

**AOM 444C (3 credits)**  
**Electrical Power and Instrumentation for Agricultural Operations Management**  
**University of Florida**

**Spring 2024** MWF 2<sup>nd</sup> period (8:30-9:20), Room 110 Frazier Rogers Hall

**Instructor:** Dr. Dan Hofstetter  
Assistant Professor  
Frazier-Rogers Hall, Rm 263,  
Phone: 352-294-6702  
Email: [d.hofstetter@ufl.edu](mailto:d.hofstetter@ufl.edu)  
Office hours: Monday and Wednesday 9:30am-10:30am or by appointment

**Catalog Description**

Fundamental concepts of electricity, power, instrumentation, computer control operations and selected transducers. Foundation to aid in management of agricultural processing operations.

**Pre-requisites/Co-requisites:**

*None.*

**Course Objectives**

This course introduces the student to the electrical concepts, circuits and systems that are used throughout agriculture. Topics covered include circuits, power, motors, instrumentation, control, measurements, and computers. The intention of the course is to provide the student with a foundation in electrical systems sufficient to allow them to make informed decisions in the management of agricultural operations. At the end of this course, students will be able to:

1. Explain the process of electricity transmission from the utility provider to the end user, detailing components involved in the transmission system.
2. Identify common symbols used in electrical circuit layout schematics.
3. Calculate required sizes for electrical supply wires, circuit breakers, and service entrance panels, and emergency backup generators for residential and farm buildings and operations.
4. Analyze electricity costs by calculating and comparing utility rates for residential and commercial customers for specific periods.
5. Estimate the size of solar panel arrays and battery storage capacity required to supplement or replace grid power in a residential setting, considering specific energy needs and environmental factors.

**Course Outline**

1. Module 1: Introduction and Electrical Review
2. Module 2: The Grid and Electricity Transmission
3. Module 3: Farmstead Design
4. Module 4: Homestead Design
5. Module 5: Emergency Power and Generators
6. Module 6: Rate Analysis: Residential and Commercial
7. Module 7: Renewable Energy
8. Module 8: Micro-grids
9. Module 9: Instrumentation

Date	Topic	Assignments	
Monday, January 8, 2024	Orientation to class, class requirements		
Wednesday, January 10, 2024	Electrical tools, safety, electrical review	Assign Mod1 HW1	
Friday, January 12, 2024	Continue electrical review	Assign Mod1 HW2	
Monday, January 15, 2024	Holiday		
Wednesday, January 17, 2024	Finish electrical review, begin module 2	Assign Mod2 HW3	Mod1 HW1 due
Friday, January 19, 2024	Continue module 2, review how to tell 120/240V by wattage	Assign Mod2 HW4	Mod1 HW2 due
Monday, January 22, 2024	Continue module 2, start module 2 in-class activity	Assign Mod2 HW5	
Wednesday, January 24, 2024	Finish module 2, in-class activity, HW3 explanation		Mod2 HW3 due
Friday, January 26, 2024	Begin module 3, intro to NEC demand method, examples		Mod2 HW4 due
Monday, January 29, 2024	HW3 & 4 review, begin Module 3 in-class review activity	Assign Mod3 HW6	Mod2 HW5 due
Wednesday, January 31, 2024	Begin module 3 in-class review activity 2		
Friday, February 2, 2024	Wrap-up module 3 slides, begin in-class review activity 3		
Monday, February 5, 2024	Begin in-class review activity 4		Mod3 HW6 due
Wednesday, February 7, 2024	Review for test 1		
Friday, February 9, 2024	<b>Test 1</b>		
Monday, February 12, 2024	Wrap-up Module 3	Assign Mod3 HW7	
Wednesday, February 14, 2024	Finish Module 3, conductor sizing in-class activity 5		
Friday, February 16, 2024	Finish Module 3, Begin Module 4 homestead design		
Monday, February 19, 2024	Return test 1, go over answers, continue Module 4	Assign Mod4 HW8	Mod3 HW7 due
Wednesday, February 21, 2024	Module 4 in-class activity 1		
Friday, February 23, 2024	Continue, wrap-up Module 4, in-class activity 2		

