

Date Approved by
DJUSD Board of
Education:

Course descriptions are updated
and reviewed with all new text
adoptions.

Secondary Course Description

COVER PAGE	
1. Course Title: Intro Agricultural Engineering B	9. Subject Area: History/Social Science English Mathematics Science Language other than English Visual & Performing Arts x DJUSD Graduation Elective College Prep Elective (will seek UC/CSU approval)
2. Transcript Title / Abbreviation:	
3. Transcript Course Code / Number (Office Use Only):	
4. School: Holmes/Emerson Jr. High	
5. District: Davis Joint Unified School District	
6. Length of Course: 1 semester	10. Grade Level(s): 8,9
7. School / District Web Site: http://www.djUSD.k12.ca.us/	11. Seeking "Honors" Distinction? Yes <div>No</div>
8. School Contact Name: Phillip Bentz Title/Position: Teacher	12. Credit Value:

Phone: _____ Ext.: _____ Fax: _____ E-mail: pbentz@djUSD.net	0.5 (half year or semester equivalent) Other: _____
--	--

13. Was this course previously approved by UC? Yes ☒ No ☐
 If so, in what year? _____ Under what course title? _____

14. Pre-Requisites: If in eighth grade must of had wood shop the prior year
 Co-Requisites: _____

15. Preliminary Approval - Secondary Site Principal Signature (Must be signed before proceeding to Step 16):

16. Date Course Proposal with Preliminary Approval (Step 15) sent to Associate Superintendent, Educational Services:
 11/16/17

17. Review & Approval:

Date	Signature
Site Curriculum and Instruction Leadership Team	
Date: _____	Signature/Title _____
Secondary Department Articulation/Collaboration	
Date: _____	Signature/Title _____
Secondary Principal Signatures:	
Date: 11/16/17	Signature/Title Scott Hens / Principal ESH

BACKGROUND INFORMATION

Brief Course Description: The course is designed to provide an introduction across a broad spectrum of skills that are fundamental to Agricultural Engineering. Students are engaged in an instructional program that integrates applied math and science, training for technical expertise, and preparation for postsecondary success. Intro to Agricultural Engineering emphasizes the introduction of a broad range of relevant experiences for students to gain practical skills and understanding necessary for

advancing in select areas of interest. Integral components of Intro to Agricultural Engineering are supervised practical experiences and the development of leadership behaviors for post-secondary success. The course initiates the preparation of students for the expectations of the agricultural engineering workplace.

Context for Course: The course is a pre-existing course (formerly called Agricultural Engineering I) and curriculum is being adjusted to meet Junior High curricular deliver needs.

The Agricultural Mechanics pathway prepares students for careers related to design, construction, operation, and maintenance of equipment used by the agriculture industry.

District adopted standards for agricultural mechanics have been adopted for this course and directly reflect current State Standards called Anchor Standards and Agriculture Mechanics Pathway Standards. In combination, Anchor Standards and Pathway Standards provide the curricular framework for College and Career readiness in CTE courses delivered by District. Additionally, Board adopted standards embedded in the courses support, in parallel, academic standards in reading, writing, speaking, and mathematics.

Pathway standards for Agriculture Mechanics are outlined below. B1.0 through B8.0 (the basic introductory course) cover demonstrated proficiencies in woodworking, electrical systems, plumbing, cold metal work, concrete, and welding technology. The basic proficiencies are precursors to advanced fields of study and areas of emphasis. Advanced courses are aligned with the advanced standards B9.0 through B12.0, found below. The emphasis and direction of the courses offered in the District align with an advanced emphasis most closely aligned with Design and Fabrication and support all Agricultural Engineering and Mechanical Engineering associated careers. Advanced courses offer college credit through articulation agreements with local service area community colleges. Sample occupations associated with this pathway:

Agriculture Equipment Operator
Farm Equipment Mechanic and Service Technician
Agricultural Engineer
Welder
Equipment Fabricator

Pathway Standards

B1.0 Implement personal and group safety practices.

B1.1 Practice the rules for personal and group safety while working in an agricultural mechanics environment.

B1.2 Integrate accepted shop management procedures and a safe working environment.

B1.3 Safely secure loads on a variety of vehicles.

B2.0 Apply the principles of basic woodworking.

B2.1 Identify common wood products, lumber types, and sizes.

B2.2 Measure and lay out lumber, calculating board feet and square feet.

B2.3 Identify, select, and implement basic fastening systems.

B2.4 Complete a woodworking project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, shaping, joining, and finishing.

B3.0 Demonstrate basic electricity principles and wiring practices commonly used in agriculture.

B3.1 Explain the relationship between voltage, amperage, resistance, and power in single phase alternating current (AC) circuits.

