

EQUIPMENT OPERATION AND MAINTENANCE

COURSE CODE: 5621

COURSE DESCRIPTION:

This course is designed to teach students how to operate and maintain equipment commonly used in the agricultural industry. It includes equipment used in all four of the Agriculture, Food and Natural Resources pathways: Horticulture, Plant and Animal Systems, Environmental and Natural Resources Management and Agricultural Mechanics and Technology.

Typical instructional activities include hands-on experiences with agricultural power units; participating in personal and community leadership development activities; planning and implementing a relevant school-to-work transition experience; and participating in FFA activities. This is a list of core competencies to be completed in two years by each student enrolled in these courses. The teacher may select additional competencies based on a local needs assessment.

This course is a component of the following Agriculture, Food and Natural Resources Pathways:

- Agricultural Mechanics and Technology
- Environmental and Natural Resources Management
- Horticulture
- Plant and Animal Systems

OBJECTIVE:

Given the necessary equipment, supplies, and facilities, the student, upon completion of the prescribed number of instructional hours, will be able to successfully complete the following core competencies.

Credit: 1 unit

Equipment Operation and Maintenance

Unit A: Power and Technology in the Agricultural Industry

Lesson 1: The Importance of Agricultural Power and Technology

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe the emergence of agricultural power and technology
2. Identify areas of the agricultural power and technology industry.
3. Select and use information, resources and systems of operation in agricultural power.

Lesson 2: Opportunities in Agricultural Power and Technology

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify career opportunities
2. Discuss Personal needed education and technical skills
3. Plan and manage a supervised agricultural education experience.

Lesson 3: Safety in Agricultural Power and Technology

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify and describe the major causes of accidents.
2. Discuss methods of accident prevention.
3. Describe appropriate procedures in case of an accident.
4. Select and use personal safety equipment.

Lesson 4: Tools used in Equipment Maintenance

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Select, Identify and properly use tools utilized in machinery and equipment maintenance.
2. Discuss the use of diagnostic instruments and testers.
3. Identify worn and damaged tools.

Lesson 5: Maintenance and storage facilities

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain the importance of maintenance and storage of equipment.
2. Design a maintenance and storage facility.
3. Discuss the procedures in storing of equipment.
4. Discuss the handling and storing of petroleum products.

Unit B: Agricultural Equipment

Lesson 1: Applying Science Principles and Practices

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain the importance of physical science in agricultural power equipment.
2. Describe mechanical advantage
3. Explain how changing the state of matter can be used to transfer heat.
4. Explain how chemical energy is converted to electrical energy and then mechanical energy.

Lesson 2: Tractors

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify the kinds and uses of agricultural tractors.
2. Demonstrate the use of the equipment operators manual.
3. Demonstrate the safe operation of a tractor.
4. Describe the role of a tractor operator in maintenance.
5. Perform preventive maintenance procedures.
6. Explain the purpose and procedure of keeping proper maintenance records.
7. Explain troubleshooting and how it is used.

Lesson 3: Production Equipment

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe the importance of equipment in agricultural production.
2. Identify types and uses of tillage equipment.
3. Identify the types and uses of planting equipment, including calibration.
4. Identify the kinds and uses of application equipment, including calibration.
5. Identify the kinds and uses of harvesting equipment.

Lesson 4: Turf and Landscape Equipment

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify the kinds and uses of hand tools in turf and landscaping.
2. Identify the kinds and uses of turf power equipment.
3. Demonstrate mower blade sharpening.
4. Identify the kinds and uses of landscape power equipment.
5. Maintain landscape power equipment.

Lesson 5: Specialty Equipment

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe the kinds, uses and maintenance of materials-handling equipment.
2. Describe the uses and safe operation of an all terrain vehicle.

Unit C: Power Sources and Operation

Lesson 1: Internal Combustion Engine Systems and Functions

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain the meaning of internal combustion and related engine terms.
2. Describe the operation of a four stroke and two cycle engine.
3. Identify and describe the functions of engine components.

