New Mexico Agriculture, Food & Natural Resources Course Framework

Metal Fabrication for the Agricultural Industry (0153)

Suggested Course Length: 180 Days

AFNR Pathway: Power, Structural & Technical Systems (PST) with supporting Agribusiness Systems (ABS)

Prerequisite: Introduction to Agricultural Mechanics (0151) Recommended

Instructional Design Philosophy

Metal Fabrication for the Agricultural Industry is an advanced agricultural mechanics'course focused on welding, metal fabrication, project design, material selection, tool room management, safety, construction standards, and career readiness. Students apply technical knowledge and hands-on skills to design, fabricate, repair, and evaluate agricultural projects used throughout the agricultural industry.

The SAE serves as the backbone of instruction. Students should develop Welding, Fabrication, Repair, Construction, Agricultural Mechanics, Metal Art, Entrepreneurship, or Placement SAEs. Every unit contributes to a fabrication portfolio culminating in a capstone fabrication project and business proposal.

Course-at-a-Glance

Quarter	Units	Days
Q1	Units 1-3	45
Q2	Units 4-6	45
Q3	Units 7-9	45
Q4	Units 10-12	45

Unit 1: Agricultural Mechanics Safety and Shop Management

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Identifying Hazards in Agricultural Mechanics	PST.01 Safety Practices	Shop Safety Audit	NCCER Core, OSHA Resources	Welding SAE
Personal Safety in Agriculture	PST.01 Safe Equipment Operation	PPE Assessment	Shop Safety Curriculum	Placement SAE
Tool Room Management	PST.01 Technical Systems Management	Tool Inventory Project	Shop Manuals	Agricultural Mechanics CDE

Unit Assessment

- Shop Safety Certification
- Tool Room Management Project

Unit 2: Foundations of Agricultural Mechanization

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Agricultural Mechanization Systems	PST.01 Technical Systems Overview	Mechanization Report	CASE AIM	Career Exploration SAE
Technological Advances in Mechanics	PST.05 Technology Applications	Technology Analysis	Industry Publications	Ag Technology SAE
Agricultural Mechanics Careers	CRP.01 Career Planning & Management	Career Portfolio	AgCareers	Career Development

Unit Assessment

- Agricultural Technology Report
- Career Pathway Portfolio

Unit 3: Physical Science and Construction Principles

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Physical Science Laws in Mechanics	PST.01 Engineering Principles	Force and Motion Lab	Applied Physics Resources	Engineering SAE
Understanding Construction Codes	PST.01 Construction Systems	Code Compliance Activity	Building Standards Publications	Construction SAE
Problem Solving and Design	CRP.05 Critical Thinking	Design Challenge	CASE Resources	Fabrication SAE

Unit Assessment

- Construction Standards Project
- Applied Physics Activity

Unit 4: Metals and Material Science

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Identifying Metals	PST.01 Materials Technology	Metal Identification Lab	Welding Textbooks	Welding SAE
Physical Properties of Metals	PST.01 Material Science	Material Comparison Study	Industry Resources	Fabrication SAE
Metal Selection for Agriculture	PST.01 Technical Applications	Material Selection Exercise	Manufacturer Specifications	Agricultural Construction SAE

Unit Assessment

- Metal Identification Practicum
- Materials Portfolio

Unit 5: Cold Metalworking and Fabrication Techniques

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Layout and Measurement	PST.01 Fabrication Systems	Layout Project	Shop Resources	Fabrication SAE
Applying Cold Metalworking Techniques	PST.01 Metal Fabrication	Cold Metal Project	Technical Manuals	Welding SAE
Tool Selection and Use	PST.01 Technical Skills	Tool Competency Evaluation	Industry Guides	Placement SAE

Unit Assessment

- Metal Fabrication Project

Unit 6: Fuel Gas Welding and Cutting

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Applying Fuel Gas Welding	PST.01 Welding Applications	Weld Evaluation	NCCER Welding Resources	Welding SAE
Metal Cutting Processes	PST.01 Fabrication Processes	Cutting Project	Industry Welding Guides	Fabrication SAE
Brazing Techniques	PST.01 Joining Processes	Brazing Assessment	Welding Curriculum	Metal Art SAE

Unit Assessment

- Oxy-Fuel Welding Skills Test

Unit 7: Shielded Metal Arc Welding (SMAW)

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Arc Welding Safety	PST.01 Welding Safety Systems	Safety Assessment	NCCER Welding	Welding SAE
Applying SMAW Techniques	PST.01 Welding Processes	Weld Coupon Evaluation	Welding Curriculum	Agricultural Mechanics CDE
Weld Quality Inspection	PST.01 Technical Evaluation	Weld Testing Activity	AWS Standards	Fabrication SAE

