

STRANDS AND STANDARDS

AGRICULTURAL MECHANICS & TECHNOLOGY 1



Course Description

Students will develop knowledge and skills in the application of principles and techniques of power, structural, and technical systems used in the agricultural industry, particularly agricultural production and service. Students will develop basic skills in areas of hot and cold metal work, tool reconditioning, plumbing, painting, bill of materials preparation, small gas engines, and welding. The basic practices associated with soil and water management are included. Safety and proper use of tools and equipment will be emphasized.

Intended Grade Level	9-12
Units of Credit	1.0
Core Code	30.01.00.00.030
Concurrent Enrollment Core Code	N/A
Prerequisite	N/A
Skill Certification Test Number	110
Test Weight	1.0
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Agriculture (CTE/General)
Endorsement 2	Agriculture Mechanization
Endorsement 3	

STRAND 1

Student will participate in personal and leadership development activities through the FFA.

Standard 1

Student will use communication skills to effectively communicate with others.

- Understand when it is appropriate to listen and to speak.
- Understand and follow verbal and written instructions for classroom and laboratory activities.

Standard 2

Student will effectively use teamwork to respectfully work with others.

- Identify and understand different roles in working with a team

Standard 3

Student will use critical thinking and problem-solving skills

- Analyze the cause of the problem.
- Develop a solution to address the problem.
- Implement the plan.
- Evaluate the effectiveness of the plan.
- Use generally accepted industry standards to analyze, evaluate, troubleshoot and diagnose the challenges associated with a specific repair, maintenance, or fabrication project.

Standard 4

Student will be dependable, reliable, steady, trustworthy and consistent in performance and behavior.

- Set and meet goals on attendance and punctuality.
- Prioritize, plan and manage work to complete assignments and projects on time.

Standard 5

Student will be accountable for results.

- Use an achievement chart for activities and behaviors in class that encourages a personal evaluation of classroom performance.
- File a weekly/bi-weekly written report on progress toward completion of assignments and projects.

Standard 6

Be familiar with the legal requirements and expectations of the course.

- Be familiar with the course disclosure statement and all requirements for successful completion of the course.
- Demonstrate workplace ethics, e.g. fair, honest, disciplined.

STRAND 2

Student will participate in work-based learning activities through the Supervised Agricultural Experience (SAE) Program.

Standard 1

Student will demonstrate employability skills.

- Use a career search network to find career choices.
- Identify appropriate CTE Pathway for selected career choice.
- Write a resume including a list of demonstrated skills.
- Write a letter of application.
- Complete a job application.

- Participate in an actual or simulated job interview.

Standard 2

Student will participate in a work-based learning experience outside the classroom

- Student will plan and implement a Supervised Agricultural Experience Program from at least one of the following areas; ownership/entrepreneurship, placement/internship, research, school-based enterprise, and/or service-learning experiences.

Standard 3

Student will develop a job portfolio specific to their selected work-based learning experience.

- Student will keep a personal record/journal/log of their work-based learning experience; including pictures, financial records, skills learned, hours associated with project, goals, reflection, etc.

STRAND 3

Student will demonstrate appropriate safety practices in agricultural power, structural, and technical systems in laboratory and work settings.

Standard 1

Explain the meaning and importance of safety in agricultural power, structural, and technical systems.

- Define safety and describe why it is important.
- Identify safety hazards, and demonstrate the actions needed to minimize or eliminate risk associated with agricultural power, structural, and technical systems in learning and/or work situations.

Standard 2

Implement safety practices related to agricultural power, structural, and technical systems in learning and work situations.

- Identify, select, and properly use appropriate personal protective equipment (PPE).
- Verify that all equipment is in good operating condition and that appropriate safety devices are in place and working (e.g., guards in place, tool rests adjusted, etc.).
- Maintain neat, well-organized, well-ventilated, and safe work areas.

Standard 3

Identify fire hazard conditions and actions to take in case of fire.

- Explain combustion and identify three conditions necessary for it to occur.
- Describe fire prevention in agricultural power, structural, and technical systems.
- Explain classes of fires and appropriate extinguishers.

Standard 4

Take appropriate actions in an accident or emergency.

- Demonstrate the use of simple first aid in an accident with an injury.
- Locate first-aid kits, and investigate their contents and use in power, structural, and technical systems settings.
- Discuss appropriate safety responses in an accident or emergency.

STRAND 4

Students will plan, construct, and appropriately maintain agricultural structures.

Standard 1

Create and/or use sketches, plans, and specifications for agricultural structures.

- Identify symbols and drawing techniques used in creating sketches and plans.
- Use scale measurement and dimensions with sketches and plans.
- Identify and interpret different views of a construction drawing.
- Develop sketches or plans for an agricultural structure.

Standard 2

Determine materials for agricultural structures.

- Identify types and grades of materials used in constructing agricultural structures, including lumber, plywood, manufactured materials (e.g. particle board and wafer board), roofing, insulation, and doors and windows.
- Identify common fasteners and other devices used in constructing agricultural structures.
- Identify dimensions and sizes of materials and fasteners used in agricultural structures.

Standard 3

Construct a small agricultural structure or project.

- Identify and demonstrate safe and proper use of common tools used in agricultural construction.
- Select materials for a construction project.
- Prepare a bill of materials for a small structure or project, including a cost estimate.
- Measure, mark, and cut materials according to plans for an agricultural structure.
- Assemble an agricultural structure by properly fitting materials and using fasteners.
- Evaluate a completed structure in terms of plans and quality of work.

Standard 4

Select and use appropriate protective coatings, such as paints and preservatives.

