



# ILLINOIS VALLEY COMMUNITY COLLEGE

## COURSE OUTLINE

**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:	<input checked="" type="checkbox"/> <b>Lecture</b>	<b>2 Contact Hours</b> (1 contact = 1 credit hour)
	<input type="checkbox"/> <b>Seminar</b>	<b>0 Contact Hours</b> (1 contact = 1 credit hour)
	<input checked="" type="checkbox"/> <b>Lab</b>	<b>2 Contact Hours</b> (2-3 contact = 1 credit hour)
	<input type="checkbox"/> <b>Clinical</b>	<b>0 Contact Hours</b> (3 contact = 1 credit hour)

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 diagramming
    - 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, ect.
    - 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**

Koel, L., G.A. Mazur, B.J. Moniz, and R.B. Radcliff. 2013. Agricultural technical systems and mechanics. American Technical Publishers. ISBN: 978-0-8269-3663-9.  
 Radcliff, R.B. 2016. Small engines. 4th Edition. American Technical Publishers. ISBN: 978-0-8269-0033-3.  
 Hoerner, H.J. 2007. Basic electricity and practical wiring. Hobar Publications. ISBN: 978-0-913163-42-9.  
 Field, H.L. 2012. Landscape surveying. 2nd edition. Cengage Publishers. ISBN: 9781111310608.

#### **Resources**

Field, H., and J. Long. 2018. Introduction to Agricultural Engineering Technology. Springer International Publishing. ISBN: 978-3-319-69678-2.

Illinois Agricultural Education Library – [www.mycaert.com](http://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

U3019- Small Engines – Repair and Overhaul  
U3020- The Two-Cycle Engine  
U3072- Small Gasoline Engine Maintenance  
DT486- Small Gas Engine Parts Identification  
DT488- Small Gas Engine Operating Principles  
U2042- Land Surveys and Descriptions  
U3010b- Surveying in Agriculture  
DT310- Introduction to Surveying

## **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.