Unit Assessment

- SMAW Weld Certification Project

Unit 8: MIG Welding Applications

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
MIG Equipment Setup	PST.01 Welding Equipment Systems	Equipment Setup Evaluation	Industry Manuals	Welding SAE
Applying MIG Welding Techniques	PST.01 Metal Joining Technologies	Fabrication Project	Welding Resources	Entrepreneurship SAE
Weld Evaluation	PST.01 Technical Skill Assessment	Visual Inspection Exercise	AWS Resources	Fabrication Portfolio

Unit Assessment

- MIG Fabrication Project

Unit 9: TIG Welding Applications

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Tungsten Inert Gas Welding	PST.01 Advanced Welding Systems	TIG Weld Evaluation	Industry Resources	Advanced Welding SAE
Specialized Fabrication	PST.01 Precision Fabrication	TIG Fabrication Project	Welding Technology Guides	Metal Design SAE
Weld Quality Analysis	PST.01 Welding Evaluation	Weld Comparison Analysis	AWS Standards	Agricultural Mechanics CDE

Unit Assessment

- TIG Welding Portfolio

Unit 10: Fabrication Design and Project Development

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Fabrication Project Design	PST.01 Engineering Design Principles	Design Portfolio	Design Software	Fabrication SAE
Material Estimation	ABS.01 Business Planning Principles	Material List Development	Industry Cost Guides	Entrepreneurship SAE
Project Planning	PST.01 Technical Planning Systems	Project Proposal	Shop Project Templates	Agricultural Mechanics SAE

Unit Assessment

- Fabrication Design Portfolio

Unit 11: Career Readiness and Agribusiness Applications

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Resumes and Job Applications	CRP.04 Professional Communication	Resume Portfolio	Career Center Resources	Placement SAE
Job Interview Skills	CRP.04 Communication Skills	Mock Interview	Industry Professionals	Employment Skills LDE
Business Goals and Planning	ABS.01 Business Development	Business Goals Project	SBA Resources	Agricultural Entrepreneurship SAE
Agribusiness Organization	ABS.01 Business Operations	Business Structure Analysis	Local Agribusinesses	Entrepreneurship SAE

Unit Assessment

- Career Readiness Portfolio
- Mock Interview Evaluation

Unit 12: Metal Fabrication Capstone

Length: 15 Days

Course Competency	AFNR Performance Indicator	Sample Measurement	Teacher Resources	SAE/FFA Connection
Fabrication Project Construction	PST.01 Integrated Technical Systems	Complete Fabrication Project	Shop Facilities	Agricultural Mechanics SAE
Financial Planning	**ABS.02.02.01.b** Prepare financial reports to describe AFNR business performance.	Project Budget	Farm Credit Resources	Entrepreneurship SAE
Recordkeeping	**ABS.02.01.01.a** Describe accounting systems and procedures used for recordkeeping.	Project Record Book	AET	Degree Applications
Risk and Business Protection	**ABS.04.03.01.a** Describe sources of risk for an AFNR business.	Risk Assessment	Insurance Resources	Agricultural Business SAE

Capstone Assessment

Students develop and present a complete **Metal Fabrication Portfolio** including:

1. Safety Certifications
2. Metal Identification Records
3. Welding Skill Documentation
4. SMAW Project
5. MIG Project
6. TIG Project

7. Fabrication Design Drawings
8. Material Cost Estimate
9. Fabrication Business Plan
10. SAE Documentation and Reflection

SAE Backbone Model

Quarter	SAE Milestone
Q1	Establish welding, fabrication, or mechanics SAE and document safety competencies
Q2	Develop fabrication and welding skill certifications
Q3	Complete advanced welding and fabrication projects
Q4	Design, build, budget, and present capstone fabrication project

End Goal

Every student completes a documented Welding, Fabrication, Agricultural Mechanics, Construction, Repair, Engineering, or Entrepreneurship SAE while developing competencies in:

- Welding Safety
- Oxy-Fuel Welding
- SMAW Welding
- MIG Welding
- TIG Welding

- Metal Fabrication
- Materials Science
- Project Design
- Cost Estimation
- Agribusiness Applications

This course serves as New Mexico's advanced metal fabrication course and aligns naturally with Agricultural Mechanics CDEs, Welding Certifications, Placement SAEs, Fabrication Entrepreneurship Projects, and careers in welding, manufacturing, construction, agricultural equipment repair, and technical trades.