

GREENHOUSE AND PROTECTED AGRICULTURE

HOS3222C / HOS6932 - 3 CREDITS

SPRING 2025

MEETING TIMES AND LOCATION

Blueberry Building	Room 152	Tuesdays	10:40 am – 11:30 am (4 th per.)
		Thursdays	10:40 am - 12:35 pm (4 th & 5 th per.)

INSTRUCTOR

Dr. Amethyst Merchant
1131 Fifield Hall
352-273-4595
Email: amethyst@ufl.edu

OFFICE HOURS

Tuesdays 1 – 2 pm and by appointment

COURSE DESCRIPTION

This course will present an overview of the different structures, materials, technologies, and practices used locally and globally to produce vegetables, small fruits, and other specialty produce through various types of protected agriculture. The covered material is intended to provide insight into how the choices in structural design, materials, technology, and management procedures affect fruit quality and economic viability of operations. Different specialty crops currently grown in protected structures in the state will be discussed.

LEARNING OBJECTIVES

Upon successful completion of this course, students will be able to:

- Debate the benefits and drawbacks of protective structures compared to open field production.
- Discuss key components and practices related to greenhouse and protected agricultural production and management systems.
- Evaluate advantages and disadvantages of different protected agriculture technologies.
- Demonstrate planting, pruning, trellising, and harvesting techniques for determinate and indeterminate crops in greenhouse systems.
- Criticize production methods for determinate and indeterminate vegetables under protective structures in sub-tropical and temperate climates.
- Schedule fertilization, irrigation, and cultural practices for vegetables under protective structures.
- Demonstrate an appreciation for the role of the greenhouse and protected agriculture industry at the local, national, and global scales.

COURSE FORMAT

This course includes lectures (guest lectures as well), demonstrations, hands-on activities, and field visits (Citra Plant Science Research and Education Unit and another

location). Hands-on activities will take place in the field, tunnels, and greenhouses at the Horticultural Sciences Teaching Garden.

TEXTBOOK

There is no required textbook for this course, but learning materials (handouts, extension publications, journal articles, book chapters, websites) to be read before or after each class will be provided via Canvas.

COURSE WEBSITE

E-Learning at Canvas: <https://elearning.ufl.edu>

Students must familiarize themselves with the "Modules", "Assignments" and "Grades" tabs of the HOS3222C mini-site in the Canvas platform. Links to this syllabus and other learning materials will be available. On occasion, printed versions of some of these documents will be required for in-class activities. Students will be notified of all such instances.

ATTENDANCE

Students are encouraged to attend every class. **Attendance will be taken.** Each student is allowed one no-questions-asked absence. However, each subsequent unexcused absence will be penalized **with a deduction of 2 points for a Tuesday absence and 4 points for a Thursday absence.** Please note these points are part of your attendance points that are discussed in the next section over course assessment components. Multiple unexcused absences will also negatively impact a student's overall participation score as well.

Acceptable reasons for an absence are found in UF's attendance policy. Acceptable reasons include illness; Title IX-related situations; serious accidents or emergencies affecting the student, their roommates, or their family; special curricular requirements (e.g., judging trips, field trips, professional conferences); military obligation; severe weather conditions that prevent class participation; religious holidays; participation in official university activities (e.g., music performances, athletic competition, debate); and court-imposed legal obligations (e.g., jury duty or subpoena). For all planned absences, a student in a situation that allows an excused absence from a class, or any required class activity must inform the instructor as early as possible prior to the class. Please review the following link for details:

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

COURSE ASSESSMENT COMPONENTS AND GRADING

1. Exams (Three exams, 90 points each = 270 points) 54 %

Students will be evaluated through three comprehensive exams each worth 90 points. Multiple choice, true/false, matching, calculation, short answer, and essay questions may be included on each exam. Exams will only cover materials directly presented or discussed during class unless otherwise noted.

If a student misses an exam, a request for a make-up should be made via email within 24 hours. Should any student have a documented emergency or excused absence that

prevents making the scheduled exam time, the instructor will provide a make-up exam at an agreed-upon time and place worth 100% of the total points. The format of this make-up exam is at the discretion of the instructor. Students are only eligible to earn 70% of the total points on an unexcused absence make-up exam.

2. Production Management Experiments and Lab Reports (90 points) 18 %

We will use the scientific method to determine the impact of low tunnel and various practices on the production of vegetable crops during the winter in the Teaching Garden. The objective is to encourage students to utilize all the resources available to start and maintain protected agriculture operations. These projects will test your research, critical thinking, and quantitative skills in similar ways as a job in horticulture would.

Additional details about these assignments will be provided in handouts during class and on Canvas at a later date. Assignments for this project will be submitted via Canvas.

3. Class Attendance and Participation (90 points) 18 %

Students are required to participate actively in all class activities by paying attention, asking questions, taking notes, working on group projects, engaging in work in the Teaching Garden, etc. Students are required to be respectful during talks from all guest lecturers. Showing up on time for a guest lecture is a must. Attendance and participation for the course will be graded based on the following rubrics.