Monday, February 26, 2024	Module 5 emergency power and generators	Assign Mod5 HW9	Mod4 HW8 due
Wednesday, February 28, 2024	Module 5 in-class activity 1		
Friday, March 1, 2024	Continue Mod5 activity 1, Mod 5 in-class activity 2		
Monday, March 4, 2024	Module 6 calculate your bill	Assign Mod6 HW10	Mod5 HW9 due
Wednesday, March 6, 2024	Continue Mod6, commercial demand billing		
Friday, March 8, 2024	Review Mod4 HW8 (homestead)		
Monday, March 11, 2024	Spring Break		
Wednesday, March 13, 2024	Spring Break		
Friday, March 15, 2024	Spring Break		
Monday, March 18, 2024	Review Mod5 HW9 (generators), begin Module 7		
Wednesday, March 20, 2024	Module 7 renewable energy	Assign Mod7 HW11 and HW12	Mod6 HW10 due
Friday, March 22, 2024	Continue Module 7		
Monday, March 25, 2024	Continue Module 7, wrap-up solar sizing calculations for Test 2	Assign final project extra credit	Mod7 HW11 due
Wednesday, March 27, 2024	Wrap-up Module 7, Review for test 2		Mod7 HW12 due
Friday, March 29, 2024	<b>Test 2</b>		
Monday, April 1, 2024	Begin Module 8 micro-grids		
Wednesday, April 3, 2024	Continue Module 8		
Friday, April 5, 2024	Wrap-up Module 8, Mod8 in-class activity	Assign Mod 8 HW 13	
Monday, April 8, 2024	Intro Module 9 Instrumentation		
Wednesday, April 10, 2024	Return test 2, go over answers, continue Module 9		
Friday, April 12, 2024	Continue Module 9	Assign Mod9 HW14	Mod8 HW13 due
Monday, April 15, 2024	Continue Module 9		

Wednesday, April 17, 2024	Continue Module 9		
Friday, April 19, 2024	Continue Module 9, demo instrument, YOLOv5		Mod9 HW14 due
Monday, April 22, 2024	Review for test 3		
Wednesday, April 24, 2024	<b>Test 3</b>		
Friday, April 26, 2024	No class (reading days)		

This syllabus is subject to change depending on student progress and scheduling.

**Texts:** Fundamentals of Electricity for Agricultural, 4<sup>th</sup> Edition, 2004, Gustafson, Robert J., and Mark T. Morgan, American Society of Agricultural Engineers, St. Joseph, Michigan. Text is provided on-line, selected chapters and sections.

### **Grading**

Tests:	3 @ 100 pts each	300 pts
Homework:	14 @ 10 pts each	140 pts
Attendance:	40 @ 2 pts each	80 pts
Total points		520 pts

520-479 pts	=	A
478-468	=	A-
467-453	=	B+
452-427	=	B
426-416	=	B-
415-405	=	C+
404-375	=	C
374-364	=	C-
363-349	=	D+
348-323	=	D
322-312	=	D-
<312	=	E

**Class participation is expected.**

### **Grades and Grade Points**

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

### **Attendance and Make-Up Work**

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.

## **Online Course Evaluation Process**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-results/>.

## **Academic Honesty**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

## **Software Use:**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

## **Services for Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

0001 Reid Hall, 352-392-8565, <https://disability.ufl.edu/>

## Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu](http://www.counseling.ufl.edu)*
  - Counseling Services
  - Groups and Workshops
  - Outreach and Consultation
  - Self-Help Library
  - Wellness Coaching
- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- *Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>.*
- Student Success Initiative, <http://studentsuccess.ufl.edu>.

### Student Complaints:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>.
- Online Course: <https://pfs.tnt.aa.ufl.edu/state-authorization-status/#student-complaint>