AOM4510C
Introduction to Instrumentation and Climate Management for Controlled Environment Agriculture
Credits: 3
Class Periods: M & W: 5th & 6th periods, from 11:45 pm to 1:40 pm
Location: 283 Frazier-Rogers Hall
Academic Term: Spring 2025

Catalog Description

Sensors and instruments for monitoring growing environments in controlled environment agriculture will be introduced. Students will learn how to evaluate production systems, monitor environmental variables, control growing conditions, and design experiments.

Instructor
Ying Zhang
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Office Phone: (352)294-6864
Office Hours: MWF 7th and 8th Periods (1:55 pm – 3:50 pm), at Frazier Rogers Hall room 103, or by Appointment
When contacting the instructor, please allow up to 48 hours for a response, not including weekends or holidays.

Course Pre-Requisites / Co-Requisites

Junior standing

Course Objectives

Students, upon completing this course, will be able to:
   a. Recognize the advantages, complexities, and problems associated with environmental controls

   b. Monitor the various environmental variables affecting plant growth and development under controlled environments

   c. Analyze and report environmental data for scientific research

   d. Apply different control algorithms on climate controls

   e. Build a data acquisition system for controlled environment plant production systems

   f. Design experiments with statistical analysis

Materials and Supply Fees
Not Applicable

Required Textbooks and Software

Handouts and online material will be provided to students that will serve as a textbook.

Recommended Materials
   • Greenhouse Operation and Management, Paul V. Nelson, 2011, 7th Edition, ISBN number: 978-0132439367

Course Schedule
Week 1:   **Lecture:** Introduction to Controlled Environment Agriculture & environmental factors
Week 2:   **Lecture:** Data collection and measurement/**Lab**: Introduction/**Homework 1**
Week 3:   **Lecture:** Temperature management /**Lab:** Temperature measurement/ **Homework 2**
Week 4:   **Lecture:** Solar radiation/**Lab:** light spectrum measurement/ **Homework 3**
Week 5:   **Lecture:** Lighting systems/**Lab:** Lighting system design/ **Homework 4**

Week 6:	**Lecture:** Water and nutrient delivery/**Lab:** Irrigation system control / **Homework 5**
Week 7:	**Lecture:** Plant nutrient and the root zone environment/**Lab:** PH and EC measurements/**Homework 6**
Week 8:	**Review/Midterm Exam**
Week 9:	**Lecture:** Air environment/**Lab:** Greenhouse tours/ **Homework 7**
Week 10:	**Lecture:** Humidity Management/**Lab:** Humidity measurement/**Quiz 1**
Week 11:	**Lecture:** Experimental Design /**Quiz 2**
Week 12:	**Lab:** Term project meetings
Week 13:	**Lab:** Term project meetings
Week 14:	**Lab:** Term project meetings
Week 15:	**Lab:** Term project meetings/**Term project presentations**

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance. Attendance (on time) at lectures is expected from all students at all times and will be recorded at every class meeting. 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/.

Late Submission of Course Work. All course work (including, but not limited to: assignments, quizzes, exams, and term projects) must be submitted no later than the due date unless prior arrangements are made with the mentor and a new due date is established. Assignments submitted late without having made arrangements with the mentor, but before 5:00 PM on the day following the due date, will be marked down 10 points. Assignments returned late, before 5:00 PM on the second day following the due date will be marked down 50 points. No assignments will be accepted after 5:00 PM on the third day following the due date. Students with documented evidence of an emergency which prevented prior communication with the mentor may present documentation to the mentor for consideration.

Make-up Exams. No make-up exams will be given except for excused absences or unless prior arrangements have been made.

Evaluation of Grades

Assignment	*Total Points*	*Percentage of Final Grade*
Attendance	100	10%
Homework Assignments (7)	100 each	25%
Quizzes (2)	100 each	10%
Midterm Exam	100	25%
Term Project	100	30%
		100%

Attendance (100 pts.). Attendance accounts for 10% of your final grade and will be recorded through random in-class attendance quizzes. Students will gain full points for each quiz if they submit their answers. Final attendance points will be calculated based on the percentage of total missed quizzes of the total released quizzes.

Homework Assignments (100 pts. each). Each homework assignment will be worth 100 points and there will be 7 assignments to complete during the semester. **Homework assignments will become available on Friday at 12:00 PM, and they will be due next Friday at 11:59 pm.** Make up assignments will be provided in accordance with the attendance policy described under **Attendance**. Homework assignments account for 25% of your final grade.

Quizzes (100 pts. each). Each quiz will be worth 100 points and there will be 2 quizzes with 8 multiple choice questions and 2 short answer questions during the semester. **Quizzes will become available on Friday at 12:00 PM, and they will be due next Friday at 11:59 pm.** Make up homework assignments will be provided in accordance with the policy described below. Quizzes account for 10% of your final grade.

Midterm exam (100 pts.). In the midterm exam, students will be asked to analyze different production systems using engineering principles. The exam will consist of two parts. The first part has a mix of multiple-choice, short-answer, and computational questions. In the second part, students will be asked to use sensors to meet specific control requirements with an Arduino board. The midterm exam accounts for 25% of your final grade.

Term Project (100 pts.). Students will conduct a term project with sensing, control, and data acquisition components. Student will demonstrate the capability of monitoring one or more environmental parameters and use executors to modify the environment to achieve a specific environmental condition for agricultural production. Students will make a technical presentation and submit a project report at the end of the semester. The term project accounts for 25% of your final grade. The grading rubrics are listed as follows：

Total	Category	20-25	10-19	5-9	0-4
25	Creativity	Exceptionally clever and unique in showing deep understanding	Thoughtfully and uniquely presented	A few original touches enhance the project	Shows little creativity, originality and/or effort
25	Understanding of Content	Shows a sophisticated understanding of the themes in the course content	Shows an understanding of the major themes of the course content	Displays a somewhat limited understanding of the course content	Does not show an understanding of the course content
25	Grammar	No grammatical or mechanical mistakes in the project	A few grammatical/mechanical mistakes which are not distracting	Several grammatical/mechanic al mistakes which are distracting	Many grammatical/mechanical mistakes throughout the project
25	Overall quality and completion	Project is engagingly organized and presents material that meet the assignment requirements	Project is somewhat organized, complete the basic requirements	Project is disorganized and incomplete	Project is incomplete and not easy to follow

Grading Policy

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 – 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 – 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

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

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
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/.

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.

Health and Wellness
You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to

someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

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 and Technology Assistance:
All faculty, staff and student 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.

If you are having issues with technology and software including the Canvas site, please contact the UF Help Desk to resolve any matters. Additional information and resources about technology assistance and technical help can be found in the Canvas site on the page titled Technical Help.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

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 wellbeing 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
  Counseling Services
  Groups and Workshops
  Outreach and Consultation
  Self-Help Library
  Wellness Coaching

• U Matter We Care, 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-studentconduct-code/.

• Online Course: https://distance.ufl.edu/state-authorization-status/#student-complaint.