

GREENHOUSE AND PROTECTED AGRICULTURE



HOS3222C/HOS6932 - 3 CREDITS - SPRING 2020
1253 FIFIELD HALL - **ROOM 2318**
2550 HULL RD GAINESVILLE, FL 32611
TUESDAY 1:55 – 2:45 PM (7TH PERIOD)
THURSDAY, 1:55 – 3:50 PM (7TH AND 8TH PERIOD)

INSTRUCTOR: Emmanuel Torres Quezada, Ph.D.

Fifield Hall - office 2121, etorres1618@ufl.edu, phone: (352) 682-0708

OFFICE HOURS: by appointment.

COURSE WEBSITE: <http://elearning.ufl.edu>

REQUIRED/RECOMMENDED TEXTBOOKS:

There is no required textbook for this course. The following textbooks can be used as reference materials:

- *Good Agricultural Practices for Greenhouse Vegetable Crops – Principles for Mediterranean Climate Areas* - Baudoin et al., 2013. <http://www.fao.org/3/a-i3284e.pdf>.
- *Florida Greenhouse Vegetable Production Handbook* - UF-IFAS, Reviewed 2018. http://edis.ifas.ufl.edu/topic_book_florida_greenhouse_vegetable_production_handbook.
- *Plant Nutrition of Greenhouse Crops* - Sonneveld and Voogt, 2009. <https://link.springer.com/content/pdf/10.1007%2F978-90-481-2532-6.pdf>

These books are available as e-books through the UF Libraries. You can download and save them to your devices while on campus or using a VPN connection off-campus. Additional learning materials will be provided via Canvas. A pdf file of each class session PowerPoint file will be provided to aid in the discussion of the topic during class.

COURSE DESCRIPTION:

This course will cover the history and development of protective structures for sub-tropical and temperate climates, with special focus on vegetable production. Production techniques for vegetables under protective structures differ from open field systems, as fruit quality and economic sustainability become priorities over high yield. The material provided is intended to present you with insights into the design and covering materials of different protective

structures, water requirement and plant nutrition basics, soilless production systems and integrated environmental strategies in greenhouse production.

COURSE GOALS AND/OR OBJECTIVES:

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

- *Debate the benefits and drawbacks of protective structures compared to open field production.*
- *Criticize production methods for determinate and indeterminate vegetables under protective structures in sub-tropical and temperate climates.*
- *Calculate fertilizer applications for vegetables based on land area or volumetric water applied.*
- *Schedule fertilization, irrigation and cultural practices for vegetables under protective structures.*
- *Demonstrate planting, pruning, trellising, and harvesting techniques for determinate and indeterminate crops in greenhouse systems.*
- *Compare advantages and disadvantages of different protected agriculture technologies.*

In addition to the previously listed learning objectives, graduate students will be able to:

- *Formulate fertilization programs for vegetables under protective structures.*
- *Assemble production programs, including budgets, labor time estimations, crop management plans, harvest schedules, and projected economic benefits.*
- *Estimate potential yield based on functional flowers, cultural practices, and production system.*

INSTRUCTIONAL METHODS:

This course combines lectures and hands-on activities to deliver engaging and rigorous training in protected agriculture. Hands-on activities will take place in greenhouses and tunnels at the Horticultural Sciences Teaching Garden. Learning materials (handouts, extension publications, journal articles, book chapters, websites) will be provided via Canvas.

COURSE POLICIES:

ATTENDANCE POLICY:

You are encouraged to attend every lecture and complete quizzes and assignments by the posted deadlines. Students are urged to arrive on time to avoid disrupting class. Attendance will be taken based on a photo book at the beginning of the class. You must contribute to the creation of the course photo book by emailing the instructor a clear photo of your face during the first week of the semester.

*I am aware that sometimes life can throw you a curve ball. Thus, **you are allowed one no-questions-asked absence per semester.** You cannot use your no-questions-asked absence on a date when exams, graded class activities, or assignments are due. **Subsequent unexcused absences will make you ineligible for the Extra Credit assignment.** Please note that having access to the materials posted on E-learning is not an excuse for missing classes.*

Absences will be excused, and late assignments will be fully graded only for documented emergencies as per UF's attendance policy. Absences count from the first-class meeting. The university recognizes the right of the individual professor to make attendance mandatory. After due warning, professors can prohibit further attendance and subsequently assign a failing grade for excessive absences.

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

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

QUIZ/EXAM DATES/POLICIES:

Essays, matching, true/false, and multiple-choice questions may be included in the exams. The exams will only cover materials directly presented or discussed during class unless otherwise noted. Mobile phones must be turned off during quizzes and exams. Inquiries about examination questions after initial grading can be reviewed during office hours.