B3.2 Use proper electrical test equipment for AC and direct current (DC) circuits.

B3.3 Analyze and correct basic circuit problems (e.g., open circuits, short circuits, incorrect grounding).

B3.4 Implement proper basic electrical circuit and wiring techniques using nonmetallic cable and conduit as defined by the National Electric Code (NEC).

B3.5 Interpret basic agricultural electrical plans.

B3.6 Complete an electrical project, including interpreting a plan, following NEC code, selecting materials and components, and completing a circuit. 10 ANR | California Career Technical Education Model Curriculum Standards

B4.0 Select and apply plumbing system practices commonly used in agriculture.

B4.1 Match appropriate basic plumbing fitting skills with a variety of materials, such as copper, polyvinyl chloride (PVC), steel, polyethylene, and acrylonitrile butadiene styrene (ABS).

B4.2 Explain the environmental influences on plumbing and irrigation system choices (e.g., filter systems, water disposal, drip vs. flood).

B4.3 Research and communicate how various plumbing and irrigation systems are used in agriculture.

B4.4 Complete a plumbing project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, joining, and testing.

B5.0 Understand agricultural cold metal processes.

B5.1 Identify common metals, sizes, and shapes.

B5.2 Demonstrate basic tool-fitting skills.

B5.3 Properly lay out materials for a given project.

B5.4 Demonstrate basic cold metal processes (e.g., shearing, cutting, drilling, threading, bending).

B5.5 Complete a cold metal project, including interpreting a plan, developing a bill of materials, selecting materials, shaping, fastening, and finishing.

B6.0 Understand concrete and masonry practices commonly used in agriculture.

B6.1 Identify and explain the use of concrete and masonry tools and demonstrate proper handling of concrete materials.

B6.2 Practice bed preparation, concrete forms layout, and construction.

B6.3 Complete a concrete or masonry project, including calculating volume, developing a bill of materials, assembling, mixing, placing, and finishing.

B9.4 Design project plans by using mechanical drawing techniques.

B9.5 Finish a metal project by implementing proper sequencing.

B9.6 Manipulate and finish metal by using a variety of tools, machines, and techniques (e.g., lathe, mill, CNC plasma, shears, press break, grinders, and sanders).

B9.7 Construct a welding project using any electric welding process, appropriate products, joints, and positions, which will include interpreting a plan, determining proper assembly sequence, developing a bill of materials and cutting list, selecting and acquiring materials, and developing a clear and concise fabrication contract.

B10.0 Understand small and compact engines.

B10.1 Understand and explain engine theory, including the application of mathematical and/or physical science laws for both two- and four-stroke cycle engines.

B10.2 Differentiate among types of small engines and their applications.

B10.3 Identify small-engine parts and explain the various systems (e.g., fuel, ignition, compression, cooling, and lubrication systems).

B10.4 Troubleshoot and solve problems with small engines.

B10.5 Disassemble, inspect, adjust, and reassemble a small engine.

B10.6 Look up and order parts, apply repair and maintenance recommendations from a repair manual, and complete appropriate forms, including work orders.

B11.0 Understand the principles and applications of various engines and machinery used in agriculture.

B11.1 Identify common agricultural machinery and implements.

B11.2 Calibrate, operate, and maintain equipment safely and efficiently.

B11.3 Summarize the theory, operation, and troubleshooting of various types of engines found on agricultural machinery, including cooling, fuel, and lubrication systems.

B11.4 Explain the theory, operation, and troubleshooting of hydraulic systems.

B11.5 Explain the theory, operation, and troubleshooting of power train and power take-off systems.

B11.6 Understand the theory and operation of 12-volt DC electronic and electrical systems (e.g., circuit design, starting, charging, and safety circuits).

B12.0 Apply land measurement and construction techniques commonly used in agriculture.

B12.1 Describe common surveying techniques used in agriculture (e.g., leveling, land measurement, building layout, GPS).

B12.2 Draw and interpret architectural plans.

B12.3 Install single- and three-phase wiring and control systems found in agricultural structures, pumps, and irrigation systems.

B12.4 Install plumbing in agricultural structures (e.g., potable water, sewer, irrigation).

B12.5 Form, place, and finish concrete or masonry (e.g., concrete block).

B12.6 Construct agricultural structures by using wood framing and steel framing systems (e.g., barns, shops, greenhouses, animal structures).

B12.7 Develop clear and concise agricultural construction contracts.

Anchor Standards

1.0 Academics

Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Agriculture and Natural Resources academic alignment matrix for identification of standards.

