

PLNU Mission: To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

“Innovation in life science will be the major driver of meeting four major societal challenges: challenges of climate, challenges of food, challenges of energy, and challenges of health.”

*Phillip A. Sharp, Massachusetts Institute of Technology,
Co-chair, National Research Council Committee, A New Biology for the 21st Century*

BIO 3012 Applied Plant Biology (2 units) catalog description

A study of plant structure, function, and phytochemistry through an examination of economically and culturally important plants, including plants used for medicine, food, fuel, fiber, and building materials. Topics include environmental plant physiology, biotechnology, plant propagation, medicinal botany, and sustainable land use. Lecture, lab and fieldwork.

This course is designed to promote learning about the myriad of ways in which humans produce and use plants. The course lecture and lab activities are designed to provide multiple opportunities you to learn and to apply ideas and to learn how scientific inquiry is applied to problems in applied plant biology. Outside of class, you will have assigned readings to prepare for lab and discussion activities on Fridays. You are expected to do all assigned reading before class, and to come prepared to discuss the content for the day. Biology 2012 is a pre- or co-requisite for this course, so you will be expected to know basic concepts related to plant diversity as well as basic plant structure and function. The course is an upper division biology elective for biology and environmental science majors.

Instructor office hours and contact information

dianneanderson@pointloma.edu Office: Rohr Science 146 Phone: 619-849-2705

Office hours: Tuesdays and Wednesdays 1:00-3:00 or by appointment

Class session schedule

Class will be held on Friday afternoons from 2:45-4:45 PM in Rohr Science 40 and the greenhouse.

Required books for the course:

The Fate of Food: What We'll Eat in a Bigger, Hotter, Smarter World (2019)
by Amanda Little ISBN: 978-0804189033

Most Delicious Poison (2023) By Noah Whiteman ISBN: 978-0316386579

Links to a variety of additional sources will be posted on Canvas.

Course learning outcomes:

1. Distinguish between 1) possible benefits to the plant and 2) possible uses by humans for a variety of botanical structures and molecules.
2. Analyze the impacts of plant pathology, biotechnology, traditional plant breeding, innovative farming methods, and sustainable land use in meeting the needs of a growing world population.

3. Develop questions related to overall course themes, then access and summarize appropriate resources, including journal articles, to answer those questions and report findings to the class.
4. Compare wood, fiber and food samples to identify characteristics desirable for various uses.
5. Design and carry out experiments, then analyze data to test hypotheses on the following topics:
 - a. Determination of the optimal physical properties and nutrient profile for growing plants
 - b. Determination of the optimal light and temperature conditions for photosynthesis
 - c. Comparison of the antibacterial activity of spices and CA native plants
6. Describe how plants can be used for food, fuel, fiber, wood and a variety of unique molecules.
7. Gain experience in using a variety of equipment and methods including germination chambers, hydroponic/aeroponic equipment, dissection & binocular microscopes, soil testing kits, sonication, and an antibiotic disc diffusion assay.
8. Propagate and care for plants using various growing systems.

Grading

Grades will be given on the basis of total points earned. Points are distributed as follows:

Syllabus verification	5 pts
Lecture/lab exams (2 @ 80 points each)	160 pts.
Lab summaries (10 pts. X 8 weeks)	80 pts.
Weekly reading assignments (5 pts. X 12 weeks)	60 pts.
Misc. homework and activities	approximately 45 pts.
Projects (4 @ 25 points each)	100 pts.
Research Presentation	<u>100 pts.</u>
	approximately 550 pts. total

Grade calculation

A 92-100%	A- 90-91%	B+ 88-89%	B 82-87%	B- 80-81%	C+ 78-79%
C 72-77%	C- 70-71%	D+ 68-69%	D 62-67%	D- 60-61%	F 59% or lower

Project information:

- Project #1 – Design, carry out, and analyze a **plant nutrition project** based on either a comparison of fertilizer types or concentrations.
- Project #2 - Design, carry out, and analyze a **medicinal botany project** based analyzing the antibacterial properties of various plants/spices.
- Project #3 - Complete a class-related **service project** (2-3 hours) to benefit someone else and submit a brief written summary as well as before and after pictures (1-2 pages)
- Project #4 – Complete a **landscape design project** as a horticultural therapy space to benefit a particular population (such as dementia patients, inmates, patients/families at a children’s hospital)

Research Presentation:

Prepare and present a **summary of current research** (at least three research articles) on a topic related to applied plant biology, then propose a line of research to extend the work.

Exams:

You are expected to take the exams on the days scheduled unless you have an excuse cleared by me no later than the Friday preceding the exam. If something unexpected happens, we will make appropriate arrangements at that time. Makeup exams may not be the same as the original and will generally be more difficult in nature. Un-excused misses will result in a zero grade.

