

## CTE CONTENT AREA: Agriculture

### CONTENT MODULE TITLE: Agriculture Mechanics

#### MODULE DESCRIPTION

This module introduces students to the ways in which power, mechanical, and technical systems are utilized in the agriculture industry. Students investigate ways the agriculture industry uses physical science principles and engineering applications to solve problems and improve performance in power, mechanical, and technical systems. Students explore the career options in agriculture power, mechanical, and technical fields and identify the knowledge, skills, education, and training necessary for success in these fields.

#### GUIDING QUESTION

What knowledge and skills are necessary to demonstrate introductory understanding of how power, mechanical, and technical systems support efficient and effective work in the agriculture industry?

#### MODULE CONTENT

##### **Agriculture Mechanics**

##### 1. Power, Mechanical, and Technical Systems

Students will

- a) List and describe the characteristics of power systems, mechanical systems, and technical systems used in the agriculture industry
- b) Identify the tools, equipment, machinery, and technology typical of power systems, of mechanical systems, and of technical systems in the agriculture industry
- c) Cite examples of ways power, mechanical, and technical systems foster efficient and effective work in the agriculture industry
- d) Explain how technological advances have changed the applications of power, mechanical, and technical systems in the agriculture industry

##### 2. Safety

Students will

- a) Explain hazards associated with the tools, equipment, machinery, and technology used in agricultural power, mechanical, and technical systems
- b) Follow guidelines for safe use of agriculture tools, equipment, machinery, and technology
- c) Demonstrate appropriate and consistent use of safety features found on agricultural tools, equipment, and machinery
- d) Demonstrate appropriate use and care of Personal Protective Equipment (PPE) and safety apparel in agriculture

##### 3. Tools, Equipment, and Machinery

Students will

- a) Identify and select the appropriate tools, equipment, and machinery for use in specific agricultural tasks

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- b) Investigate the role and importance of regularly scheduled inspection and maintenance of agricultural tools, equipment, and machines
- c) Demonstrate development of hand and power tool skills through practice of these skills in a variety of classroom applications

#### 4. Project Design and Construction

Students will

- a) Design a construction project to meet a need in animal, plant, or conservation agriculture
- b) List and describe the properties of wood, metal, and plastic
- c) Select project materials based on an analysis of the project and the quality of the materials
- d) Identify the tools, machines, and equipment needed to construct and/or fabricate a project
- e) Develop construction skills by operating tools, machines, and equipment to construct a project
- f) Assess project quality and efficiency of workmanship

#### 5. Technical Systems

Students will

- a) Describe complex problems facing the agriculture industry
- b) Identify problem-solving methods and apply steps in a variety of classroom scenarios
- c) Research technical systems and technologies used to solve problems and increase efficiency in the agriculture industry
- d) Analyze data using computer programs and other current technologies used in agriculture
- e) Cite examples of advances made in agriculture due to advances in technical systems

#### 6. Careers in Agriculture Power, Mechanics, and Technical Fields

Students will

- a) Investigate a career in agriculture power, mechanics, or technical fields and identify the pathways used to reach that career
- b) Assess personal knowledge, skills, and interest in careers in agriculture, mechanics, and technical fields and evaluate personal suitability for these careers

## **ILLUSTRATIVE ACTIVITIES by Theme Module**

### **Career and Community Connections**

#### Postsecondary Opportunities

Students research local community college certificate and degree programs that prepare workers for agricultural careers in power, mechanical, and technical systems. Students prepare questions based on their research. Invite college admissions and/or program representatives to class to share program information and to answer students' questions. Students prepare Q&A index cards based on their research and the presentations.

### **Communication and Interpersonal Relationships**

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## Teach the Teacher

Students learn how to properly and safely use the equipment and tools in the classroom. After mastering a piece of equipment, students invite another teacher (or other adult) to class where they teach the teacher how to use that particular piece of equipment. Teachers assess whether they would be able to attempt safe use of the equipment based on the students' teachings. Students refine their teaching based on feedback from the teachers they taught.

## Financial and Consumer Literacy

### Project Cost Estimate

Students work in small groups to design construction projects to meet a need in animal, plant, or conservation agriculture. Student groups draw project plans and prepare a bill of materials. Student groups complete estimates showing material and labor costs for implementation of their construction project design. Groups present their plans and the class decides which project to construct.

## Health, Safety, and Wellness

### Personal Protective Equipment

Students research common safety hazards associated with agricultural tools, equipment, and machinery. Students investigate the Personal Protective Equipment (PPE) and safety apparel available to protect agricultural workers from the common hazards. Students prepare safety posters reminding classmates to utilize PPE and safety apparel each time they are using agricultural tools, equipment, or machines. Hang safety posters in strategic locations throughout the classroom.