2.0 Communications

Acquire and accurately use Agriculture and Natural Resources sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats. (Direct alignment with LS 9-10, 11-12.6)

3.0 Career Planning and Management

Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans. (Direct alignment with SLS 11-12.2)

4.0 Technology

Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Agriculture and Natural Resources sector workplace environment. (Direct alignment with WS 11-12.6)

5.0 Problem Solving and Critical Thinking

Conduct short as well as more sustained research to create alternative solutions to answer a question or solve a problem unique to the Agriculture and Natural Resources sector, using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques. (Direct alignment with WS 11-12.7)

6.0 Health and Safety

Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Agriculture and Natural Resources sector workplace environment. (Direct alignment with RSTS 9-10, 11-12.4)

7.0 Responsibility and Flexibility

Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Agriculture and Natural Resources sector workplace environment and community settings. (Direct alignment with SLS 9-10, 11-12.1)

8.0 Ethics and Legal Responsibilities

Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms. (Direct alignment with SLS 11-12.1d)

9.0 Leadership and Teamwork

Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the Future Farmers of America (FFA) career technical student organization. (Direct alignment with SLS 11-12.1b)

History of Course Development: Agricultural Engineering has been offered in the District for the last decade. The programs available at the high school have been growing and developing during this time period. Course offerings of hands-on practical experiences for students interested in applied academics, trades, or engineering fields have been diminishing at the Junior Highs with a concurrent need to upgrade CTE programs to meet the needs of the future. While jobs, careers, and postsecondary opportunities have been growing, offerings and opportunities for students have been diminishing. We have also seen recommendations by the District's CTE-STEAM Committee to develop offerings at the Junior Highs that align horizontally and vertically with existing CTE programs at the high school. Most recently, the District sought and the Board approved the CTE Incentive Grant that can be used to support the development of this course as it supports the goals of the grant, the needs of an existing pathway and industry sector, and the recommendations of the advisory committee.

COURSE GOALS AND/OR MAJOR STUDENT OUTCOMES

LEARNING OUTCOMES:

By the conclusion of this class students will:

1. Complete a woodworking project, including interpreting a plan, developing a bill of materials and cutting list, complete a draft/CAD drawing selecting materials, shaping, joining, and finishing.
2. complete an electrical project, including interpreting a plan, following NEC code, selecting materials and components, and completing a circuit.
3. Complete a plumbing project, including interpreting a plan, developing a bill of materials and cutting list, selecting materials, joining, and testing.
4. Complete a cold metal projects, including interpreting a plan, developing a bill of materials, selecting materials, shaping, fastening, and finishing.
5. Complete a concrete or masonry project, including calculating volume, developing a bill of materials, assembling, mixing, placing, and finishing.
6. Understand and explain engine theory including the application of mathematical and/or physical science laws for both two- and four-stroke cycle engines.
 - Differentiate among types of small engines and their applications.
 - Identify small engine parts and explain the various systems (e.g., fuel, ignition, compression, cooling, and lubrication systems).

- Troubleshoot and solve problems with small engines.
 - Disassemble, inspect, adjust, and reassemble a small engine.
 - Look up and order parts, apply repair and maintenance recommendations from a repair manual, and complete appropriate forms, including work orders.
7. Describe common surveying techniques used in agriculture (e.g., leveling, land measurement, building layout, GPS).
- Draw and interpret architectural plans.
8. Install plumbing in agricultural structures (e.g., potable water, sewer, irrigation).
9. Form, place, and finish concrete or masonry (e.g., concrete block).
- Develop clear and concise agricultural construction contracts.
10. Develop plans for independent skill applications and work-place related experiences.
11. Demonstrate leadership behaviors associated with State Standards for Agriculture and CDE expectations for CTSO.

Description of how this course supports district goal to increase student awareness and appreciation of diversity:

The course is designed to prepare students for success in a 21st Century global economy. Embedded within career readiness preparation is the focus of collaborating and working with others. Successful collaborations and interpersonal relationships require an expressed awareness, understanding, and appreciation of others. Students in the course will be taught behaviors associated with successful personal, workplace, and community collaborations that occur in diverse setting. Students will demonstrate professional, ethical, and legal behaviors consistent with applicable laws, regulations, and organizational norms revolving around issues of diversity. The course emphasizes student understanding of effective leadership styles, key concepts of group dynamics, team and individual decision making, and benefits of workforce diversity. In addition to course standards and instruction that emphasize the importance of diversity, the course is part of a program that is reviewed annually by an advisory committee and by the State consultants. Quality criteria and measures for program review include progress toward addressing issues related to diversity and success.