Lesson 2: Rebuilding small air-cooled gasoline engines

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify considerations in rebuilding or replacing a small, air-cooled gasoline engine
2. Describe how to use an engine service and repair manual.
3. Read and interpret engine identification numbers.
4. Describe a general method of diagnosing small-engine problems..
5. Perform and conduct small-engine diagnostic tests.
6. Correctly and safely disassemble a small engine.
7. Clean small engine components
8. Evaluate small-engine components and recondition as appropriate.
9. Reassemble a small engine and make preliminary adjustments..

Lesson 3: Maintaining Diesel Engines

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain the operation of a diesel engine.
2. Identify the importance of fuel-injection systems.
3. Identify the maintenance practice for with diesel engines.
4. Troubleshoot a diesel engine.

Lesson 4: Engine Power and Efficiency

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Define and calculate work, torque, power and horsepower using correct units.
2. Explain types of power ratings.
3. Describe the measurement of engine and tractor power and use the findings to improve efficiency.
4. Discuss the meaning of efficiency.

Lesson 5: Power Trains

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Explain the meaning and components of a power train.
2. Describe how to maintain a transmission and drive system.
3. Differentiate types of transmission fluid.
4. Describe how to service a power train.

Lesson 6: Precision Technology

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Define precision technology and explain its role in agriculture.
2. Explain the use of Global Positioning System in precision agriculture..
3. Explain the use of a geographic information system in precision agriculture.
4. Discuss the advantages and disadvantages of precision technology.

Unit D Supervised Experience in Agriculture

Lesson 1. Keeping and Using SAE Records

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain how SAE records are organized.
2. Identify the procedures to making entries in the SAE records.
3. Explain how to summarize and analyze the SAE records.

Lesson 2. Making Long Range Plans for Expanding SAE Programs

Student Learning Objective: Instruction in this lesson should result in students achieving the following objectives:

1. Identify the factors that should be considered in expanding an SAE program.
2. Explain how placement and ownership SAE programs may be expanded.

Unit E Developing Leadership Skills in Agriculture

Lesson 1. Planning and Organizing an FFA Meeting

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain how to plan a meeting and develop the order of business.
2. Describe how to set up the meeting room.
3. Explain the parliamentary procedure used in an FFA meeting.

Lesson 2. Developing an Awareness for Your Community

Student Learning Objectives:.. Instruction in this lesson should result in students achieving the following objectives:

1. Describe the meaning and importance of community service.
2. List and identify community service organizations.
3. Explain how FFA members can be involved with community improvement and development.

Lesson 3. State FFA Degree

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. List the requirements for the State FFA Degree.
2. Explain how a FFA member can obtain the State FFA Degree.

Unit F Developing Communication Skills

Lesson 1—Introduction to Communication

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Define communication and explain its purpose.
2. Identify the components of the communication process.
3. Identify the five different levels of communication.
4. Explain the barriers of successful communication.
5. Explain the relationship between communication and leadership.

Lesson 2—Organizing and Presenting a Persuasive Message

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain the steps in preparing a persuasive message.
2. Describe delivery techniques in a persuasive message.

Lesson 3—Using Communication Skills In Appropriate Situations

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Understand the role of communication skills in the workplace.
2. Understand how to present a problem to a supervisor.
3. Identify the techniques used in requesting information from a supervisor.
4. Explain the role of written communication in an agribusiness.

Unit G Gaining Employment**Lesson 1—Developing Goals**

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain the process of goal setting.
2. Describe the terms and types of goals.
3. Explain some aspects of effective goals.

Lesson 2—Finding a Job

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Describe information sources for job opportunities.
2. Develop a system to evaluate job openings.

Lesson 3—Applying for a Job

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain how to research a job opportunity.
2. Describe two methods of applying for a job.
3. Identify the common types of information requested on a job application form..

Lesson 4—Writing a Résumé and Letter of Application

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Explain the purpose of a résumé.
2. List the main items that should be included in a résumé.
3. Describe the purpose of a letter of application and its primary elements.