MAKE-UP POLICY:

*In case of absence on a date when a quiz or exam is due, the student should request a make-up quiz or exam with the instructor via email within 24 hours of the absence. Make-up exams and quizzes supported by an excused absence will be fully graded. **Unexcused absence on a date when a quiz or exam is due will be eligible for only 70% of the total points.** The format of the make-up exam is at the instructor discretion.*

ASSIGNMENT POLICY:

***All the assignments should be submitted electronically to Canvas.** Assignments are expected to be in legible format with grammar, punctuation, and spelling errors at a very minimum.*

Anything submitted after midnight of the due date will be eligible for only 50% of the total points.

If you are experiencing technical difficulties with Canvas, you should immediately contact the UF Help Desk. This will generate a ticket number, which documents the date and time of your technical difficulty. Any requests to make-up late work due to technical difficulties must be accompanied by this ticket number and should be graded in full.

- UF Help Desk, HUB 132, (352) 392-4357, www.lss.at.ufl.edu/help.shtml

ONLINE COURSE EVALUATION:

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semesters, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES:

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

UNIVERSITY POLICY ON ACADEMIC CONDUCT:

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code”. On all work submitted for credit by students 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.

The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

CLASS DEMEANOR OR NETIQUETTE:

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats.

GETTING HELP:

For issues with technical difficulties for Canvas, please contact the UF Help Desk at:

- <http://helpdesk.ufl.edu>
- (352) 392-HELP (4357)
- Walk-in: HUB 132

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from the Help Desk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are available at www.distance.ufl.edu/getting-help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit <http://www.distance.ufl.edu/student-complaints> to submit a complaint.

GRADING POLICIES:

Undergraduate students:

1. Weekly quizzes - 20 points

Every Friday at 9:00 AM, a 5-question quiz will become available in Canvas. Quizzes will consist of 4 multiple choice questions (0.5 points per question), and one extra question (extra credit–0.5 points) graded on completion. Each quiz will be worth 2 points + plus extra credit, and there will be 10 quizzes during the semester. Each quiz will be timed to 15 minutes, and it can only be taken once. Students can refer to class handouts, personal notes, websites, or any reference materials to complete the quiz. However, each student must work individually. Quizzes will be available until the following class period. Students are responsible for taking the weekly quizzes even if they miss lectures. Make-up quizzes will be provided in accordance with the policy described above.

2. Exams - 40 points

You will be evaluated through two comprehensive exams roughly scheduled to coincide with the midpoint and endpoint of the semester. Each exam will be worth 20% of the final grade. **The instructor will provide the students with sample questions and hold a review session before each exam.** Make-up exams will be provided in accordance with the policy described above.

3. Protected agriculture practicum – total 40 points

This practicum is intended to aid in developing the technical skills necessary to successfully maintain and manage a protected agriculture operation. **Groups of 5 to 6 people** will be formed by the students. Your group will have permanent and occasional duties related to the setup and maintenance of a multi-crop, multi-system horticultural operation. I will demonstrate all hands-on activities during class time, but you will have to use out-of-class time to grow your produce. Consider this your homework.

Permanent duties – 20 points towards the protected agriculture practicum:

During the first week of class, your group will sign up for a two-weeks of duties schedule, when you will be responsible for doing the maintenance and cleaning of the growing systems and nutrient solution and irrigation adjustments. These tasks may extend beyond class time. Permanent duties will be graded based on completion. An updated list of duties, with not more than 5 tasks, will be given to each group on their corresponding work weeks. Each task will be worth 2 points per week ((week 1 = 5 tasks x 2 points = 10 points); (week 2 = 5 tasks x 2 points = 10 points) = total= 20 points).

Occasional duties – 20 points towards the protected agriculture practicum:

Every season, there are several critical activities for greenhouse and protected agriculture growers. **These activities include transplants preparation, growing media preparation, planting, pollination (depending on the system), pruning and training, cluster thinning**

(tomato only), leaning and lowering, harvests, freeze protection (depending on the season), etc. To learn all the relevant skills to be a greenhouse grower, you will have to participate in these occasional duties in the following dates:

Practice	Description	Week	Point value
1	Transplants and media preparation	1	4
2	Planting	2	4
3	Pruning, training and pollination	5-6	4
4	Cluster thinning	7-8	4
5	Harvests	12-13	4
Extra credit	Freeze protection	Depending on weather	4
Your level of interaction/participation during the practices will determine your grade.			
Score based on frequency of interaction: Never 1, Rarely 2, Sometimes 3, Often 4.			

I expect that there will be at least one night after transplant when temperatures drop below 32 degrees Fahrenheit. We will use this opportunity to learn hands-on about passive freeze protection. I will announce potential freeze events 2 to 3 days in advance. **On the date of the first freeze, we will meet at 5:00 p.m. in the Teaching Garden.** Again, it will be cold; please dress accordingly.

Summary

Assignment	Points
Weekly quizzes	20 points
Exams	40 points
Protected agriculture practicum	40 points
Extra credit	9 points
Total possible points	109 points
Students that accumulate more than 100 points will be round down to 100 points.	



