

AGME 3173/3170L
Electricity in Agriculture

Lecture: 12:30 - 1:20 pm
Tuesday & Thursday
AST Center

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Lab: 1:30 - 3:20 p.m.
Thursday
AST Center

Textbook: Required: Fundamentals of Electricity for Agriculture, 3rd Ed. (Gustafson & Morgan).

References: Agricultural Wiring Handbook (NFEC); Farm Buildings Wiring Handbook (MWPS). 2002 National Electrical Code (NFPA, 2001). Electronic Concepts: Fundamental Knowledge of How Electronic Devices Operate (2003). All references are available for student use - Only purchase the required course textbook.

Equipment: Calculator--bring to class and lab each period; Type II eye protection (ANSI Z.87 approved)--bring to lab each week.

Catalog

Description: Principles of electric circuits; wiring of home, farmstead and other agricultural structures; selection of electric motors and their care and application in the broad field of agriculture; lighting and special uses of electricity such as heating and electrical controls. Recitation 2 hours, laboratory 3 hours per week.

Course

Objectives: Upon successful completion of this course, you should be able to:

1. Define electricity and explain the conventional and electron theories of electrical current flow;
2. Describe the effects of various levels of electrical current flow on humans, and describe and observe approved electrical safety practices.
3. Describe characteristics of DC and AC electricity, including uses and method(s) of generation.
4. Define, measure and/or calculate the following circuit characteristics: voltage, amperage, resistance, watts, kilowatts, kilowatt-hours, inductance, capacitance, impedance, true and apparent power, and power factor.
5. Identify electrical circuit components, functions and various circuit conditions.

6. Explain the physical and electrical characteristics of simple, series, parallel and combination resistive electrical circuits.
7. Analyze series, parallel and combination R, RC and RCL circuits.
8. Describe common three-phase (delta and wye) and single-phase (3-wire and 4-wire, 120/240 volt) electrical systems.
9. Describe the electrical generation and distribution system from the electric utility to the customer's service transformer.
10. Describe the on-farm electrical distribution system from the service transformer to the end utilization point.
11. Determine the total connected load and the demand load for residential and non-residential farm buildings and light industrial buildings and size building service entrance panels..
12. Locate and size the main electrical distribution point (and service equipment) for a farmstead or agribusiness facility having a central point distribution system.
13. Select and size individual building service conductors based on use conditions, ampacity and voltage drop criteria.
14. Define the term 'electrical grounding' and explain the purpose of system grounding and equipment grounding.
15. Define the term "stray voltage," and explain common causes, effects and solutions; Safely conduct and interpret stray voltage diagnostic tests.
16. Describe both general wiring practices and materials and special wiring practices and materials appropriate for agricultural applications.
17. Correctly select and size materials and properly install electrical branch and feeder circuits for different environmental conditions.
18. Properly plan and install both manual and automatic electrical control systems.
19. Plan, wire, and program control circuits using programmable logic controllers.
20. Identify common electric motor types and their common uses, explain their operating principles, and interpret and apply nameplate information.
21. Plan and wire electric motor branch circuits, to include approved wiring, disconnecting device(s) and conductor and motor overcurrent protection.

22. Locate and interpret applicable NEC requirements for specific wiring situations and conditions.
23. Plan electrical heating and lighting systems for agricultural structures.
24. Explain the operation of basic discrete and integrated electronic components and circuits.
25. Interface electronic sensors to a personal computer and conduct programming, data transmission and analysis tasks.

Student

Assessment: Your performance in this class will be based on the following activities:

Unit exams, 2 at 20% each
Comprehensive Final Exam, 25%
Homework and in-class assignments, 10%
Graded lab assignments, 25%

Grades will be earned on the following percentage basis:

A = 90 - 100%
B = 80 - 89%
C = 70 - 79%
D = 60 - 69%
F = < 60%

Late Work Policy:

Homework is due at the beginning of the next regular class period after the assignment is made. In-class assignments are due at the time specified by the instructor. ***No late homework or in-class assignments will be accepted.*** The lowest homework or in-class assignment will be dropped.

All lab activities should be completed during the laboratory period for which they are assigned. Labs may only be made up by prior approval and at the discretion of the instructor.

Academic Honesty:

Students are expected to comply with the U of A Academic Honesty policy as stated in the most recent Catalog of Studies. Violations this policy will be dealt with in the manner proscribed in the policy. It is the responsibility of each student to become familiar with this policy.

Attendance: Regular and punctual attendance is expected.