Agricultural Mechanics

Santa Maria Joint Union High School District

Submitted: Feb 15, 2019

Decision: Mar 6, 2019

ubmission Feedback

PPROVED

asic Course Information

hool(s) Offering This Course:

School Name	Course Learning Environment	Transcript Code(s)
rnest Righetti High School (053303)	Classroom Based	Abbreviation: Ag Mech A — Course Code: AG6282 Abbreviation: Ag Mech B — Course Code: AG6283
anta Maria High School (053305)	Classroom Based	Abbreviation: Ag Mech A — Course Code: AG6282 Abbreviation: Ag Mech B — Course Code: AG6283
ioneer Valley High School (053847)	Classroom Based	Abbreviation: Ag Mech A — Course Code: AG6282 Abbreviation: Ag Mech B — Course Code: AG6283

Title: Agricultural Mechanics

Length of course: Full Year

Subject area: College-Preparatory Elective (G) / Interdisciplinary

UC honors designation? No

Prerequisites: none (Recommended)

Co-requisites: None

Integrated (Academics / CTE)? Yes: Agricultural Mechanics

Grade levels: 9th, 10th, 11th, 12th

ourse Description

urse overview:

Agricultural Mechanics is the first in a series of courses offered in the Mechanized Agriculture Pathway. In this course, students will study theories relating to the transfer of matter and energy through electrical, fluid, thermal and mechanical systems. They will also study the fundamentals of mechanical and structural systems and facilities. Students will explore professional opportunities in the field of agricultural engineering. Integral to this will also be the opportunity to participate in activities developed through a student leadership organization. By participating in this program, students will prepare to matriculate into post-secondary Agriculture Engineering programs such as those offered at the University of California, Davis and Cal Poly, San Luis Obispo. Additionally, this course may be a gateway program for those students interested in pursuing a post-secondary study in mechanical or structural engineering.

urse content:

Electrical Theories and Electrical Wiring

1. Electrical Theories and Electrical Wiring

Objective: Students will understand how the theories of electricity apply to circuits and devices common to simple lighting and power distribution systems.

Procedure: Following a reading assignment and instructor lead demonstration, students will analyze diagrams and instructions to assemble a functional electrical distribution circuit. This lab apparatus will consists of switches, outlets, plugs, connectors, and lighting devices. After proper operating status is achieved, students will measure all operating parameters using instrumentation and processes presented in the demonstration and instructions. Data will be recorded and a narrative report written to verify that correct readings of voltage, current and resistance were made.

Unit Assignment(s):

Students will understand proper basic electrical circuit and wiring techniques with nonmetallic cable and conduit as defined by the National Electric Code.

Students will be able to produce and demonstrate the proper electrical test equipment for AC and direct current (DC).

Students will be learn and be able to use word meanings within the appropriate context and show ability to verify those meanings by definition, restatement, example, comparison, or contrast.

Electronics

2. Electronics

Objective: Students will be able to identify specific electronic components, breadboard a simple circuit and determine if the device is operating correctly.

Procedure: Students will study a number of discrete electronic components and be able to connect them in a functional circuit using a laboratory breadboard. A simple timing device will be used to demonstrate how electronic devices can be used as components of automated devices in agriculture. As part of the project, students will observe circuit operation and record data as listed in the lab description.

Unit Assignment(s):

Students will name and how to use the proper electrical testing equipment.

Students will name and how to use common electrical wiring tools.

Students will continue to demonstrate how various tools are used to prepare electrical circuits.

Students will be able to identify the electrical tools that are used in the industry.

Understanding Design and Fabrication Processes using Wood

3. Understanding Design and Fabrication Processes using Wood

Objective: Upon completion of the lab students will understand three basic wood working joints and how to properly assemble those joints.

Procedure 1: Using hand tools in the lab area students will be responsible for cutting a rabbit joint, dado joint, and miter joint.

Procedure 2: Using hand and power tools in the lab facility, students will construct two bookends and a planter box using #2 pine that will allow them to put to practical use the theories learned in the classroom. They will be asked to focus on the areas of safety, types of wood fasteners, measurement, proper finishing of wood, and applying paint or finish.

