

Implementation date

Fall 2009

**PROGRAM CONCENTRATION:**

**Agriculture**

**CAREER PATHWAY:**

**\*Additional Course for**

**Agricultural Mechanics Pathway**

**COURSE TITLE:**

**Agricultural Mechanics III**

**Course Description:** This laboratory course is designed to prepare students with advanced level experiences in selected major areas of agricultural mechanics technology which may include small engine maintenance and repair, metal fabrication, concrete construction, building construction, plumbing, electrical wiring, soil and water conservation, and maintenance of agricultural machinery, equipment and tractors. Learning activities include information, skill development, and problem solving.

**AG-AMIII-1. Students will become oriented to the comprehensive program of agricultural education, learn to work safely in the agriculture lab and work sites, demonstrate selected competencies in leadership through the FFA and agricultural industry organizations, and develop plans for a supervised agricultural experience program (SAEP).**

- a. Explain the role of the Agriculture Education program and the FFA in personal development.
- b. Demonstrate knowledge learned through a Supervised Agricultural Experience Program (SAEP).
- c. Develop leadership and personal development skills through participation in the FFA.
- d. Explore career opportunities in Agriscience through the FFA and Agriculture Education Program.
- e. Explore the professional agricultural organizations associated with the course content.
- f. Explore the history and background of the FFA.

**Academic Standards:**

*ELA10C1 The student demonstrates understanding and control of the rules of the English language, realizing that usage involves the appropriate application of conventions and grammar in both written and spoken formats.*

*ELA9RL5 The student researches the life of a particular person as it is represented in a variety of texts.*

*SCSh9 The student enhances reading in all curriculum areas.*

*ELA10LSV1 (d) The student actively solicits another person's comments or opinion. (e) Offers own opinion forcefully without domineering.*

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*ELA10LSV1 (i) The student employs group decision-making techniques such as brainstorming or a problem-solving sequence (e.g., recognizes problem, defines problem, identifies possible solutions, selects optimal solution, implements solution, evaluates solution).*

*ELA10LSV1 (e) The student offers own opinion forcefully without domineering. (f) The student contributes voluntarily and responds directly when solicited by teacher or discussion leader. (g) The student gives reasons in support of opinions expressed.*

**AG-AMIII-2. Students will service, maintain, repair, and operate small, two-cycle, air cooled engines.**

- a. Explain theories of operation of two-cycle engines.
- b. Identify parts and functions of two-cycle engines.
- c. Report operating systems of two-cycle engines.
- d. Develop a schedule of routine maintenance in accordance with manufacturer's manual.
- e. Perform routine service of two-cycle engines.
- f. Prepare two-cycle engine for seasonal use.
- g. Troubleshoot two-cycle engines for repair.
- h. Disassemble two-cycle engines according to manufacturer's specifications.
- i. Assemble two-cycle engine according to manufacturer's specifications.
- j. Describe hazards involved in using equipment with two-cycle engines.
- k. Operate equipment with a two-cycle engine in a safe and efficient manner.

**Academic Standards:**

*ELA9RC2 The student participates in discussions related to curricular learning in all subject areas.*

*ELA12LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions.*

*ELA9RL5 The student understands and acquires new vocabulary and uses it correctly in reading and writing.*

*ELA10W3 The student uses research and technology to support writing.*

*MM1A3 The student solves simple equations.*

*MA1P1 The student solves problems (using appropriate technology).*

*MA1P3 The student communicates mathematically.*

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*SCSh2 The student uses standard safety practices for all classroom laboratory and field investigations.*

*SCSh3 The student identifies and investigates problems scientifically.*

*SCSh4 The student uses tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

*SP1 The student analyzes the relationships between force, mass, gravity, and the motion of objects.*

*SPS5 The student compares and contrasts the phases of matter as they relate to atomic and molecular motion.*

*SPS7 The student relates transformations and flow of energy within a system.*

**AG-AMIII-3. Students will join metals together using the metal inert gas and/or tungsten inert gas welding process and cut metal using the plasma arc torch.**

- a. Describe adjustments and controls for welding and cutting equipment.
- b. Select appropriate materials for welding and cutting equipment.
- c. Adjust welding and cutting equipment for optimum performance.
- d. Practice welding and cutting operations to the standards set by the instructor.
- e. Plan, draw, and estimate materials for a metal project.
- f. Fabricate a metal project.

