



## **BE/PLS 217 LAB: Introduction to Hydroponics Laboratory (1 Credit) Fall 2021**

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

**Day/Time:** Tuesdays & Thursdays 4:15 - 5:30 pm  
Lab is directly after BE/PLS 217 LEC 3:00 – 4:15 pm

- You must currently be registered for, or have already taken, BE/PLS 217 LEC, in order to take the LAB!

### **Description of Course**

Hands-on tomato plant cultivation course, teaching tomato production from seedling through harvest using commercial high-wire production techniques. Students apply what they have learned in BE/PLS 217 Lecture to real plants in a real commercial-style greenhouse. Course includes plant cultivation techniques such as clipping, stem pruning, leaning and lowering, cluster pruning and clipping, leaf maintenance, and harvesting techniques. Course also includes plant spacing, making nutrient tanks, and monitoring plant health, pollination, and irrigation, and awareness of various production systems and the importance of environmental control for the success of the crop.

### **Course Prerequisites or Co-requisites**

PLS 217 LECTURE is a Pre-Requisite or Co-Requisite.

### **Instructor and Contact Information**

Name	Mr. Myles Lewis
Office Location	CEAC Building Room 103
Telephone number	520-626-9953
E-mail address	mylesd@email.arizona.edu
Office Hours/“Open Door Policy”	By appointment
Web information:	
Current semester info available through D2L.	

### **Course Format and Teaching Methods**

This is a hands-on laboratory (the greenhouse is our laboratory) course that takes place entirely in the UA-CEAC Teaching Greenhouse (GH# 2087). Students will learn all aspects of hydroponic tomato cultivation from planting the crop up through harvest by physically working on the plants and completing exercises to give them experience with other aspects of production including pollination, plant health, and irrigation/fertigation management. Students will be assigned a group of plants and

must complete a list of tasks each class period, which is checked for completion by the instructor, and then turned in for credit each day. Students will also complete short exercises and a final plant care evaluation, which serves as part of the Final Exam. Students MUST make every possible effort to attend every single class period (the plants do not stop growing!). Students will respect the greenhouse as any other UA laboratory for safety of activities, but also as a greenhouse with production by other classmates in producing crops that are to be safe and without damage.

D2L will be used for supplemental videos and information.

## **Course Objectives and Expected Learning Outcomes**

The course objective is for students to gain an enhanced scientific and practical understanding of the science and techniques of hydroponics and controlled environment agriculture.

**The expected learning outcomes are for students to be able to:**

- 1) Demonstrate an understanding of basic principles of plant biology, entomology, plant nutrition and disorders, irrigation and fertilization, and environmental conditions necessary for growing greenhouse hydroponic vegetable crops.
- 2) Understand, apply, and practice plant cultivation, harvesting, pest management, and food safety techniques for growing hydroponic tomatoes.

This course aligns to all five Student Learning Outcomes for the Sustainable Plant Sciences 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 four of the Student Learning Outcomes for the Agriculture Technology Management Major:

- 1) Students will be able to demonstrate safe practices when operating tools and equipment.
- 2) Students will be able to identify and select tools and equipment to perform specific operations.
- 3) Students will be able to work cooperatively with others.
- 4) Students will be able to identify unsafe conditions in a laboratory or workplace.

This course aligns to four of the Student Learning Outcomes for the Agricultural and Biosystems Engineering Major:

- 1) Can apply mathematics, science, and engineering principles to solve problems.
- 2) Can use the techniques, skills, and modern engineering tools necessary for engineering practices.
- 3) Has the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context.
- 4) Has a knowledge of relevant contemporary issues.
- 5) Can communicate effectively.

## **Absence and Class Participation Policy**

This class is unlike most classes you will take at the U of A. Plants continue to grow daily and work needs to be completed in a timely manner, essentially, each week. Attending laboratory sessions

are vital to the learning process and as such, **attendance is required at each and every laboratory meeting.** All plant work is done during class time, unless there is an extenuating circumstance where you need extra time and then that time must be approved by the instructor.

While it is important for you to be in class, you cannot be in class if you are sick. **Contact me as soon as you know you will be missing class.** Email me at [myleisd@email.arizona.edu](mailto:myleisd@email.arizona.edu). Plants keep growing and I will need to have someone cover your plant work until you can safely return to lab. If you have to miss a considerable amount of class, we will have to discuss alternative work for you to complete or have you take an “I” Incomplete grade.

