



BE 350L: Advanced Hydroponic Crop Production Laboratory
1 Credits
Spring

Location: Campus Agriculture Center
Controlled Environment Agriculture Center (CEAC)
1951 E. Roger Rd, Tucson, AZ 85719
CEA Building, Classroom 117

Day/Time: Tuesdays 2:30pm – 5:20pm

Description of Course

This is an advanced level course, building on the basic principles covered in BE 217: Introduction to Hydroponics. Students will gain hands-on experience with various hydroponic and specialty crop production systems such as Nutrient Film Technique (NFT), Deep Water Culture (DWC), bag culture, aquaponics, and gourmet mushroom production. Course will cover nutrient and irrigation management, integrated pest management, crop scheduling, seeding, transplanting, harvesting, and packaging using GHP/GAP food safety protocols.

Course Prerequisites or Co-requisites

BE 217: Introduction to Hydroponics. BE 350L is a co-requisite for Sustainable Plant Systems majors with a CEA subplan. BE 350L is not required, but is highly recommended for all others. BE 350L may be taken without taking BE 350 Lecture, but students must have completed BE 217 as a pre-requisite.

Instructor and Contact Information

Name	Dr. Stacy Tollefson
Office Location	CEA Building Room 103
Telephone number	520-626-9953/ 520-250-4156 Cell
E-mail address	stacy1@email.arizona.edu
Office Hours/“Open Door Policy”	By appointment
Web information:	
Course:	TBD
Current semester info available through D2L.	

Course Format and Teaching Methods

This is a hands-on course to give students experience with various hydroponic and specialty crop production systems. Class attendance is mandatory. Some lab activities and basic techniques will be demonstrated during the first few lab sessions. For the remaining sessions, students will be placed in small groups and rotate through the different lab stations in 2-4 week blocks. Each student will be assigned to a different role each time they are in the rotation so they get experience with all the different tasks. There will be a list of tasks to complete while on each rotation and each group will turn in a rotation report at the end of each session. The rotation reports will include attendance and a manager

report detailing the amount and quality of work done by each member. Students will also be assigned to take lysimeter measurements in the teaching greenhouse for 3-4 days out of the semester. The course grade is made up of class activities/lysimeters, rotation reports, manager evaluations, and a final exam.

Examples of rotations may include:

- Tomato Harvesting: Teaching greenhouse
 - Includes harvesting, grading fruit by weight and size, weighing, packaging, review of harvest data
- Nutrient Management
 - Calculating amounts needed and refilling A, B, C Tanks
- NFT System and ZipTowers: Club Greenhouse
 - Includes seeding, transplanting, harvesting, sample weighing, checking and adjusting pH/EC of systems
- IPM
 - Monitor, employ beneficials, spray as needed, add pollen to hives, pollination %
- Cucumber and Pepper Cultivation: Teaching Greenhouse
 - Plant care, harvest, grading fruit by weight and size. Weighing, packaging, review of harvest data
- Farmer's Market – Saturday mornings 9am - noon.

- Lysimeter duty includes collecting and recording input and output volumes, pH and EC of input and output water, and calculating the daily percent drainage.

Course Objectives

Through this course, students will:

- Gain experience growing specialty crops within a wide range of hydroponic systems
- Learn how to manage crop scheduling, plant health, and plant nutrition in these systems
- Gain experience with harvesting, grading, weighing, and packaging fruit
- Gain experience working as a team to complete tasks for successful crop management

Expected Learning Outcomes

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

1. Seed, transplant, harvest, and package various types of produce using a variety of hydroponic growing systems while adhering to a specific crop scheduling plan and GHP/GAP food safety protocols.
2. Use appropriate equipment and methods to manage nutrients, irrigation, pest levels, and plant health in multiple growing systems.
3. Sort/grade/weigh harvested produce and keep production records.
4. Work successfully as a team and keep individuals accountable so as to achieve production goals.

This course aligns to the following Student Learning Outcomes for the Sustainable Plant Systems Major:

This course will provide the students with opportunities to:

- 1) Integrate and apply the general principles of Sustainable Plant Systems to specific plant production systems (Hydroponics and CEA).
- 2) Apply the basic principles of plant biology and soil science to plant production systems.

- 3) Communicate effectively principles and technical terms associated with plant production systems both orally and in writing.