## Problem Solving and Innovation

### The Perfect Tool

As a class, brainstorm a list of everyday challenges or problems that occur in an agriculture setting. Divide the class into teams and have each team choose a challenge from the class list. Teams design the perfect tool to solve the problem and create a prototype tool. Teams invite school leaders and community members to a "Perfect Tool" presentation event. Students may also wish to participate in the related FFA Jr. "Tool ID" event ([New York State FFA Tool ID](#)).

## Sustainability

### Construction Project

Students build construction projects to fill a need in animal, plant, or conservation agriculture using repurposed items or materials that otherwise would end up in a landfill. Students collect materials from school and community members and donate finished projects to fill community needs.

## STANDARDS ADDRESSED

New York State Career Development and Occupational Studies (CDOS) Standards

Intermediate Level

<http://www.p12.nysed.gov/cte/>

Standard 1: Career Development

Students will be knowledgeable about the world of work, explore career options, and

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relate personal skills, aptitudes, and abilities to future career decisions.

Standard 2: Integrated Learning

Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings.

Standard 3a: Universal Foundation Skills

Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace.

Common Career Technical Core Standards

<https://www.careertech.org/career-ready-practices>

Career Ready Practices

1. Act as a responsible and contributing citizen and employee
2. Apply appropriate and academic and technical skills
3. Attend to personal health and financial well-being
5. Consider environmental, social, and economic impacts of decisions
6. Demonstrate creativity and innovation
7. Employ valid and reliable research strategies
8. Utilize critical thinking to make sense of problems and persevere in solving them
10. Plan education and career paths aligned to personal goals
11. Use technology to enhance productivity

National Agricultural Education Standards

<https://www.ffa.org/thecouncil/afnr>

CS.05. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food and Natural Resources career pathways.

PST.01. Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural and technical systems.

\* CRP .01, .02, .03, .05, .06, .07, .08, .10, .11 Standards coincide with Common Career Technical Core Standards

## RESOURCES

United States Department of Agriculture (USDA)

Forest Service

<https://www.fs.usda.gov/main/conservationeducation/educator-toolbox/middle-school>

This website contains a variety of Forest Service and partner conservation education programs and materials for middle school teachers and students.

New York Agriculture In The Classroom (NYAITC)

[www.agclassroom.org/ny/](http://www.agclassroom.org/ny/)

This website is a partnership of Cornell University, the NYS Department of Agriculture and Markets, the NYS Education Department, Cornell Cooperative Extension, and the New York Farm Bureau. Resources include the Agricultural Literacy Curriculum Matrix, lesson plans, and websites for classroom use.

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National FFA

Ag Explorer

<https://www.agexplorer.com>

National FFA and Discovery Education have created a comprehensive career resource to help students explore the broad range of careers within the industry of agriculture. Students learn about agriculture careers by watching the videos, exploring the career pages and completing the Career Finder interactive.

New York State FFA

[nysffa.org](http://nysffa.org)

The New York State FFA webpage contains information on events. Junior Competition Events information, FFA Manual, FFA Student handbook, and state contacts are also available.

American Farm Bureau Foundation for Agriculture

[www.agfoundation.org](http://www.agfoundation.org)

This website contains free downloadable materials to help students develop agricultural literacy and links to other resources for classroom use. Some materials are specifically developed for middle- school students.

New York State Department of Labor

New York State Career Zone

<https://www.careerzone.ny.gov>

Career Zone is a no-cost online career exploration and planning tool developed by the New York State Department of Labor. It offers career and education information on thousands of careers, as well as, self-assessment and career planning tools. Career Zone is appropriate for users from middle school through adult.

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Association of Career and Technical Education

Career Planning Guide

[https://www.acteonline.org/wp-content/uploads/2018/02/ACTE\\_CC\\_Paper\\_FINAL.pdf](https://www.acteonline.org/wp-content/uploads/2018/02/ACTE_CC_Paper_FINAL.pdf)

Research has identified middle school as a time when students can benefit the most from career exploration, a process of building self-awareness, learning about potential careers, and developing a plan for reaching future goals.

AdvanceCTE

Middle Level Career Interest Inventory

<https://cte.careertech.org/sites/default/files/StudentInterestSurvey-English.pdf>

AdvanceCTE provides a Career Interest Inventory worksheet to use with students in helping them identify the potential matches to the 16 career clusters available to

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them.

Association of CTE Administrators (ACTEA)

CTE Strong Videos

<http://www.ctestrong.com>

Edge Factor has created a series of videos related to career and education that provide students with a very contemporary perspective on CTE options. Career Cluster videos provide a new look at the many career options that students have in high school and beyond.

Career and Technical Education Technical Assistance Center of New York (CTE TAC)

<http://nyctecenter.org/>

The Career and Technical Education Technical Assistance Center (CTE TAC) operates under a state contract to assist the New York State Education Department (NYSED) in carrying out its mission of improving the quality, access, and delivery of career and technical education through research-based methods and strategies resulting in broader CTE opportunities for all students.