

Ag Mechanics

Course Description:

- Suggested grade level: 10th – 12th
- Pre-requisite: None
- Available Credit: ½ credit
- Text: *Agricultural Mechanics: Fundamentals and Applications, 4th Ed.*
- This lab-intensive course will allow students to learn the basics of concrete, electricity and wiring, plumbing and small gas engines. Basic arc welding, wire-feed welding, and plasma cutting will be covered.

Core Technical Standards and Examples

Indicator #1: Apply safety skills with engineering applications with mechanical equipment, structures, land treatment, power utilization and technology.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Comprehension	P1.1 Observe and define rules of the road to operate machinery and equipment.	<ul style="list-style-type: none"> • X 	<ul style="list-style-type: none"> • X
Application	P1.2 Illustrate and show the use of tools in the workplace to demonstrate safety use and proper skills with construction/fabrication hand tools.	<ul style="list-style-type: none"> • Demonstrate proper use of measurement and layout tools on scrap materials and equipment. • Apply proper use of measurement and layout tools in construction/fabrication of an actual project. • Demonstrate safety and proper techniques using hand and power tools in construction/fabrication. • Identify and demonstrate proper hand and power tool maintenance procedures. 	<ul style="list-style-type: none"> • Welding Unit • Ag Mechanics Textbook, <ul style="list-style-type: none"> ○ Chapter 8 (Layout Tools and Procedures) ○ Chapter 14 (Portable Power Tools) ○ Chapter 16 (Metalworking with Power Machines) ○ Chapter 20 (Repairing and Reconditioning Tools)

Indicator #2: Apply principles of operation, maintenance, service and repair to mechanical equipment, structures, land treatment, power utilization, and technology.

Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Application	P2.1 Perform scheduled service routines to maintain machinery and equipment.	<ul style="list-style-type: none"> • Lubricate machinery and equipment with proper lubrication equipment. • Ensure presence and function of safety systems and hardware by students demonstrating safety. • Perform machine adjustments (e.g. belts, drive chains). • Maintain vehicle, machinery and equipment cleanliness and appearance. • Identify causes of malfunctions and failures. 	<ul style="list-style-type: none"> • Welder Maintenance Unit
Application	P2.2 Apply principles of lubricants to sort and classify lubricants.	<ul style="list-style-type: none"> • X 	<ul style="list-style-type: none"> • X
Evaluation	P2.3 Troubleshoot problems and evaluate performance to service and repair the components of internal combustion engines.	<ul style="list-style-type: none"> • Describe principles of operations by performing a list of operations or students developing a power point. • Identify engine systems and components. • Analyze and troubleshoot small gas engine through hands-on evaluation. • Interpret symbols and diagrams while performing tasks. 	<ul style="list-style-type: none"> • Small Engines Unit • Ag Mechanics Textbook <ul style="list-style-type: none"> ○ Chapter 29 (Fundamentals of Small Engines) ○ Chapter 30 (Small Engine Maintenance and Repair)
Evaluation	P2.4 Understand manufacturers' guidelines to service power transmission and hydraulic systems.	<ul style="list-style-type: none"> • X 	<ul style="list-style-type: none"> • X
Comprehension	P2.5 Evaluate performance and check maintenance manuals to service and repair hydraulic systems.	<ul style="list-style-type: none"> • X 	<ul style="list-style-type: none"> • X
Analysis	P2.6 Interpret from schematics to service vehicle electrical systems.	<ul style="list-style-type: none"> • X 	<ul style="list-style-type: none"> • X

Application	P2.8 Illustrate and show the use of tools in the workplace to demonstrate safety use and proper skills with constructions/fabrication hand tools.	<ul style="list-style-type: none"> • Demonstrate proper use of measurement and layout tools on scrap materials and equipment. • Apply proper use of measurement and layout tools in construction/fabrication of an actual project. • Demonstrate safety and proper techniques using hand and power tools in construction/fabrication. • Identify and demonstrate proper hand and power tool maintenance procedures. 	<ul style="list-style-type: none"> • Welding Unit
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Indicator #3: Exercise basic skills in blueprint and design development to create sketches, drawing and plans with estimate cost.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Comprehension	P3.1 Describe the use of computer skills and or draft tools to develop simple sketches and plans.	<ul style="list-style-type: none"> • Use current technology to develop simple plans and sketches of a metal project. • Identify symbols and drawing techniques used to develop simple plans and sketches on their individual project. • Use scale measurement and dimension to develop simple plans and sketches. 	<ul style="list-style-type: none"> • Welding Unit
Application	P3.2 Examine blueprints and local codes to develop a logical construction plan.	<ul style="list-style-type: none"> • X 	<ul style="list-style-type: none"> • X
Application	P3.3 Use bids and billing information to develop a complete materials list and project cost estimate.	<ul style="list-style-type: none"> • Identify materials used in agricultural construction/fabrication of individual project. • Estimate and select type and quantities of materials and other costs associated with specified project plan. 	<ul style="list-style-type: none"> • Welding Unit • Ag Mechanics Textbook, <ul style="list-style-type: none"> ○ Chapter 18 (Figuring a Bill of Materials) ○ Chapter 19 (Selecting, Planning, and Building a Project)