Unit Assignment(s):

Students will accurately measure lumber length, width, and thickness. Students will successfully calculate the volume of each board sample. Students will be able to determine the board feet calculation for four samples of lumber. Students will be able to relate changes in measurement with change of scale to the units used and to conversions between units. They will learn how to extend ideas presented in primary or secondary sources through original analysis, evaluation, and elaboration. Students will be able to produce and construct models and projects based off of drawings and plans. Students will continue to demonstrate the use of sophisticated learning tools by following technical directions. Students will produce a wood project with the skills learned that may or may not include a wood saw horse.

Irrigation and Plant Nutrient Distribution Systems

4. Irrigation and Plant Nutrient Distribution Systems

Objective: Students will be able to design and assemble a scaled irrigation system using materials typical to those used in agriculture.

Procedure: After studying the essentials of delivering water and nutrients to various plants and crops, students will use steel, plastic, aluminum and copper tubing or pipe to assemble a small scale irrigation system. Assigned research will aid students in making choices in design and materials selection. Engineering principles pertaining to fluid flow and the reactions to chemicals on commonly used materials will be explored and considered. Students will make observations and collect data to support design and materials choices or to make necessary changes.

Unit Assignment(s):

Students will understand the use of technological resources to access, manipulate, and produce information, products, and services. Students will be able to apply appropriate problem solving strategies and critical thinking skills to work-related issues and tasks. Students will be able to learn and produce a complete plumbing project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, joining, and testing. Students will continue to learn basic plumbing and irrigation fitting skills with a variety of materials, such as copper, pvc, steel, polyethylene, and ABS.

Engineering Principles of Hydraulic Systems in Agriculture

5. Engineering Principles of Hydraulic Systems in Agriculture

Objective: Through the application of the principles of physics, students will gain an understanding of pressurized fluid work and tool systems. They will learn how to determine flow rates, pressures, thermal conditions and types of pump systems required to meet engineered specifications.

Procedure: Students will use Pascal's Law to determine pressure, force and mechanical advantage of hydraulic systems. In addition students will disassemble analyze and re-assemble a gear pump, vane pump, piston pump and cylinders in order to understand the operation and principles of physics that enable these devices to be effective instruments. Systems will be operated as a part of this laboratory experience, observations will be made, data will be collected, efficiencies computed and conclusions drawn to facilitate student understanding.

❑ **Unit Assignment(s):**

Students will be able to identify everyday items that use hydraulics. Students will be able to learn the varieties of equipment and how hydraulics work. Students will be able to closely read informational text and identify central idea and key details. Students will be able to explain how energy is transferred. Students will be able to evaluate how energy is transferred and predict the effects of resistance in mechanics, electrical, fluid, and thermal systems. Students will learn how to assemble a variety of hydraulic systems to ensure they learn the parts and contribution of each piece. Students will learn the practices and methods of irrigation as it relates to pressure and irrigation systems.

Concrete as an Engineered Structural Material

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6. Concrete as an Engineered Structural Material

Objective: Students will study variables and follow process needed to formulate, mix, form and cure concrete as a material used in constructing engineered structures.

Procedure: Each student will design and manufacture a stepping stone. Following a laboratory instruction sheet, materials will be gathered, measured and mixed in a quantity needed to complete the designed stone. Then, the mixture will be poured into a form fabricated by the student, set, removed and cured. The finish project will be evaluated as to appearance then tested for strength to see that in meets the minimum requirements set in the design.

❑ **Unit Assignment(s):**

Students will extend ideas presented in primary or secondary sources through original analysis, evaluation, and elaboration. Students will be able to demonstrate the use of sophisticated learning tools by following technical directions. They will be able to produce and generate relevant questions about readings on issues that can be researched. Students will be able to produce and complete a concrete or masonry project, including developing a bill of materials, assembling, mixing, placing, and finishing. Students will learn the vast array of tools through tool identification along with the techniques of pre-pouring, tamping, screeding, floating, jointing, edging, finishing and curing.

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ourse Materials

Textbooks

'itle	Author	Publisher	Edition	Website	Primary
،gricultural Mechanics Fundamentals	Ray V. Herren	Delamr	6th edition	[empty]	Yes

Supplemental Materials

'itle	Content
upplemental Materials	Fluid Power Data Book NFPA 70: National Electrical Code (NEC) Handbook, 2011 Edition Mark W. Earley and Jeffrey S. Sargent

،dditional Information

ɪurse Author:

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