This course aligns to the following Student Learning Outcomes for the Agriculture Technology Management Major:

1. Fulfills knowledge for topic area of Controlled Environment Agriculture.
2. Students will be able to demonstrate safe practices when operating tools and equipment.
3. Students will be able to identify and select tools and equipment to perform specific operations.
4. Students will be able to work cooperatively with others.

This course aligns to the following Student Learning Outcomes for the Biosystems Engineering Major:

- 1) Can apply mathematics, science, and engineering principles to solve problems.
- 2) Can communicate effectively.

Absence and Class Participation Policy

Students are expected to attend every class session and participate in all class activities to the best of their ability. Participation in this course is vital to the learning process. Because of the nature of this course and the requirement that students work collaboratively in teams, students must be in attendance in order to get the points for that day. If you were ill or have University approved absence (see below for policy) AND contact me within 24 hours of the absence, you may either make-up the time or complete an alternative assignment, as determined by the instructor. If you do not contact me about your absence within 24 hours of the absence, you forfeit any points earned that day. If you anticipate being absent or are unexpectedly absent, please contact me ahead of time.

To request a disability-related accommodation to this attendance policy, please contact the Disability Resource Center at (520) 621-3268 or drc-info@email.arizona.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Robert L. Nugent Building, room 100, or call 520-621-7057.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Makeup Policy for Students Who Register Late

Students who register after the first class meeting must make up all assignments within 3 days of first day of attendance, or time agreed upon by instructor.

Required Texts or Readings

There is no textbook required for this course.

Required or Special Materials

Students will be supplied with disposable gloves. Students should wear long pants, closed-toed shoes (no sandals or flip flops), and clothes they don't mind getting dirty. No food or drink in the greenhouses, except water.

Assignments and Examinations: Schedule/Due Dates

Class activities will occur on the first few class dates. Rotations will occur for all other class periods. Lysimeters will be assigned to each student for certain days.

Assignment Format

Students will be given requirements to include in their report for each rotation. Lysimeters data must be recorded in the teaching greenhouse log book on the days students are assigned to lysimeter duty. The Final reflection paper should be 5-8 pages typed, 12 pt double-spaced, reflecting on the activities in this class, what they learned, how these skills will impact their future careers etc.

Final Examination

The reflection paper will be in lieu of the Final Exam. The reflection paper will be due the Monday after the last day of class.

Grading Scale and Policies

FINAL GRADE =

GRADE	%
Rotation Report 1, 2, 3 (20% each)	60%
Peer Evaluation 1, 2, 3 (5% each)	15%
Lysimeters	15%
Final reflection paper	10%
TOTAL	100%

Late work policy: Assignments MUST be completed and turned during class. Late work is only accepted if you had an approvable absence. See absence policy.

Testing policy: There is only one exam which is the Final Exam. Students must take the Final Exam on the date provided by the UA schedule of final examinations unless otherwise arranged at the instructor's approval.

Requests for incomplete (I) or withdrawal (W): Must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively. Incomplete grades must be verified with a written agreement between the instructor and student. This agreement will specify the work to be done and a timetable of completion.

Dispute of Grade Policy: Students may discuss/dispute a given grade with the instructor as long as it is within one week of the grade being returned to the student. The instructor reserves the right to maintain the grade as it was originally assigned.

Honors Credit

Students wishing to contract this course for Honors Credit should email me to set up an appointment to discuss the terms of the contract. Information on Honors Contracts can be found at <https://www.honors.arizona.edu/honors-contracts>.

Scheduled Topics/Activities

Schedule to be determined at the start of the semester after number of students and student groups is known.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.). Cell phones should remain OFF during class, unless approved by instructor to being used as calculators. Laptops, ipads, and tablets are not recommended as we will be working with water which can damage these items. Phones, laptop, and other personal electronics are NOT allowed during exams.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Accessibility and Accommodations

At the University of Arizona we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations. Please plan to meet with me by appointment or during office hours to discuss needed accommodations.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>. The University Libraries have some excellent tips for avoiding plagiarism, available at <http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions. Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may also constitute copyright infringement. The University Libraries have some excellent tips for avoiding plagiarism, available at <http://new.library.arizona.edu/research/citing/plagiarism>.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Student Assistance and Advocacy information is available at
<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.