### **Classroom (Greenhouse) Considerations:**

- Face coverings are requested in our classroom: Per UArizona’s Administrative Directive, face coverings that cover the nose, mouth, and chin are required to be worn in all learning spaces at the University of Arizona (e.g., in classrooms, laboratories and studios). Any student who violates this directive will be asked to immediately leave the learning space, and will be allowed to return only when they are wearing a face covering. Subsequent episodes of noncompliance will result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied. The student will not be able to return to the learning space until the matter is resolved.
  - The Disability Resource Center is available to explore face coverings and accessibility considerations if you believe that your disability or medical condition precludes you from utilizing any face covering or mask option. DRC will explore the range of potential options as well as remote course offerings. Should DRC determine an accommodation to this directive is reasonable, DRC will communicate this accommodation with your instructor.
- **Physical distancing is required in our classroom:** During our in-person class meetings, we will respect CDC guidelines, to try to maintain at least 6 ft or more physical distancing. Your work plants will be sectioned such that you should be able to stay 6 ft from one another. If you need to work on plants in the immediate area of someone else, wait until they are finished in that area to go there to do your work. For training and demonstrations, I will work with you in smaller groups to try to maintain social distancing.
- **Classroom attendance:**
  - If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.
  - **Notify your instructors if you will be missing an in person or online course.**
  - Campus Health is testing for COVID-19. Please call (520) 621-9202 before you visit in person.
  - Visit the UArizona COVID-19 page for regular updates.

### Dropping the course once it has begun:

If you decide to drop the class once it has begun (once you have been assigned a rep of plants, i.e., after the first class meeting), **you MUST NOTIFY the instructor prior to dropping the class so that your plants can be reassigned to student workers or others for care.**

Course withdrawal policy: Students must notify the instructor prior to non-attendance in classes and must execute drop or withdrawal procedures: <http://catalog.arizona.edu/policy/grades-and-grading->

[system#Withdrawal](#) Please see University withdrawal procedures:  
<http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal>

### **Makeup Policy for Students Who Register Late**

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

### **Required Texts or Readings**

There is no required textbook for this class. All materials will be available to students on D2L or handed out in class. Students can refer to PLS 217 Class Notes: Intro to Hydroponics and CEA is available on D2L and online at <https://ceac.arizona.edu/students/ua-courses/bepls-217> for supplemental information.

### **Required or Special Materials**

A mask, work clothes (that you don't mind getting green or dirty) and closed-toed shoes (no flip-flops) must be worn in greenhouse. Water, a hat, sunscreen, and camera are recommended. No food or drinks other than water are allowed in the greenhouse. A white lab coat and disposable plastic gloves will be provided to each student. NOTE: Each student will be assigned a box with items/tools to be used in the greenhouse, which will be checked out/in during each lab session. If any items are lost/damaged, the student will be assessed the cost of the lost/damaged items.

### **Assignments and Examinations: Schedule/Due Dates**

Lab check out sheets are given out at the start of each class and are due at the end of each class period before leaving lab. The short exercises will be due according to the lab schedule. They are due at the end of the classperiod, unless I tell you otherwise.

Plants must be ready for the Final Plant Evaluation by the end of classes in December.

### **Assignment Format**

Lab check out sheets provide students with a list of each activity they must complete during each lab session. Students must initial when they have finished each task and then have the instructor look over their plants and initial that each thing has been done before the student may turn in the sheet and leave for the day. Exercises will be handed out, to be completed during class time, and then turned in by the end of the class period assigned, unless they are told otherwise.

### **Final Examination**

The Final Plant Evaluation plus a comprehensive paper exam will be the Final Exam for this course. The exam will be the last day of class. Plants must be ready for grading by 5pm on the Friday of the last week of class.

### **Grading Scale and Policies**

Extra Credit Opportunity: On the last regular class meeting day (Tuesday, December 08), we will have a "pot luck" (\*). Faculty, staff, and students of the CEAC will be invited to share in our bounty. This is a time to show off your favorite recipes, so start planning early. **YOU MUST PREPARE**

<u>How your grade will be determined</u>	<u>%</u>
Check-out sheets	39.9%
Lab exercises	10.0%
Midterm Exam & Plant Evaluation	20.0%
Final Exam & Plant Evaluation	20.0%
Attendance	10.1%
<b>TOTAL</b>	<b>100.0%</b>

THIS YOURSELF! You will receive extra credit if you:

- 1) Bring a dish to share that includes at least one of the crops we have grown: tomato, cucumber, and/or pepper.
- 2) Bring a copy of your recipe to display with your dish (this will be collected)
- 3) Have the dish (ready to eat) and recipe at the CEAC by 4:15pm on Tues, Dec. 08.