Final exam policy: All students are required to take the final exam for the course on the day and at the time on the PLNU final exam schedule.

Attendance, participation, and cooperation

Class attendance is mandatory. Poor attendance tends to correlate with low grades. Please communicate regarding any planned absences. Since the class only meets once a week, at 2 absences, I must contact the Vice-Provost for Academic Administration, and you will be dropped from the course unless there is an exception granted by the administration.

Note these important dates:

January 21, 2024 is the last day to add BIO 3012.

March 22, 2024 is the last day to drop BIO 3012.

In an effort to create the best learning environment possible, all students should work in groups when asked to do so. I will often assign groups, and I may shuffle the groups several times during the semester. You may be surprised how much you can learn from one another, especially from people who you may not have chosen to work with on your own.

Cell phones must be muted/on vibrate during class. Only in cases of emergency should you leave class to take a phone call, unless the lab is on a break. Please, NO texting during class as it distracts both you and people around you. **It is important that you bring both your required book and computer with you to each class if at all possible, as you will be using both in almost every class session.**

GENERAL PLNU POLICIES

Spiritual Care

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If you have questions, a desire to meet with the chaplain or have prayer requests you can contact your professor or the Office of Spiritual Life and Formation.

PLNU Copyright Policy

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU Academic Honesty Policy

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

Artificial Intelligence (AI) Policy

You are allowed to use Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor.

PLNU Academic Accommodations Policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course. Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

Language and Belonging

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality. You may report an incident(s) using the [Bias Incident Reporting Form](#).

Sexual Misconduct and Discrimination

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that accommodations and resources are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix.

PLNU Attendance and Participation Policy

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an "F" grade.

Loma Writing Center

The Loma Writing Center exists to help all members of the PLNU community cultivate transferable writing skills to engage their academic, professional, personal, and spiritual communities. We work toward this goal by conducting one-on-one consultation sessions, supporting writing education across the PLNU community, and participating in ongoing writing center research.

Getting feedback from the Loma Writing Center while you're in the process of working on an assignment is a great way to improve the quality of your writing and develop as a writer. You are encouraged to talk with a trained writing consultant about getting started on an assignment, organizing your ideas, finding and citing sources, revising, editing for grammar and polishing final drafts, and more. For information about how to make in-person or online appointments, see [Loma Writing Center webpage](#) or visit the Loma Writer Center on the first floor of the Ryan Library, room 221.

BIO 3012 Class schedule – Spring 2024 (subject to change)

Additional reading assignments, assignment details, and due dates available on Canvas

Week	Date	In-class topics and activities	Projects due
1	Jan. 12	Intro to BIO 3012 Plant nutrition Part I: Root structure & function Lab: Root examination and Plant nutrition experiment design Demo: repotting houseplants	
2	Jan. 19	Plant nutrition Part II: Soils Lab: Soil composition (mineral components and nutrients) Lab: Radish germination observations, set up plant nutrition experiment & composting boxes	Write up most of lab report
3	Jan. 26	Plant Production Part I: Organic vs. conventional vs. sustainable practice farming Lab: Impact of abiotic factors on photosynthesis	
4	Feb. 2	Plant Production Part II: Alternative methods of farming Lab: Comparison of DWC, aeroponics and growing in soil. Expectations for research projects (rubrics)	
5	Feb. 9	Plants as a source of unique molecules – Part I Collect and dry plants for medicinal botany labs	
6	Feb. 16	Plants as a source of unique molecules – Part II Lab: Medicinal Botany Part I	Write up most of lab report
7	Feb. 23	Plants as a source of unique molecules – Part III ID major medicinal/toxic plant families Lab: Medicinal Botany Part II	
8	Mar. 1	Exam #1 Harvest and analyze plant nutrition experiment this week	Research project sources due
	Mar. 8	Spring Break – no class	
9	Mar. 15	Research presentation(s) – 2 students each week rest of semester Plants as a source of food ID major food plant families Lab: Growing microgreens and extending shelf life	Plant nutrition project due
10	Mar. 22	Plants as a source of fiber/wood and fuel Lab: Fiber/wood structure and uses	Medicinal botany project due
11	Mar. 29	Easter Break – no class	
12	Apr. 5	Using plants to solve problems: Phytoremediation & horticultural therapy Lab: Design a garden for a specific population	
13	Apr. 12	Plant pathology Lab: Plant pathology	Landscape Design Project due
14	Apr. 19	Plant varieties GM database activity Lab: Apple tasting	
15	Apr. 26	Plant propagation Prepare succulent bowls for graduation	Service project due
	May 3	Exam #2 –Wednesday, May 3 from 1:30-4:00	

