New Mexico Agriculture, Food & Natural Resources Course Framework

Agricultural Power and Machinery (0154)

Suggested Course Length: 180 Days

AFNR Pathway: Power, Structural and Technical Systems (PST) with supporting Agribusiness Systems (ABS) components.

Instructional Design Philosophy

This course should utilize a **project-based and laboratory-centered instructional model** where students develop technical competencies through hands-on application, equipment operation, diagnostics, maintenance, troubleshooting, repair, and precision agriculture technologies.

The SAE should serve as the backbone of instruction. Students should maintain a mechanical, technical, fabrication, repair, maintenance, or precision agriculture SAE throughout the course. The SAE becomes the laboratory extension of classroom instruction and provides real-world application of technical competencies.

Unit 1: Introduction to Agricultural Mechanization

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Identifying Basic Areas of Agricultural Mechanization	PST.01 Mechanical Systems Fundamentals	Agricultural Mechanization Inventory	MyCAERT, CASE AIM	Agricultural Mechanics SAE
Agricultural Equipment Systems	PST.01 Equipment Identification	Equipment Identification Exam	Equipment Manuals	Agricultural Mechanics CDE
Mechanization Safety	PST.01 Safety Practices	Shop Safety Assessment	OSHA Resources	Workplace Safety SAE

Unit Assessment

- Agricultural Equipment Identification Practicum
- Shop Safety Certification

Unit 2: Internal Combustion Engines

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Principles of Internal Combustion Engines	PST.02 Power Systems	Engine Operation Demonstration	Small Engine Textbooks	Repair SAE
Engine Systems & Components	PST.02 Equipment Diagnostics	Component Identification Lab	Service Manuals	Engine Restoration Project
Engine Measurements & Specifications	PST.02 Technical Troubleshooting	Engine Measurement Lab	Precision Measurement Tools	Mechanics SAE

Unit Assessment

- Engine Tear-Down and Reassembly
- Engine Components Examination

Unit 3: Preventative Maintenance and Service

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Preventative Maintenance	PST.02 Equipment Maintenance	Maintenance Plan	Equipment Manuals	Equipment Maintenance SAE
Fluid and Lubricant Applications	PST.02 Equipment Service Systems	Fluid Analysis Activity	Manufacturer Resources	Farm Equipment SAE
Troubleshooting Equipment	PST.02 Diagnostic Procedures	Equipment Diagnostics Report	Service Guides	SkillsUSA/FFA Preparation

Unit Assessment

- Maintenance Portfolio
- Diagnostic Troubleshooting Lab

Unit 4: Small Engines

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Using Small Engines	PST.02.01 Power Equipment Systems	Small Engine Overhaul	Briggs & Stratton Resources	Entrepreneurship SAE
Engine Repair	PST.02 Maintenance Procedures	Repair Documentation	Technical Service Manuals	Repair Business SAE
Performance Analysis	PST.02 Equipment Evaluation	Engine Performance Report	Diagnostic Equipment	Agricultural Mechanics CDE

Unit Assessment

- Small Engine Rebuild Project

Unit 5: Multi-Cylinder Engines and Power Transmission

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Multiple Cylinder Engines	PST.02 Power Systems	Engine Comparison Report	Manufacturer Guides	Agricultural Engineering SAE
Power Transmission Systems	PST.02.02 Equipment Systems	Transmission Analysis	Service Manuals	Equipment Repair SAE
Troubleshooting Power Systems	PST.02 Diagnostic Procedures	Troubleshooting Exercise	Industry Resources	Placement SAE

Unit Assessment

- Transmission Troubleshooting Project

Unit 6: Hydraulic and Pneumatic Systems

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Hydraulic Systems	PST.04 Mechanical Applications	Hydraulic Circuit Analysis	Hydraulic Training Materials	Repair SAE
Pneumatic Systems	PST.04 Equipment Operation	Pneumatic Systems Lab	Industry Training Resources	Technical SAE
System Maintenance	PST.04 Maintenance Practices	Maintenance Checklist	Equipment Manuals	Agricultural Mechanics CDE

Unit Assessment

- Hydraulic System Service Project

Unit 7: Electrical and Monitoring Systems

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Vehicle Electrical Systems	PST.05 Technological Systems	Wiring Diagram Interpretation	Schematics and Service Manuals	Electrical Repair SAE
Monitoring Systems	PST.05 Equipment Monitoring Technologies	System Analysis Report	Industry Software	Precision Agriculture SAE
Diagnostic Equipment	PST.05 Technology Applications	Diagnostic Exercise	Industry Equipment	Agricultural Technology Careers