<u>Grading Scale</u>
A = 90.0% - 100 %
B = 80% - 89.9%
C = 70.0% - 79.9%
D = 60.0% - 69.9%
E < 60.0%

Late work policy: Exercises must be completed in class on the day listed in the Lab Schedule. They may not be taken home to finish, unless agreed upon by the instructor.

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.

## Course Communications

All course communications will be done through email and D2L, and phone if you have a last minute absence. You may email me anytime at [mylesd@email.arizona.edu](mailto:mylesd@email.arizona.edu) **DO NOT use the D2L email. I don't get those emails!**

## 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 greenhouse times, unless being used as calculators

## 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

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit <http://drc.arizona.edu>.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

## **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.

## **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**

Academic advising: If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the Advising Resource Center can guide you toward university resources to help you succeed. 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>

Life challenges: If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or [DOS-deanofstudents@email.arizona.edu](mailto:DOS-deanofstudents@email.arizona.edu).

Physical and mental-health challenges: If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520-621-9202). For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

## **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.

**BE/PLS 217: INTRODUCTION TO HYDROPONICS LAB SCHEDULE  
FALL 2021**

**INSTRUCTOR:** Mr. Myles Lewis

(Schedule subject to change)

	Module:	
Intro		24-Aug
Intro Module: Lab Syllabus, Video, CEAC Crop Production Laboratory Rules		26-Aug
Start in – person: Greenhouse tour, assign sections.		31-Aug
Demo: Plant care.		2-Sep
Demo: Leaning and lowering, bottom leaf removal. Plant care and lean and lower if needed.		7-Sep
Demo: Growth tapes and harvest. Put up first growth tape and harvest. Plant care.		9-Sep
Demo: Cluster pruning, j-hooks. Plant care. Lean and lower if needed.		14-Sep
Growth tapes. Harvest. Plant care.		16-Sep
Plant care. Lean and lower.		21-Sep
Growth tapes. Harvest. Plant care.		23-Sep
Discuss crop layout/spacing. Complete EX1. Plant care. Lean and lower.	<b><u>EX 1: Plant Spacing</u></b>	28-Sep
		30-Sep
Growth tapes. Harvest. Plant care.		5-Oct
Plant care. Lean and lower. Complete EX2.	<b><u>EX 2: Pest ID &amp; count #1</u></b>	7-Oct
Growth tapes. Harvest. Plant care.		12-Oct
Plant care. Lean and lower. Complete EX3.	<b><u>EX 3: Measure pollination %</u></b>	14-Oct
Lecture class exam earlier. Growth tapes. Harvest. Plant care.		19-Oct
Plant care. Lean and lower. Complete EX4.	<b><u>EX 4: Pest ID &amp; count #2</u></b>	21-Oct
Growth tapes. Harvest. Plant care.		26-Oct
Plant care. Lean and lower. Complete EX5.	<b><u>EX 5: Monitoring Emitters</u></b>	28-Oct
Growth tapes. Harvest. Plant care.		2-Nov
Plant care. Lean and lower. Complete EX6.	<b><u>EX 6: Monitoring Irrigation/lysimeters</u></b>	4-Nov
Growth tapes. Harvest. Plant care.		9-Nov
Plant care. Lean and lower. Complete EX7.	<b><u>EX 7: Veg vs Rep Characteristics and Pollination % #2</u></b>	16-Nov
Plant care. Lean and lower. Complete EX8.	<b><u>EX 8: Pest ID &amp; count #3</u></b>	18-Nov
Growth tapes. Harvest. Plant care		23-Nov
Growth tapes. Harvest. Plant care		30-Nov
Growth tapes. Harvest. Plant care	<b><u>EC: Potluck dish</u></b>	2-Dec
<b>FINAL EXAM</b>	<b>Plant Care Evaluation: Plants must be ready for grading on Friday Dec. 10, 5:00pm</b>	7-Dec

