

Bio 3012 Applied Plant Biology

Dr. Dianne Anderson

Spring 2021

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.

Course description and format

This course is designed to promote learning about the myriad of ways in which humans 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 to 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.

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.

“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

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. Describe the roles of biotechnology, traditional plant breeding, innovative farming methods, and sustainable land use in meeting the needs of a growing world population.
4. Critique primary literature by identifying the research question, and analyzing the methods and results to determine if the conclusions are valid.
5. Develop questions related to overall course themes, then access and summarize appropriate resources to answer those questions, and report findings to the class.
6. Design an experiment, collect and analyze the data and write up experiments.
7. Describe how plants can be used for food, medicine, fuel, and fibers, as well as to address problems mental health and climate change.

Instructor office hours and contact information

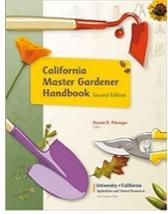
Zoom Office Hours: Mon, Wed, Thurs. & Fri (not Tuesdays) from 10:30-11:30AM or by appointment. Join office hours using this link: <https://pointloma.zoom.us/j/95248189087>

dianneanderson@pointloma.edu Office: 619-849-2705

Class session schedule

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

Resources for the course



Required Text:

California Master Gardener Handbook (2nd edition)

ISBN-13: 978-1601078575

ISBN-10: 1601078579

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

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	approximately 50 pts.
Homework and in-class activities	approximately 45 pts.
Projects (4 @ 25 points each)	100 pts.
Research Presentation	<u>100 pts.</u>
	approximately 500 pts. total

Project information:

- Project #1 – Design, carry out, and analyze a **plant nutrition project** based on either a comparison of fertilizer types, concentrations, or protocols.
- Project #2 - Design, carry out, and analyze a **medicinal botany project** based on 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 – Create 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.

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 there is an approved conflict, you will be expected to take the exam **prior to** the scheduled time. 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.

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

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:

March 12, 2021 is the last day to add BIO 3012.

May 7, 2021 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 (although this will be unlikely this semester due to COVID restrictions). 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 textbook and computer with you to each class if at all possible, as you will be using both in almost every class session.**

Coronavirus-Related Safety Requirements

1. **A face mask must be worn properly in the laboratory at ALL times.** This will be strictly enforced! If you forget your mask, you will be sent home to retrieve it. **Your face mask should completely cover both your nose and mouth at all times.** Do NOT let your mask sag below your nose or mouth and become a chin strap. You should have **several face masks** in your possession, since you may wish to switch to a fresh mask once or twice a day. You will also want to have a good supply of cloth masks so that they can be washed frequently.
2. Follow all safety instructions given to you by your professor and lab assistants. **Six feet must be maintained** between students or between student lab partners, depending on how your professor has set up the laboratory space. Do not visit other students or student pairs within the classroom during class, and do not visit any equipment or other station within the lab unless it is vacant of other students/student pairs. When in doubt, please ask for instructions.
3. **Absolutely NO consumption of food (including gum) or beverages within the lab,** since this would require removing your mask. You MUST leave the lab classroom and go outside to take a drink from a closed container. Closed beverage containers must be protected within a back pack or bag while in the lab classroom so that air particles do not fall on the drinking surface.
4. Hands should be washed **thoroughly (20-30 sec) with soap both at the beginning and at the conclusion of each laboratory period.** Coronaviruses are effectively trapped by soap (like grease on pots and pans when washing dishes) and removed from your hands if you thoroughly wash your

hands with soap for at least 20-30 seconds, and then dry them completely. Hand sanitizer will be made available as well.

5. We will be very thorough and strict with our disinfection policies. Students will do the following at **both the beginning and the end of the laboratory session**.
 - Thoroughly spray down and clean your lab bench. The special covid-19 disinfectant should thoroughly cover the surface and be allowed to sit for 1 full minute before wiping the cleaner off. Use a timer to ensure a full minute has passed.
 - Using whatever cleaner and other supplies given to you (e.g., special cloth rags or lens paper, etc), wipe down any shared equipment being used that day.

Do NOT touch your face while in lab, regardless of whether or not you are wearing lab gloves. Do not touch your phone or laptop in lab until you have washed your hands or used hand sanitizer. Sanitize your hands after touching shared equipment before using your cell phone or computer.

GENERAL PLNU POLICIES

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.

PLNU ACADEMIC ACCOMMODATIONS POLICY

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses.

If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly

recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all **synchronous** class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions (virtual or face-to-face), 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 drop date or, after that date, receive the appropriate grade for their work and participation. In some courses, a portion of the credit hour content will be delivered **asynchronously** and attendance will be determined by submitting the assignments by the posted due dates. See [Academic Policies](#) in the Undergraduate Academic Catalog. If absences exceed these limits but are due to university excused health issues, an exception will be granted.

Asynchronous Attendance/Participation Definition

A day of attendance in asynchronous content is determined as contributing a substantive note, assignment, discussion, or submission by the posted due date. Failure to meet these standards will result in an absence for that day. Instructors will determine how many asynchronous attendance days are required each week.

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 students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#).

USE OF TECHNOLOGY

In order to be successful in the online environment, you'll need to meet the minimum technology and system requirements; please refer to the [Technology and System Requirements](#) information. Additionally, students are required to have headphone speakers compatible with their computer available to use. If a student is in need of technological resources please contact student-tech-request@pointloma.edu.

Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

BIO 3012 Class schedule – Spring 2021 (subject to change)
Additional assignment details and due dates available on Canvas

Week	Date	CMGH reading	Topic
1	Mar. 5	Ch. 1- Overview & Ch. 2 - Intro to Horticulture	Intro to horticulture and agriculture Set up growth conditions experiment
2	Mar.12	Ch. 3 – Soil & Fertilizer	Plant nutrition – Part I
3	Mar. 19	Ch. 4 – Water management	Plant nutrition – Part II
4	Mar. 26	Ch. 19 – Landscape & Garden Design	Using plants to solve problems: Phytoremediation & horticultural therapy using landscape design
5	April 2	Ch. 6 – Plant Pathology	Plant pathology
6	April 9	Ch. 7 – Insects & Ch. 8 - Weeds	Plant Production – Part I
7	April 16	Ch. 9 – Safe/Sustainable Pest Management	Plant production – Part II Landscape design project due
8	April 23	Ch. 5 - Plant Propagation	Plant propagation & Exam #1
9	April 30	Read assigned chapter (10, 11, 12, 14, 15, 16, 17, or 18) and prepare PPT slides	Plant varieties Plant nutrition project due
10	May 7	Ch. 20 – Poisonous Plants	Plants as a source of unique molecules – Part I
11	May 14	See readings on Canvas	Plants as a source of unique molecules – Part II
12	May 21	Ch. 13 – Home Vegetable Gardening	Plants as a source of food Medicinal botany project due
13	May 28	See readings on Canvas	Plants as a source of fuel and fiber Service project due
14	June 4	See readings on Canvas	Revegetation field trip & Exam #2
15	June 11 (1:30- 4:00)		Research presentation due