Attendance and Participation frequency	Score	Participation quality	Score
Never	0	Poor	0 - 9
Rarely	9 – 18	Fair	18
Sometimes	27	Good	27
Often	36	Very good	36
Always	45	Excellent	45

4. Required Field Trip and Reflection Write-up (30 points) 6 %

Attendance to a field trip is required by all students (i.e., This cannot be used as your no-questions-asked excused absence). We will be going to UF/IFAS plant science research and education center in Citra (9am – 1pm) and at least one other location. The instructor will gladly provide written excuses for students who have other academic, athletic, or employment-related events happening on that day. Students are only required to attend one of the field trips. Attendance and a reflection paper will be due to earn credit for this assignment. Note: Students that are unable to attend due to extreme circumstances or illness will be able to do a make-up assignment. This make-up assignment will be a research paper, so field trip attendance is highly preferred by all.

5. Quizzes (Two quizzes, 10 points each = 20 points) 4 %

There will be two open-notes quizzes. These are presented to help you learn Dr. Merchant's question style before an exam. Each quiz will be 15 minutes long. Students can refer to slides, handouts, personal notes, and other references material, but each student must work independently. Each quiz will be worth 10 points. Multiple choice, true/false, matching,

and calculation questions may be included. Each quiz will be available in Canvas for 3 days before the due date. Students will be informed when the quiz becomes available in class and via Canvas announcement. NOTE: Each quiz can only be taken once.

6. Extra Credit (18 points possible)

+ 3 %

If you attend both field trips, you can complete a reflection assignment on the second trip for extra credit.

GRADING SCALE

All points earned in the course will be summed to calculate your final grade. Letter grades will be based on the performance of each student relative to the following standard percentages (%):

93 – 100	A	73 – 76.9	C
90 – 92.9	A-	70 – 72.9	C-
87 – 89.9	B+	67 – 69.9	D+
83 – 86.9	B	63 – 66.9	D
80 – 82.9	B-	60 – 62.9	D-
77 – 79.9	C+	< 60	E

Information on current UF grading policies for assigning grade points can be found here:

- *Grading policy*, <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

COURSE POLICIES AND RESOURCES:

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/>

Privacy Related Issues Statement

Our class sessions may be audio visually recorded for students in the class to refer back to and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

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 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>

GREENHOUSE AND PROTECTED AGRICULTURE

TENTATIVE COURSE SCHEDULE

Spring 2025 Schedule

Date	Topic	Remarks
14-Jan	Introduction to course and syllabus	
	What is protected ag?	
16-Jan	Abiotic and biotic factors impacting production	
	Pros and cons of protected ag use	
	Basic types of protected ag	
21-Jan	Greenhouse glazing impacts on light quantity and quality	
23-Jan	Teaching Garden – Start seeds in trays (prep for experiments) & Plasticulture setup with low tunnel installation	
28-Jan	Greenhouse glazing impacts on light quantity and quality (continued)	
30-Jan	Teaching Garden – Direct Seed in areas with plasticulture	
	Lighting within protected ag structures	
4-Feb	Lighting within protected ag structures (continued)	
6-Feb	<i>Protected Ag Overview – Robert Hochmuth</i> <i>Selecting various types of protected ag structures that fit your operation – Robert Hochmuth</i>	
11-Feb	Irrigation	
13-Feb	Hydroponics and CEAs (Teaching Garden)	
18-Feb	Hydroponic growth systems	
20-Feb	Collect data in Teaching Garden experiment	
25-Feb	Phytochrome-mediated photoperiodic responses	
27-Feb	Phytochrome-mediated photoperiodic responses (continued)	
4-Mar	<i>Soilless media – Robert Hochmuth</i>	
6-Mar	Temperature – Greenhouse heating and cooling / ventilation	
11-Mar	Temperature – Greenhouse heating and cooling / ventilation (continued) [Look for reading material in this week's module]	
13-Mar	<i>Integrated pest management under protected ag – Robert Hochmuth</i>	
18-Mar	SPRING BREAK	
20-Mar	SPRING BREAK	
25-Mar	Controlling Temperature and Relative Humidity	

27-Mar	<i>Greenhouse Economics and Product Costing – Dr. Kevin Athearn</i>
1-Apr	Teaching Garden plant harvest and data collection (Covered low tunnel vs. exposed plants)
<u>3-Apr</u>	<u>Visit Research Center in Citra; University of Florida / IFAS Plant Science Research and Education Unit (PSREU) – Dr. Gerardo Nunez***</u>
8-Apr	Preliminary look at data
<u>10-Apr</u>	<u>Visit to additional location – Details soon***</u>
15-Apr	Tour greenhouse and protected ag facilities near PSF4 classroom with Brian Owens (subject to change)
17-Apr	Figure creation and statistical analysis of data (Covered low tunnel vs. exposed plants)
22-Apr	Dr. Neil Mattson presentation and paper discussion – “Energy requirements for controlled environmental agriculture....Is it the future of fresh fruit and vegetable production? Can we do it sustainably?”

Disclaimer: This syllabus and schedule of topics represents my current plans and objectives. As we go through the semester, those plans may need to change slightly to enhance the class learning opportunities and accommodate the guest lecturers. Any changes will be communicated in class and via Canvas. Updated versions of the syllabus will be posted when plans change.