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*SP1 The student analyzes the relationships between force, mass, gravity, and the motion of objects.*

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**AG-AMIII-4. Students will construct an agricultural structure on a prepared site.**

- a. Interpret property maps to determine boundary lines.
- b. Analyze the impact of topography, climate, and utilities upon building construction.
- c. Analyze the environmental effects of the building being constructed.
- d. Interpret local codes and regulations for building construction.
- e. Interpret a blueprint and specifications of a building.
- f. Apply basic math skills to estimate construction materials.
- g. Identify construction materials for agricultural buildings.
- h. Prepare a materials list for estimating construction materials.
- i. Measure construction materials using measuring tools or instruments.
- j. Record each estimate.
- k. Analyze owner needs and purposes for the building.
- l. Determine storage space requirements.
- m. Design a cost efficient building.
- n. Design an energy efficient building.
- o. Design a building for the weather conditions of the local area.
- p. Set up and manipulate a builder's level and engineer's rod.
- q. Record accurate notes of elevation readings taken.
- r. Describe the importance of accuracy in measurements and calculations.
- s. Analyze building site for possible problems.
- t. Construct batter boards for laying out an agricultural building.
- u. Read a building site plan.
- v. Read measuring devices.
- w. Manipulate tools in the carpenter's tool kit.
- x. Demonstrate carpenter skills used in the building industry.

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*SP1 The student analyzes the relationships between force, mass, gravity, and the motion of objects.*

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**AG-AMIII-5. Students will demonstrate skills necessary for safe operations of electric motors and controls that are used in the agricultural industry.**

- a. Explain the theory and operations of electric motors.
- b. List advantages of electrical motor power.
- c. Explain the use of different types of electric motors.
- d. Describe the parts of an electric motor.
- e. List factors in selecting electric motors.
- f. Recognize types of motor bearings.
- g. Identify types of motor enclosures.

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- h. Demonstrate ability to collect and interpret name plate information.
- i. Select motor control for various agricultural related jobs.
- j. Maintain motor controls.
- k. Interpret a motor control schematic diagram.
- l. Calculate total motor current required.
- m. Analyze proper conductor size based on capacity requirements.
- n. Determine conductor size based on voltage drop.
- o. Select conductor size to meet both capacity and voltage drop requirements.
- p. Determine motor protection load.
- q. Check continuity of the starting and running winds.
- r. Determine the difference between starting and running winds.
- s. Calculate the amount of current drawn.
- t. Identify proper techniques for checking the voltage on electric motors.

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*SPS5 The student compares and contrasts the phases of matter as they relate to atomic and molecular motion.*

*SPS7 The student relates transformations and flow of energy within a system.*

**AG-AMIII-6. Students will recondition, calibrate, and maintain agricultural machinery in a safe and efficient manner.**

- a. Describe the procedures for preparing metal for painting.
- b. Identify the parts of a paint spray gun.
- c. Prepare paint for spraying.
- d. Operate a paint spray gun.
- e. Prepare a paint spray gun for storage.
- f. Recognize skills needed in adjustment and maintenance of agricultural equipment used in the agribusiness industry.
- g. Explore career opportunities in the area of assembling, adjusting, and maintaining agricultural equipment.
- h. Demonstrate skills necessary for assembling agricultural equipment under field conditions.
- i. Practice skills necessary to diagnose maintenance problems, lubricate machines, and make simple repairs.

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*ELA9RL5 The student understands and acquires new vocabulary and uses it correctly in reading and writing.*

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*SCSh4 The student uses tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

*SP1 The student analyzes the relationships between force, mass, gravity, and the motion of objects.*

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*SPS7 The student relates transformations and flow of energy within a system.*

**AG-AMIII-7. Students will demonstrate proper plumbing techniques.**

- a. Identify the types of drain and waste pipe used in agricultural and residential installations.
- b. Select the proper fittings for the planned plumbing installation.
- c. Prepare drain and waste plumbing material for installation.
- d. Install drain and waste plumbing.
- e. Replace worn or broken seals.
- f. Maintain pumping source.
- g. Maintain control systems.
- h. Maintain drainage lines.

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*ELA9RL5 The student understands and acquires new vocabulary and uses it correctly in reading and writing.*

*ELA10W3 The student uses research and technology to support writing.*

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*MA1P3 The student communicates mathematically.*

*SCSh2 The student uses standard safety practices for all classroom laboratory and field investigations.*



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*SCSh3 The student identifies and investigates problems scientifically.*

*SCSh4 The student uses tools and instruments for observing, measuring, and manipulating scientific equipment and materials.*

*SP1 The student analyzes the relationships between force, mass, gravity, and the motion of objects.*

*SPS5 The student compares and contrasts the phases of matter as they relate to atomic and molecular motion.*

*SPS7 The student relates transformations and flow of energy within a system.*

## 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 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

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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.