

HORT 300, Special Topics HYDROPONICS

Lecture: MW 10:30-11:45am, Skeen 139
Lab: M 1:30-4pm, Skeen 139
4 credit hours

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Office Hours: Wed., 1:30-2:30pm, Thurs., 10:30-11:30 or by appointment
Teaching Assistant: Naga Potlapalli, Skeen N329, 575-520-1211 (cell)

COURSE OVERVIEW

This course will introduce students to the basics of different soil-less growing systems: hydroponics, aeroponics and aquaponics. Topics will include growing systems and environments, crop management, business aspects of hydroponic growing, integrated pest management, commercial and restaurant systems, and plant nutrition. Labs will reinforce lecture topics and give students practical experience growing different types of crops in different types of systems.

COURSE LEARNING OBJECTIVES

After completing this course, students will be able to:

- discuss the benefits and constraints of different hydroponic systems
- evaluate different crops for each type of system
- identify the components and calculate costs of different systems
- demonstrate how to build and maintain each type of system
- discuss how soilless growing relates to sustainability and local food production

COURSE MATERIALS:

Required Textbook: You will need to have access these two texts listed below for the required readings. You will not be required to purchase a text. Additional readings and videos will be assigned over the semester and posted in Canvas.

Introduction to Hydroponics and Controlled Environment Agriculture, by Patricia Rorabaugh <https://ceac.arizona.edu/resources/intro-hydroponics-cea> (Links to an external site.)

Complete Guide to Growing Plants Hydroponically, by J, Benton Jones, Jr.
<https://pdfroom.com/books/complete-guide-for-growing-plants-hydroponically/9zk2ALIEgPJ>

Canvas: (<http://learn.nmsu.edu>) all materials related to the class will be available through Canvas. Students should make a habit of checking Canvas frequently. Grades, announcements, assignments, lecture PowerPoints, etc. will be posted in Canvas. If you have a concern about posted grades, contact the instructor.

Other required materials: Labs will meet in the greenhouse, and you will be using your hands a lot. As such, you may wish to purchase and wear work gloves. You are required to wear closed shoes at all time: no sandals of any sort. I would also recommend wearing long pants and bringing drinking water with you in a closed, sealed container.

Class structure:

Please expect to do 2-4 hours of reading, etc. outside of class as well as some time maintaining and checking the hydro systems. Classroom time will include discussion of materials and videos. You are encouraged and expected to participate in classroom discussions and part of your grade will be for participation. There is a schedule and structure to class sessions, but if we hit on a topic we want to delve into more deeply, we will adjust. Dates for exams will not change but material covered may change.

Labs will be spent planting, transplanting, and managing crops, mixing nutrients, building systems, etc. You will be divided into smaller groups and rotate management of the different systems and crops, and groups will be required to train the next group when rotations change.

Most of all, please come with a good attitude and be ready to explore and experiment. I encourage questions and an open, respectful environment amongst us all.

Projects

In all, we will be growing in 5 different soilless growing systems. These will include:

- an individual mason jar system

- group projects, including:

 - Aeroponics systems

 - Dutch bucket systems

 - NFT system

 - Tower system

- all projects will include preparing proper plant nutrition, replacing nutrient solutions, maintenance of systems, setting up weekly crop rotations which will include seeding and transplanting, crop observations for pest and disease issues, etc. Best of all, you may get some free food from our harvests!

ASSIGNMENTS & ASSESSMENTS:

GRADED ASSIGNMENTS:

Attendance and participation

Classroom sessions will include reviewing course materials and videos, as well as discussions of both. Classroom discussions cannot be replicated so missing class means missing material. Students will also be assigned to lead discussions and provide material for discussions over the course of the semester

Labs for this course will be very hands on and being present to participate will increase your knowledge and retention of the material. If you must be absent, please contact me **before** if possible. It will be your responsibility to obtain the information you miss from your classmates if you miss classes or labs.

Peer Evaluations

Participation will be a vital component of this course and will be part of your grade. I will observe participation in class and labs. In addition, you will also be asked to grade one another on your group projects. I will ask for feedback from each group member, which will be included in final grade calculations.

Class discussions

Students will be assigned weeks where they will need to provide a video or other resource pertaining to some aspect of hydroponics, sustainable agriculture, non-traditional farming, food-to-table, etc. The student will then lead the class discussion about that article.

Quizzes and Tests

There will be 5 online quizzes covering course materials, spaced over the semester. They are worth 20 points each.

There will be two tests for this course, on **Wed., Feb. 23** and **Wed., March 30**. They will focus mainly on the material covered up to that date, but knowledge from sections builds on what was learned in previous sections, so there may be some overlap. A test review will be posted and discussed in class. There will be no formal final exam for this course.

Final project

A final design project that encompasses and incorporates the entirety of class materials and projects will be due on **Mon, May 2 at 10:30am**. More details and a grading rubric will be presented in class.

Reflections

Four times over the course of the semester, you will be asked to submit reflections. These are your own thoughts, experiences, and opinions, and as such, the content cannot be termed “wrong.” However, I will expect good sentence structure and clear, logical communication of your thoughts. I prefer to have these submitted in writing but if you prefer another form of communication, please check with me. A rubric for reflections will be provided to you before the first one is due.

