issues.

ACADEMIC STANDARDS:

SCSh7. Students analyze how scientific knowledge is developed.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

Design

ENGR-STEM-3. Students will design technological problem solutions using scientific investigation, analysis and interpretation of data, innovation, invention, and fabrication while considering economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints.

- a. Demonstrate fundamental principles of design.
- b. Design and conduct experiments along with analysis and interpretation of data.
- c. Identify and consider realistic constraints relevant to the design of a system, component, or process.

ACADEMIC STANDARDS:

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

SCSh8. Students will understand important features of the process of scientific inquiry.

MM3P1. Students will solve problems (using appropriate technology).

MM3P2. Students will reason and evaluate mathematical arguments.

Abilities for a Technological World

ENGR-STEM-4. Students will apply principles of science, technology, engineering, mathematics, interpersonal communication, and teamwork to the solution of technological problems.

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- a. Work cooperatively in multi-disciplinary teams.
- b. Apply knowledge of mathematics, science, and engineering design.
- c. Demonstrate strategies for identifying, formulating, and solving technological problems.
- d. Demonstrate techniques, skills, and knowledge necessary to use and maintain technological products and systems.

ACADEMIC STANDARDS:

SCSh3. Students will identify and investigate problems scientifically.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

SCSh6. Students will communicate scientific investigations and information clearly.

SCSh8. Students will understand important features of the process of scientific inquiry.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

The Designed World

ENGR-STEM-5. Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.

- a. Use common tools correctly and safely.
- b. Describe strategies for selecting materials and processes necessary for developing a technological system or artifact.
- c. Demonstrate fundamental materials processing and assembly techniques.
- d. Evaluate the interdependence of components in a technological system and identify those elements that are critical to correct functioning.
- e. Apply analytical tools to the development of optimal solutions for technological problems.

ACADEMIC STANDARDS:

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

SCSh3. Students will identify and investigate problems scientifically.

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SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

MM3P1. Students will solve problems (using appropriate technology).

MM3P2. Students will reason and evaluate mathematical arguments.

MM3P4. Students will make connections among mathematical ideas and to other disciplines.

Reading

ENGR-STEM-6. Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.

- a. Read in all curriculum areas.
- b. Discuss books.
- c. Build vocabulary knowledge.
- d. Establish context.

ACADEMIC STANDARDS:

ELAALRC2. The student participates in discussions related to curricular learning in all subject areas.

ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.

ELAALRC4. The student establishes a context for information acquired by reading across subject areas.

Leadership Development

ENGR-STEM-7. Students will develop leadership and interpersonal problem-solving skills through participation in co-curricular activities associated with the Technology Student Association.

- a. Demonstrate effective communication skills.
- b. Participate in teamwork to accomplish specified organizational goals.
- c. Demonstrate cooperation and understanding with persons who are ethnically and culturally diverse.

ACADEMIC STANDARDS:

MM3P3. Students will communicate mathematically.

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MM3P5. Students will represent mathematics in multiple ways.

SCSh6. Students will communicate scientific investigations and information clearly.

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

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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.