Indicator #4: Develop skills required to use construction/fabrication equipment and tools.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Analysis	P4.1 Use tools in the workplace to demonstrate safe use and proper skills with construction/fabrication hand tools.	<ul style="list-style-type: none"> • Demonstrate proper use of measurement and layout tools on scrap materials and equipment. • Apply proper use of measurement and layout tools in construction/fabrication of an actual project. • Demonstrate safety and proper techniques using hand and power tools in construction/fabrication. • Identify and demonstrate proper hand and power tool maintenance procedures. 	<ul style="list-style-type: none"> • Welding Unit • Ag Mechanics Textbook, <ul style="list-style-type: none"> ○ Chapter 8 (Layout Tools and Procedures) ○ Chapter 14 (Portable Power Tools) ○ Chapter 16 (Metalworking with Power Machines) ○ Chapter 20 (Repairing and Reconditioning Tools)
Analysis	P4.2 Follow architectural and mechanical plans to construct buildings and facilities.	<ul style="list-style-type: none"> • Construct projects with wood or metal. • Install electrical wiring components and fixtures. • Paint or protect with coating. • Construct with concrete, stone, and brick. 	<ul style="list-style-type: none"> • Welding Unit • Electricity Unit • Concrete Unit
Knowledge	P4.3 Identify safety in electricity.	<ul style="list-style-type: none"> • Observe safety practices with electricity. • Understand Ohm's law. • Interpret wire code procedures. 	<ul style="list-style-type: none"> • Electricity Unit • Ag Mechanics Textbook <ul style="list-style-type: none"> ○ Chapter 31 (Electrical Principles and Wiring Materials) ○ Chapter 32 (Installing Branch Circuits)
Application	P4.4 Apply electrical and plumbing applications.	<ul style="list-style-type: none"> • Select conductor size and type. • Wire an outlet controlled by a single-pole switch. • Install a lighting outlet. 	<ul style="list-style-type: none"> • Electricity Unit • Ag Mechanics Textbook <ul style="list-style-type: none"> ○ Chapter 31 (Electrical Principles and Wiring Materials) ○ Chapter 32 (Installing Branch Circuits)
Analysis	P4.5 Measure with selected instruments to demonstrate knowledge of basic electricity.	<ul style="list-style-type: none"> • Discuss importance of and techniques for grounding. • Show understanding of codes and regulations. • Discuss various energy sources. 	<ul style="list-style-type: none"> • Electricity Unit • Ag Mechanics Textbook <ul style="list-style-type: none"> ○ Chapter 31 (Electrical Principles and Wiring Materials) ○ Chapter 32 (Installing Branch Circuits)

Indicator #5: Use a variety of concrete and masonry products.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Analysis	P5.1 Demonstrate concrete and masonry procedures.	<ul style="list-style-type: none"> Mix concrete. Calculation for slope, orders for cement, yards of concrete. Construct both block and brick layout. Make insulation, control, construction joints, finish concrete, cure concrete, mix, cut masonry unit. 	<ul style="list-style-type: none"> Concrete Unit Ag Mechanics Textbook <ul style="list-style-type: none"> Chapter 38 (Concrete and Masonry)

Indicator #6: Apply math and science principles to identify soil and water engineering and their properties.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Analysis	P6.1 Perform legal land description and operate survey equipment.	<ul style="list-style-type: none"> X 	<ul style="list-style-type: none"> X

Indicator #7: Apply metal applications.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Application	P7.1 Apply safe operation to metal fabrication process.	<ul style="list-style-type: none"> Identify and use protective clothing. Perform mechanics calculations with ruler, fractions, surface areas. Identify types of metal. Bend, cut, shape, file grind metal. Set up oxy fuel equipment. Cut metal with oxy fuel. Cut metal with plasma arc torch. Identify welders and controls. Prepare metal for welding. Weld flat, horizontal, vertical positions. 	<ul style="list-style-type: none"> Welding Unit Ag Mechanics Textbook <ul style="list-style-type: none"> Chapter 12 (ID, Marking, Cutting, and Bending Metal) Section 7 (Gas Heating, Cutting, Brazing, and Welding) Section 8 (Arc Welding)

Indicator #8: Apply safety skills with engineering applications with mechanical equipment, structures, land treatment, power utilization and technology.			
Bloom's Taxonomy Level	Standard	Supporting Concepts/Skills	Assessment and Resources
Synthesis	P8.1 Combine technique of plumbing.	<ul style="list-style-type: none"> • Select pipe/PVC/tubing type and size. • Cut tubing/PVC pipe. • Solder copper tubing. 	<ul style="list-style-type: none"> • Plumbing Unit • Ag Mechanics Textbook <ul style="list-style-type: none"> ○ Chapter 35 (Plumbing)