Hydroponics Spring 2025 Syllabus

PSC 2900 2 credits

Instructor: Noah J. Langenfeld (noah.langenfeld@usu.edu)

Prerequisites: None. A high school level understanding of chemistry, biology, and algebra is highly recommended.

Schedule: Ag Science 102, TR 9:00 – 9:50 a.m., 4 labs to replace lectures on 4 days, TBD.

Course Description: Principles and practices of design, maintenance, and applications of hydroponic systems for sustainable food production. Basic solution chemistry and plant physiology principles and their impact on hydroponic optimization. Lecture and lab components. Includes a course-long project to grow plants in your own hydroponic system!

Suggested textbook: Hydroponic Food Production: A Definitive Guidebook for the Advanced Home Gardener and the Commercial Hydroponic Grower, Seventh Edition – Howard M. Resh

Course Outcomes:

1. Apply knowledge of solution chemistry to designing and maintaining hydroponic nutrient solutions.
2. Understand environmental conditions affecting plant growth and how they can be controlled to optimize hydroponic food production.
3. Identify and implement the best hydroponic design and management practices for chosen applications.

Topics:

1. Measurement units
2. System history and designs
3. Nutrition and physiology
4. Solution preparation and monitoring
5. Aeration and substrates
6. Gases
7. Lighting
8. Automated control and design

Grading:

Assignment	Points	Number	Total points	Grade %
Quizzes	5	10	50	10
Lab reports	50	4	200	40
Homework	20	5	100	20
Student project – oral	75	1	75	15
Student project – written	75	1	75	15
Total			**500**	**100**

Quizzes will be unannounced and given at the beginning of class. They are closed book and should take less than 5 minutes. These are meant as simple checks and will be cumulative.

Lab reports will be due one week after the lab has ended. They will be a *maximum* of one page, single-spaced. There will be a 5% reduction in your score per day late.

Homework will be due one week after being handed out and will cover calculations or research. All work must be shown to receive full credit. Do *not* leave any questions blank; take an educated guess. There will be a 5% reduction in your score per day late.

Student projects will be a semester long project where students get to grow plants in their own hydroponic system they construct. Each student will do 2 plantings: the first planting will be a test run; the second planting will be dried to determine growth parameters. After completion, students will give an oral in-class presentation and write a short paper:

> Student project – oral will be a 5-minute flash talk with a *maximum* of 3 slides.
>
> Student project – written will be a short (*two-page max.)* paper, single-spaced.

Late work: Quizzes are in class and cannot be made up. Unexcused late work will be accepted up to 1 week late with a 5% reduction in your score per day late (e.g. a 100% on a homework or lab turned in 7 days late becomes 65%). Excused late work (per instructor discretion) will be accepted up to 1 week late with no score reduction. After 1 week, a 5% reduction per day will be taken, up to an additional week. Excused late work turned in more than 2 weeks after the original deadline will receive a 0. Special project components serve as a final project – absolutely no late work accepted. Labs are complex and cannot be made up. Unexcused lab absences will result in a 0 for the lab. Excused lab absences (instructor notified PRIOR to the beginning of lab) are accepted, but a point reduction may be given in the lab report.

Grade	Points	Percentage
A	≥ 465	≥ 93%
A-	450 – 464	90 – 92.9%
B+	435 – 449	87 – 89.9%
B	415 – 434	83 – 86.9%
B-	400 – 414	80 – 82.9%
C+	385 – 399	77 – 79.9%
C	365 – 384	73 – 76.9%
C-	350 – 364	70 – 72.9%
D+	335 – 349	67 – 69.9%
D	315 – 334	63 – 66.9%
D-	300 – 314	60 – 62.9%
F	< 300	< 60%

The instructor reserves the right to decrease the percentage cut-offs for all students. The cut-offs will *not* be raised.

Lab Safety: All laboratory exercises require proper personal protective equipment. Lab goggles and closed-toed shoes will be required. We will provide lab goggles for all students. Please make sure you wear closed toed shoes on the day of a laboratory activity. Lab coats are encouraged, but optional. Those not abiding by these rules will not be allowed to participate and will receive an automatic 0 for the lab activity.

Phones: Keep them in your bag. If the phone is more important than class, please step out.

Attendance: This is an in-person class, and all students are expected to attend every lecture and laboratory activity. Please arrive at class on time out of respect for your fellow students. If there are reasons you cannot come to class (sickness, weather, funeral, etc.), please notify me BEFORE the start of class. Oversleeping is not an acceptable excuse for missing class.

Office hours: *By appointment.* Please email me if you would like to discuss any course aspects.