Graduate students:

1. Weekly quizzes - 10 points

Every Friday at 9:00 AM, a 5-question quiz will become available in Canvas. Quizzes will consist of 4 multiple choice questions (0.25 points per question), and one extra question (extra credit - graded on completion – 0.5 points). Each quiz will be worth 1 point + plus extra credit, and there will be 10 quizzes during the semester. Each quiz will be timed to 15 minutes, and it can only be taken once. Students can refer to class handouts, personal notes, websites, or any reference materials to complete the quiz. However, each student must work individually. Quizzes will be available until the following class period. Students are responsible for taking the weekly quizzes even if they miss lectures. Make up quizzes will be provided in accordance with the policy described above.

2. Special project - 10 points

Let's imagine you get hired by the University of Florida as an assistant professor in charge of creating a national recognized protected agriculture program. You will be located at Gainesville and will have access to the Plant Science Research and Education Unit at Citra. Your first task as a professor with a 75% research appointment is to write and present a grant proposal.

There are only 4 rules for this assignment. The idea is to identify potential areas of research related to protected agriculture that **you think** could be executed if you had the money, and that would be of value to the industry.

Rule 1. The project should include the following: **Title, Summary (max. 400 words), Introduction (max 2 pages), Objectives (at least 3 objectives), Materials and methods (as specific as possible, please include budget and salaries), Expected results. Cited literature (use the American Society of Horticultural Science format -Harvard system).**

Rule 2. You will submit the final written version (3 points) of your idea through Canvas, by week 14 of the semester. **However, I will need your objectives by week 7 of the semester.** Also, there will be a 15 min presentation (7 points) of your proposal to your peers, **which you will have to defend.** We will determine the time and date for the presentations by popular vote, starting after week 12 of the semester.

Rule 3. If your master's thesis or dissertation is in any way, shape or form related to protected agriculture, **you are not allowed to use your current objectives or derivatives of them.**

Rule 4. No plagiarisms. Be resourceful. I will research your selected objectives, so try to be inquisitive and creative. Please, do not copy your idea from a published journal.

A word of advice: There is nothing wrong about asking around for ideas. Talk to your advisers, friends, and other faculty but **make sure that the final idea is yours** and that you give credit to those who deserve it.

If you have any questions, please feel free to ask me directly or to request an appointment.

Summary

Assignment	Points
Weekly quizzes	10 points
Special project	10 points
Exams	40 points
Protected agriculture practicum	40 points
Extra credit	9 points
Total possible points	109 points
Students that accumulate more than 100 points will be round down to 100 points.	

GRADING SCALE:

A	93 – 100 points	C	73 – 76 points
A-	90 – 92 points	C-	70 – 72 points
B+	87 – 89 points	D+	67 – 69 points
B	83 – 86 points	D	63 – 66 points
B-	80 – 82 points	D-	60 – 62 points
C+	77 – 79 points	E	<60 points

COURSE SCHEDULE:

CRITICAL DATES:

Midterm - February 27th – during class.

Final Exam - April 23rd – during class.

Grad. students special project (objectives) - February 20th (printed - before the end of the class)

Grad. students special project (final presentation) – TBD.



WEEKLY SCHEDULE OF TOPICS AND ASSIGNMENTS:

Week	Date	Topic/activity
1	January 7 th	Introduction and syllabus presentation
1	January 9 th	History and development of protected structures – Field practice 1
2	January 14 th	Site selection and outside environmental conditions
2	January 16 th	Covering materials (tropical and temperate areas) – Field practice 2
3	January 21 st	Design and ventilation systems
3	January 23 rd	Tomato production
4	January 28 th	Climate control and energy efficiency
4	January 30 th	Effects of light and temperature
5	February 4 th	Greenhouse sensors
5	February 6 th	Soil and soilless systems (part 1) – Field practice 3
6	February 11 th	Soil and soilless systems (part 2)
6	February 13 th	Water management (part 1)
7	February 18 th	Water management (part 2)
7	February 20 th	Nutrient management (part 1) – Field practice 4
8	February 25 th	Nutrient management (part 2)
8	February 27 th	Mid-term exam (20 points)
9	March 3 rd	Spring break
9	March 5 th	
10	March 10 th	Bell pepper production
10	March 12 th	Integrated pest management (insects and mites) By Dr. Oscar Liburd
11	March 17 th	Melon production
11	March 19 th	Integrated pest management (diseases)
12	March 24 th	Strawberry production
12	March 26 th	Plant factory/plant nursery By Dr. Celina Gomez
13	March 31 st	Leafy greens production
13	April 2 nd	Organic production and grafting By Dr. Xin Zhao
14	April 7 th	Hemp production
14	April 9 th	Economic sustainability
15	April 14 th	Integrated preventive environmental strategies (part 1)
15	April 16 th	Integrated preventive environmental strategies (part 2) – Field practice 5
16	April 21 st	Review (not mandatory)
16	April 23 rd	Final exam (20 points)

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.