DIVISION: Natural Sciences and Business  

COURSE: AGR 1002 Introduction to Agricultural Mechanics

Date: Spring 2023  
Credit Hours: 3

Complete all that apply or mark “None” where appropriate:

Prerequisite(s): None

Enrollment by assessment or other measure? ☐ Yes ☒ No  
If yes, please describe:

Corequisite(s): None

Pre- or Corequisite(s): None

Consent of Instructor: ☐ Yes ☒ No

Delivery Method: ☒ Lecture 2 Contact Hours  
☐ Seminar 0 Contact Hours  
☒ Lab 2 Contact Hours  
☐ Clinical 0 Contact Hours

Offered: ☒ Fall ☐ Spring ☐ Summer

CATALOG DESCRIPTION and IAI NUMBER (if applicable):
This course is designed to introduce students to the various aspects of agricultural mechanics. The content of the course is chosen to give an overview of several technical areas that compromise agricultural mechanization. IAI Equivalent: AG 906
ACCREDITATION STATEMENTS AND COURSE NOTES:
None

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. Safety
   a. Introduction
   b. Everyday safety concerns
   c. Safe work habits

II. Environmental Technology Systems
   a. Land Measurement
      i. Measure distance using pacing, taping, and an odometer wheel
      ii. Calculate area in acres and square feet
      iii. Legal descriptions
   b. Landscape Surveying
      i. Note taking for surveying
      ii. Using a hand-level
      iii. Setting up and leveling the transit
      iv. Using a self-leveling transit
      v. Profile leveling
      vi. Differential leveling
      vii. Laser levels
   c. Agricultural drainage systems
      i. Waterway construction
      ii. Installing and maintaining field drainage systems
      iii. Filter strips, terraces, and wetlands

III. Agricultural Electrification and Application
   a. Electrical Circuits
      i. Electrical Safety
      ii. Identify electrical wiring tools
      iii. Identify electrical wiring materials
      iv. Electrical diagraming
      v. Electrical theory
      vi. Ohm’s, Amperage, Wattage
      vii. Series and Parallel circuits
      viii. Wire series and parallel circuits
      ix. National Electrical Code
   b. Electric Motors
      i. Identify the parts of the electric motor
      ii. Routine maintenance
      iii. Assembly
      iv. Types of electric motors
      v. Basic operation

IV. Agricultural Structures
   a. Designing Agriculture and Horticulture structures
      i. Identify types of agricultural and horticultural structures
      ii. Identify parts of the building
iii. Planning a construction project
iv. Creating a project drawing
v. Bill of materials
vi. Stock cutting lists
vii. Dead and live loads
viii. Identify building materials

b. Constructing Agriculture and Horticulture Structures
   i. Identification of hand and power tools
   ii. Power tool safety
   iii. Tool maintenance
   iv. Safe tool use

V. Agricultural Power and Machinery
   a. Gasoline Engines
      i. Identify small gas engine parts
      ii. Identify small gas engine tools and equipment
      iii. Measuring devices
      iv. Theory of engine operation
      v. Compression system
      vi. Fuel systems
      vii. Ignition systems
      viii. Cooling systems
      ix. Troubleshooting
      x. Maintaining small gas engines
   b. Hydraulic and Pneumatic Systems
      i. Safety
      ii. Force, pressure, flow, and speed
      iii. Pascal’s Law
      iv. Hydraulic pump operation
      v. Hydraulic cylinders operation
      vi. Hydraulic valves
      vii. Single acting and double acting cylinders
   c. Agricultural Machinery and Equipment
      i. Maintenance schedules
      ii. Identifying types and uses of machinery and equipment
         1. Tractors, combines, tillage, fertilizer, etc.
      iii. Operating agricultural equipment
      iv. Calibrating agricultural equipment
      v. Adjusting agricultural equipment

INSTRUCTIONAL METHODS:
• Lecture
• Discussion
• Laboratory Exercises
• Project
• Group work
• Homework assignments
• Field trips

EVALUATION OF STUDENT ACHIEVEMENT:
A= 90-100
B= 80-89
C= 70-79
D= 60-69
F= 0-59

Exams and Quizzes – 50%
Laboratory Exercises – 30%
Homework Assignments – 20%

INSTRUCTIONAL MATERIALS:
Textbooks

Resources
Illinois Agricultural Education Library – www.mycaert.com
University of Illinois ITCS Instructional Materials:
   MDS320- Hardware and Fastener Identification
   MDS340- Hand Tool Identification
   U3009a- Using the Carpenter’s Square
   U3045- Metal Roofing and Siding for Farm Structures
   U3051b- Planning a Construction Project
   U3055- Lumber: Grading, Selecting, Buying, Using, and Storing
   DT422a- Rafter Marking
   DT423a- The Steel Square
   U3003c- Planning for Electrical Wiring
   U3016a- Electrical Wiring Procedures
   Z3016b- Electrical Wiring Exercises
   U3038- Using Three-Phase Electrical Power on the Farm
   U3057- Electrical Controls in Agriculture
   U3058- Selecting Electric Motors for Use in Agriculture
   U3059- Installing and Caring for Electric Motors in Agriculture
   U3061- Selecting Equipment for Electrical Installations
   DT400a- Electric Wiring Diagramming
   MDS300- Electric Wiring Hardware Identification
   T440- Basic Principles of Hydraulics
   U3014- Small Engines- Principles of Operation, Trouble-Shooting and Tune-Up
LEARNING OUTCOMES AND GOALS:
Institutional Learning Outcomes
☐ 1) Communication – to communicate effectively;
☒ 2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion;
☐ 3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally;
☐ 4) Responsibility – to recognize how personal choices affect self and society.

Course Outcomes and Competencies
1. The student will be able to create and complete a safety evaluation report.
2. The student will be able to recommend and justify safe work habits.
3. The student will be able to calculate area in acres and square feet.
4. The student will be able to perform a profile and differential leveling exercise.
5. The student will be able to formulate and write a recommendation for an agricultural drainage system.
6. The student will be able to illustrate series and parallel circuits.
7. The student will be able to select the correct electrical tools and hardware and construct an electrical circuit from an electrical wiring diagram.
8. The student will be able to prepare a construction project plan.
9. The student will be able to demonstrate safe tool use.
10. The student will be able to identify parts of the small engine.
11. The student will be able to demonstrate the disassembly and assembly process of small engines.
12. The student will be able to illustrate and explain engine operation.
13. The students will be able to describe the theory of hydraulic and pneumatic systems operation.
14. The student will be able to develop and complete a maintenance schedule for agriculture equipment including powered equipment and implements.
15. The student will be able to calculate force and pressure of single and double acting hydraulic cylinders.