Unit Assessment

- Electrical Troubleshooting Practicum

Unit 8: Precision Agriculture Technologies

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
GPS Applications	**PST.05.03.01.a** Identify geospatial technologies used in AFNR systems. [2024 AFNR...e Document | PDF]	GPS Equipment Demonstration	GPS Training Resources	Precision Agriculture SAE
Precision Technology Systems	**PST.05.03.02.a** Describe the components of precision technologies used in AFNR systems. [2024 AFNR...e Document | PDF]	Precision Agriculture Equipment Review	Precision Ag Resources	Agricultural Technology SAE
Economic Applications	**PST.05.03.02.b** Analyze the economic impact of utilizing precision technologies in AFNR systems. [2024 AFNR...e Document | PDF]	Cost-Benefit Analysis	Precision Agriculture Industry Materials	Agribusiness Connection

Unit Assessment

- Precision Agriculture Technology Project

Unit 9: Robotics and Emerging Technologies

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Robotic Systems	PST.05 Advanced Technology Systems	Robotics Demonstration	Robotics Kits	Engineering SAE
Remote Sensing Technology	**PST.05.03.01.b** Assess geospatial technology applications in AFNR systems. [2024 AFNR...e Document | PDF]	Remote Sensing Analysis	GIS/Remote Sensing Resources	Research SAE
Future Technology	PST.05 Innovation Applications	Emerging Technology Report	Industry Publications	Entrepreneurship SAE

Unit Assessment

- Agricultural Technology Showcase

Unit 10: Agricultural Equipment Operations

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Tillage Systems	PST.04 Field Equipment Operations	Equipment Calibration Lab	Equipment Manuals	Production SAE
Planting Systems	PST.04 Equipment Calibration	Planting System Evaluation	Precision Agriculture Resources	Crop Production SAE
Irrigation Systems	PST.04 Agricultural Water Systems	Irrigation Maintenance Project	Extension Publications	Irrigation Management SAE

Unit Assessment

- Equipment Operations Practicum

Unit 11: Harvest and Waste Management Systems

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Forage Harvest Systems	PST.04 Agricultural Equipment Systems	Harvest Equipment Analysis	Manufacturer Manuals	Production Agriculture SAE
Grain Harvesting Systems	PST.04 Equipment Operation and Maintenance	Grain Management Project	Industry Equipment Guides	Crop Production SAE
Animal Waste Management Systems	PST.04 Environmental Equipment Applications	Waste Management Evaluation	NMSU Extension	Livestock SAE

Unit Assessment

- Equipment Management Portfolio

Unit 12: Agricultural Power & Machinery Capstone

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Machinery Diagnostics	PST.02 Equipment Diagnostics	Complete Diagnostic Report	Service Manuals	Agricultural Mechanics SAE
Precision Technology Integration	**PST.05.03.01.c** Analyze and interpret data from maps utilizing geospatial technologies. [2024 AFNR...e Document | PDF]	Precision Agriculture Project	GIS Resources	Precision Agriculture SAE
Maintenance Planning	PST.04 Maintenance Systems	Equipment Maintenance Plan	Industry Resources	Placement SAE
Career Development	CRP.01 Career Planning and Management	Career Portfolio	AgCareers	Degree Advancement

Capstone Assessment

Students develop and present a complete **Agricultural Equipment Management Portfolio** including:

1. Equipment Inventory
2. Preventative Maintenance Plan
3. Repair Documentation
4. Hydraulic System Analysis
5. Electrical System Diagnostics

6. Precision Agriculture Technology Application
7. Equipment Calibration Records
8. Safety Documentation
9. SAE Documentation
10. Career Development Portfolio

SAE Backbone Model

Quarter	SAE Milestone
Q1	Equipment evaluation, safety training, and maintenance planning
Q2	Engine repair, hydraulic systems, and diagnostic skill development
Q3	Precision agriculture, electronics, GPS, and technology integration
Q4	Equipment management project and capstone portfolio

End Goal

Every student completes a documented Agricultural Mechanics, Placement, Engineering, Precision Agriculture, Repair, or Entrepreneurship SAE that supports:

- Agricultural Mechanics CDE
- Agricultural Technology and Mechanical Systems Pathways
- FFA Degree Advancement
- Agricultural Proficiency Awards

- Industry Certifications
- Workforce Development
- Postsecondary Technical Program Preparation

This course should serve as New Mexico's foundational agricultural mechanics and precision agriculture course, combining traditional power and machinery skills with modern technology and precision agriculture applications.