COURSE OBJECTIVES

OBJECTIVES:

By the conclusion of this course the student will be able to do the following:

Implement personal and group safety practices
Apply the principles of basic woodworking
Demonstrate basic electricity principles and wiring practices commonly used in agriculture.
Select and apply plumbing system practices commonly used in agriculture.
Understand agricultural cold metal processes
Understand concrete and masonry practices commonly used in agriculture.
Understand electric arc welding processes.
Understand small and compact engines
Apply land measurement and construction techniques commonly used in agriculture

COURSE OUTLINE

OUTLINE OF SPECIFIC COMPETENCY AREAS:

1. Career Options in Agricultural Engineering
2. Concrete and Masonry
3. Engineering in the World of Agriculture
4. Figuring a Bill of Materials
5. Hand Tools, Fasteners, and Hardware
6. Layout Tools and Procedures
7. Leadership
8. Leveling and Land Measurement
9. Metal Fastening
10. Metal Identifying, Marking, Cutting, and Bending
11. Metal Work & Sheet Metal Fabrication
12. Portable Power Tools
13. Project Building, Design, Planning, and Selecting
14. Safety in Agricultural Engineering
15. Shop Orientation & Procedures
16. Sketching and Drawing Project
17. Small Gas Engines

TEXTS AND SUPPLEMENTAL INSTRUCTIONAL MATERIALS

Title, Author, Publisher, Edition:

Agricultural Mechanics: Fundamentals and Applications, Delmar Publisher
(current addition)

Previously Adopted?

No (If no, provide information directly below)

Cost per book \$133.00

Total Cost \$3990/site

Budget Source

Other:

- California Agriculture Record Keeping System (The AET)
- 2 Three Ring Notebooks

Supplemental/Reference:

- AWS A3.0 (Terms and Definitions) and AWS A2.4 (Symbols), American Welding Society. American Welding Society
- Briggs & Stratton Repair Manuals
- Electrical Wiring by AAVIM.
- Leveling and Land Measurement Practices for, Hobar Publications.
- Modern Agricultural Mechanics, Interstate Publisher
- Modern Welding, Goodheart-Willcox Publisher
- Operators Manuals of Lab Equipment
- Small Gas Engines: Fundamentals, Service, Troubleshooting, Repair, Applications, Goodheart-Willcox Publisher
- The Educational Instructor's Package, Miller Electric Manufacturing Co.
- The Procedure Handbook of Arc Welding, The Lincoln Electric Company.

DIFFERENTIATED INSTRUCTIONAL METHODS AND/OR STRATEGIES

Checklists

Demonstrations

Direct Instruction

Guest Speakers/Presenters

Hands-on Activities

Independent Activities

Model Behavior

Partners or small group projects

Peer Teaching

Project-based learning

Rubrics

Self-evaluations of work (oral and written)

Shop Orientations

Stations

Supervised Experience Projects

Tiered lessons

Utilize Prior Knowledge and Student Interests

Strategies for Supporting School Goal of Improving Writing Skills:

Please see district adopted common core standards and the list of Foundation Standards for the course (above).

ASSESSMENT METHODS AND/OR TOOLS

- Quality of Products
- Daily participation
- Accuracy of Record Keeping
- Oral and Written Performance Rubrics
- Demonstrated Safety
- Documented Demonstration of Specific Leadership Behaviors
- Customer Satisfaction Survey Responses
- Traditional Written Tests on General Knowledge
- Skilled Based Application Tests
- Detail on Content and Format of Resumes and/or Application
- Public Presentation of Work

ASSESSMENT CRITERIA

65% **Coursework (Unit Projects, Class/Shop Activities)**

- To earn the full 65%: The student must complete each assignment according to oral and/or written instruction. This class relies heavily on practical applications

conducted during class. The student must attend class regularly and, while in class, the student needs to demonstrate engagement in class related activities for at least 45 minutes of each 60 minutes of class. Homework may be assigned on a few occasions throughout the year.

15% **Quizzes (Quizzes, Tests and Exams)**

- To earn the full 15%: The student must take all quizzes, tests, and exams and earn 100%.

10% **Leadership**

- Minimum criteria: Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the Future Farmers of America (FFA) career technical student organization. (Direct alignment with SLS 11-12.1b)

SAE Project

- To earn the full 10%: develop and maintain an **instructor** approved Supervised Agriculture Experience Project, and maintain a passing grade in their Agricultural Record Book.

HONORS COURSES ONLY

Indicate how this honors course is different from the standard course.

N/A

Sequence Participation

The course falls under the Agricultural Engineering Pathway of the Agriculture and Natural Resources Industry Sector. The sequence of courses in the pathway is as follows:

- 1) Intro to Agricultural Engineering 8 & 9**
- 2) Agricultural Engineering I**
- 3) Agriculture Engineering II**
- 4) Advanced Agricultural Engineering; Design and Fabrication.**

Post-Secondary Articulation

The updated courses have been submitted for articulation and community college course credit at the high school level.