ASSIGNMENT POINT TOTAL:

Attendance and participation (25 points/wk x 12 weeks)	300 points/20%
Peer evaluation of participation (30 points x 4)	120 points/15%
Leading class discussions (50 points)	50 points/5%

Reflections (25 points x 4)	100 points/10%
Quizzes (20 points x 5)	100 points/10%
Test #1	100 points/10%
Test #2	100 points/10%
Final project	100 points/20%
TOTAL POINTS AVAILABLE	970 PTS/100%

GRADING CRITERIA:

Points/percentage for grades:

873-970 points/90-100%	A
775-872 points/80-89%	B
677-774 points/70-79%	C
579-676 points/60-69%	D
<579 points or below 59%	F

POLICIES

Class Attendance and participation

You are strongly encouraged to attend all class and lab sessions. Class discussions are best understood as they happen, and lecture summaries will not be provided, so attendance and participation are crucial to comprehension of material. Lab sessions cannot be replicated either. You will be providing peer evaluations of each other for your participation in lab activities.

Late Assignments

In general, late assignments are not accepted without prior approval. You can be excused from class or lab in the case of emergencies and/or with prior approval from the instructor. Because of the hands-on nature of labs, no make-up work for missed labs will be offered.

Extra credit

If opportunities arise that are of general interest to this course, you may be allowed to earn extra credit for them. If you're seeking extra credit, make suggestions to me via email. Extra credit will not be considered as a substitute for doing what is covered in the course or to overcome non-participation/repeated absences.

Communication with me

Emails will be answered within 24 hours, often far less. Weekends it might be more like 36 hours. I prefer you to email me through Canvas. You are also welcome to text me but know that my phone is on ignore from 8:30pm to 6am. If you text me during those hours, I won't see it until I'm awake and I won't reply until I'm caffeinated, or until I'm at work. Please also know that there are weekends when I will be off grid. I will try to let you know in advance when that happens so that you know not to expect me to respond.

Cell Phones

Please turn your cell phone off or to vibrate while in class.

ACADEMIC MISCONDUCT

Academic and non-academic misconduct: The Student Code of Conduct defines academic misconduct, non-academic misconduct and the consequences or penalties for each. The Student Code of Conduct is available in the NMSU Student Handbook online:

<http://studenthandbook.nmsu.edu/>

Academic misconduct is explained here:

<http://studenthandbook.nmsu.edu/student-code-of-conduct/academic-misconduct/>

NMSU Student Resources and Policies

Please visit <https://provost.nmsu.edu/faculty-and-staff-resources/syllabus/policies> for university policies and student services, including Discrimination and Disability Accommodation, academic misconduct, student services, and more

COURSE SCHEDULE

Subject to change! Course announcements supersede this schedule!

Week	Date	Topic	Homework	Discussion leader	Due	Lab	
1	1.12	Course Intro					
2	1.17	How plants grow	Ch. 2, Jones			Tour greenhouse, start seeds	
	1.19	Systems, choose discussion leaders	Read Ch. 1 & 5, UofA Read Ch. 1, pp. 1-13, Jones				
3	1.24	Systems	Read Ch. 6, Jones Watch fogponics video	A		Intro to different systems and components,	
	1.26	Medias	Read Ch. 5, Jones Watch media videos	B			
4	1.31	Crops	Read Ch. 2, UofA Watch best crops video	C	Quiz #1	Begin set up/building of group projects	
	2.2	Crops & crop rotation	Read Ch. 6, UofA Watch plant and aeration videos	D			
5	2.7	Water, pH and EC	Read Ch. 4, pp. 49-53, Jones Watch pH and EC videos	E			
	2.9	Plants and nutrition	Read Ch. 3, pp. 31-44, Jones	F			
6	2.14	Nutrients		G			
	2.16	Plant nutrition		H			
7	2.21	Review for Test #1			Quiz #2 First reflection and peer evaluations due	Switch groups/systems	
	2.23	Test #1					
8	2.28	Nutrient solutions	Read Ch. 10, UofA Read Ch. 4, pp.53-87, Jones	I			
	3.2	Nutrition disorders	Read Ch. 9, UofA Read Ch. 3, pp. 45-47, Jones Watch nutrient video	J			
9	3.7	No classes—Spring Break					
	3.9						

10	3.14	Carbon dioxide and ethylene		K		
	3.16	Lighting, heating, cooling Last day to drop with a W is 3.17		L		
11	3.21	Pollinators	Read Ch. 7 and article Watch pollination video	M		Switch groups/systems
	3.23	Pests and pest ID	Read Ch. 4, UofA	N	Quiz #3	
12	3.28	Review for Test #2			Second reflection and peer evaluations due	
	3.30	Test #2				
13	4.4	IPM—guest lecturer Dr. Triston Hooks				
	4.6	Greenhouse materials	Read Ch. 11 & 12, UofA Watch greenhouses types video	O		
14	4.11	Sustainable energy ideas, Discuss final project	Read Ch. 14, UofA Watch energy usage videos	P		Switch groups/systems
	4.13	Aquaponics—guest lecturer Dr. Rossana Sallenave	Watch 3 aquaponics videos	Q	Quiz #4	
15	4.18	Greenhouse & CEA systems	Read Ch. 3 & 13, UofA Watch GH site video	R	Third Reflection and peer evaluations due	
	4.20	Harvesting and food safety	Read Ch. 8, UofA	S		
16	4.25	Commercial food production	Read Ch. 15, UofA Watch Hydro vs. field video	T		Close down systems and clean up greenhouse
	4.27	Green roofs, green walls, outdoor hydroponics, etc.			Quiz #5	
17		Final project due: Mon., May 2, 10:30am				
	5.2	Final reflection and peer evaluations due: Wed., May 4, noon				