- Discuss the importance of properly selecting and using paints and preservatives.
- Identify and use appropriate application methods for coating materials, including surface preparation and safety.
- Maintain painting tools and equipment by proper cleaning, storage, and on-job use.

STRAND 5

Student will demonstrate basic plumbing knowledge and perform simple plumbing skills.

Standard 1

Demonstrate basic plumbing knowledge and skills.

- Distinguish plumbing materials and products (copper, iron, steel, PVC, and PEX).
- Describe the meaning and importance of plumbing systems for air, water, wastes, and other fluid-based materials.
- Identify components of plumbing supply systems and waste systems, including pipe, tubing, valves, faucets, fittings, and fixtures.
- Describe how plumbing system components are sized, and appropriately match sizes to jobs.
- Prepare a bill of materials for a plumbing job.

Standard 2

Perform simple plumbing jobs.

- Identify and select appropriate tools for a plumbing job.
- Measure, cut, fit, and install PVC and/or PEX materials as used in water supply systems.
- Measure, cut, thread, and install iron or steel pipe materials as used in water supply systems.
- Demonstrate the use of sweating\soldering in plumbing applications.
- Repair and maintain plumbing systems.

STRAND 6

Student will select, operate, maintain, and repair small internal combustion engines.

Standard 1

Select and operate internal combustion engines.

- Identify components and systems of internal combustion engines.
- Describe the operation of internal combustion engines by cycle and fuel used.
- Use the operator's manual to operate and maintain an engine properly.
- List and explain criteria to use in selecting an engine.
- Obtain and/or prepare the proper fuel for an internal combustion engine.

Standard 2

Analyze and troubleshoot internal combustion engines.

- Identify the major components of internal combustion engines and the functions of each.
- Explain the meaning of troubleshooting and list the common engine problems identified/solved by troubleshooting.

Standard 3

Maintain internal combustion engines.

- Perform routine maintenance, such as cleaning an engine, changing the oil, and cleaning or replacing the air filter.
- Replace and adjust spark plugs as needed.
- Winterize or otherwise prepare an engine for extended storage.
- Practice environmental responsibility through the proper disposal of engine wastes, such as oil and filters.

Standard 4

Understand the operation of small equipment powered by internal combustion engines.

- Identify safety hazards and practices to follow to assure safe operation with small equipment, including mowers, tillers, blowers, and edgers.
- Explain the meaning and importance of pre-operation inspections, including those of fuel and oil levels, the air system, and the condition of engine components.
- Start and safely operate engine-powered equipment.
- Stop and properly cool down and store engine-powered equipment.

STRAND 7

Students will fabricate with metal.

Standard 1

Explain kinds of metals and their uses.

- Identify kinds of metals by appearance and testing, such as spark testing.
- Classify metals according to characteristics and uses.
- Identify, maintain, recondition, and use tools in hot and cold metal work.

Standard 2

Fabricate with hot and cold metal.

- Select and use appropriate safety practices in metal fabrication.
- Apply cold metal processes in fabrication, including measuring and marking, cutting, bending, tapping and threading, filing and drilling, and riveting.
- Discuss the use of hot metal processes, including annealing, tempering, bending, welding, cutting, and hole punching.

Standard 3

Use shielded metal arc welding (SMAW) processes.

- Set up for SMAW operations on carbon steel.
- Start and restart an arc and backfill at the edge while running a bead on carbon steel.
- Build a weld pad on carbon steel in the flat position.
- Make 1F (flat position-fillet weld) welds on carbon steel.
- Make 2F (horizontal position-fillet weld) welds on carbon steel.
- Make 1G (flat position-groove weld) welds on carbon steel.
- Make 2G (horizontal position-groove weld) welds on carbon steel.

Standard 4

Use manual oxyfuel gas cutting processes.

- Perform safety inspections of equipment and accessories.
- Set up for manual oxyfuel gas cutting operations on carbon steel.
- Perform straight cutting operations on carbon steel.
- Perform shape-cutting operations on carbon steel.
- Perform bevel-cutting operations on carbon steel.
- Pierce a hole through a carbon steel plate.

Standard 5

Use gas metal arc welding (GMAW) processes.

- Set up for GMAW operations on carbon steel.
- Start and restart an arc and backfill at the edge while running a bead on carbon steel.
- Use Short Circuit Transfer welding process to make 1F (flat position-fillet weld) welds on carbon steel.
- Use Short Circuit Transfer welding process to make 2F (horizontal position-fillet weld) welds on carbon steel.
- Use Short Circuit Transfer welding process to make 1G (flat position-groove weld) welds on carbon steel.
- Use Short Circuit Transfer welding process to make 2G (horizontal position-groove weld) welds on carbon steel.

Performance Skills

- File a weekly/bi-weekly written report on progress toward completion of assignments and projects.
- Student will keep a personal record/journal/log of their work-based learning experience; including pictures, financial records, skills learned, hours associated with project, goals, reflection, etc.
- Maintain a neat, well-organized laboratory or shop working area.
- Assemble an agricultural structure by properly fitting materials and using fasteners.
- Perform simple plumbing jobs.
- Start, operate, and shut down an internal combustion engine.
- Use SMAW to make 1G (flat position-groove weld) welds on carbon steel.
- Use GMAW/Short Circuit Transfer welding process to make 1G (flat position-groove weld) welds on carbon steel.
- Use a manual oxy/fuel system to perform straight cutting operations on carbon steel.

Skill Certification Test Points by Strand

Test Name	Est #	Number of Test Points by Strand										Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10		