



Biology Department

**BIO4073: Experimental Marine Ecology
Lecture (3) & Lab (1)**

4 Units

Spring 2022

“Here is the sea, great and wide, which teems with creatures innumerable, living things both small and great. There go the ships, and Leviathan, which you formed to play in it. These all look to you, to give them their food in due season.”

- Psalm 104:25-27

Meeting days: Lecture: Mon., Wed., Fri. Lab: Wednesday	Instructor title and name: Dr. Walter Cho
Meeting times: Lecture: 11AM-11:55AM Lab: 2:45-6:15PM	Phone: 619-849-2398
Meeting location: Lecture: Rohr Science 40 Lab: Rohr Science 40	Email: wcho@pointloma.edu
Final Exam: Mon., 05/04/2022, 10:30AM-1PM	Office location and hours: Rohr Science 134; Zoom link on Canvas: Mon. & Fri., 12PM-1:30PM; Th., 11AM-12PM (PT); & by appointment

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 is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Foundational Explorations Mission

PLNU provides a foundational course of study in the liberal arts informed by the life, death, and resurrection of Jesus Christ. In keeping with the Wesleyan tradition, the curriculum equips students with a broad range of knowledge and skills within and across disciplines to enrich major study, lifelong learning, and vocational service as Christ-like participants in the world’s diverse societies and culture.

COURSE DESCRIPTION

From the course catalog:

A field-oriented course that explores aspects of marine ecology within the context of coastal communities, including ecological relationships within the marine environment, factors influencing community structure, and biogeography. A central component of the course will be an independent project with experimental design. Lecture, lab, and fieldwork.

Prerequisite: BIO 2011

Welcome to BIO4073! In this course we are going to study the ecology of marine coastal communities and apply the concepts covered in this course in an independent research project. We will study the history of the

field of marine ecology, including a review of some of the key experiments in the field. We will then briefly review the physical context of the ocean and then study the concepts of dispersal, connectivity, biogeography, and biodiversity in the context of marine ecology. We will learn and practice experimental protocols to study multiple marine habitats and employ them in an independent research project focused on the dynamics of marine communities. Students will be involved in all steps of this research project including a comprehensive literature review, experimental design, sample collection, sample processing, and data analysis. The project will culminate in a final presentation of the results and conclusions.

COURSE LEARNING OUTCOMES

Upon completion of the course, you will be able to...

1. ... describe several major ecological processes that influence marine population dynamics and marine community structure, including current hypotheses regarding relationships between marine organisms and their environment, intra- and interspecific interactions, and biotic and abiotic factors that structure marine communities.
2. ... identify and apply several metrics that can be used to describe populations and communities in nature.
3. ... develop a working knowledge of relevant research literature.
4. ... design and conduct an original research project.
5. ... develop experience with experimental techniques in marine ecology.
6. ... organize, statistically analyze, and interpret field data and communicate your interpretations in written and oral form.

FOUNDATIONAL EXPLORATIONS LEARNING OUTCOMES

Select questions on the final exam will be used to assess Foundational Explorations Learning Outcome 1d. Critical Thinking: Students will be able to examine, critique, and synthesize information in order to arrive at reasoned conclusions.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES

- Kaiser, M.J., et al. 2020. Marine ecology: processes, systems, and impacts. Oxford University Press, New York, NY.
- A lab notebook that is used solely for the work in this course. These lab notebooks will be collected periodically to be assessed.
- Additional reading and articles as assigned for class discussions and posted on the course site.

ASSESSMENT AND GRADING

Grades will be based upon a straight percentage of the total possible points available in this course and will include the following requirements:

Approximate Grading Scale:

93-100 = A 90-92 = A- 88-89 = B+ 83-87 = B 80-82 = B- 78-79 = C+

73-77 = C 70-72 = C- 68-69 = D+ 63-67 = D 60-62 = D- 00-59 = F

Your grade for this course will be based on several categories, described in detail below.

A. Lecture:

The lectures will follow the TENTATIVE Schedule attached at the end of the syllabus. Due to limitation in time, lectures will cover important key concepts but will not cover all of the information important for this course. You will need to read the appropriate chapters before the lecture to be best prepared for lecture and to participate in classroom discussions and activities. Keep up with the course material and do not be afraid to ask questions.

B. Exams:

There will be 2 exams (15% of final grade each). Each exam is objective and will be open-book, take-home exams. You may use your textbook and primary or secondary literature to help answer the questions, but you CANNOT discuss the questions or your answers with anyone else. You must answer the questions on your own. They will also require you to use your research skills for finding appropriate peer-reviewed resources, synthesizing information, and writing a cogent statement on a focused topic. TENTATIVE dates for the exams are: Exam #1 – week of February 10, 2020; Exam #2 – week of March 30, 2020. Dates are subject to change depending on progression through required course material.

NOTE: See below for make-up policy for exams.

C. Lab/Field Participation & Assignments:

We will be conducting an independent research project studying the dynamics of marine communities. This will involve a mix of field and lab work which will be assessed through a combination of field reports and reviewing a lab notebook that is to be maintained by each student for their work in this course. Because each lab is critical for the completion of the project, attendance at scheduled lab activities and full completion of lab reports is mandatory and will constitute 25% of your grade.

NOTE: The schedule of lab activities is TENTATIVE, as adjustments may need to be made depending on the results of each lab.

D. Independent Project Lab Report:

You will be expected to write a final lab report worth 15% of the final course grade. The term paper will be a formal lab report of your independent research project. This lab report will include all the sections of a traditional lab report including: an abstract, an introduction, a materials and methods section, a results section, a discussion section, and a bibliography.

Writing is a vital skill that you will use in whatever field you enter in the future. This is an opportunity to practice and improve that skill.

REQUIRED COMPONENTS:

1. You must submit an outline of your independent research project, including potential sample locations, methods, and analyses as part of the 2nd take home exam.
2. FINAL DRAFT OF YOUR TERM PAPER DUE: FRI, May 1, 2020.
 - a. NOTE: References (both parenthetical in the text and at the end of your term paper/bibliography) should follow a standard format following a citation guide that will be provided.
 - b. Your final project lab report will be graded along the following criteria: your outlines, prompt submission of required components, content and thoroughness of the topic discussed, proper grammar, exhibited knowledge of supporting literature, etc. A grading rubric will be given to you before the final submission date.
 - c. The term paper should be 6-8 pages in length (not including references), double-spaced and with a 12 pt font.
 - d. You are expected to use/cite at least 4 references in the preparation of the paper and these must be listed on the last page of the term paper following a standard citation format. All 4 references must be from peer-reviewed sources.

E. Final Presentation:

You will need to provide a cogent summary of your term paper and its conclusions. You will be graded on the content (preparation, introduction, organization summary, use of sources and appropriateness) and the quality (voice quality and volume, visual aid usage, ease of delivery, body language, dress and professionalism) of your presentation and is worth 10% of your grade. A PowerPoint presentation is strongly encouraged, but is not the only option for your talk. Try not to read your paper or formulate your presentation as an oral duplicate of your paper. Rather, you should highlight the important themes/points/ issues/questions that you'd like your audience to really know and discuss. The presentation should be about 15 minutes long, with an additional 5 minutes for questions.

F. Quizzes/Assignments/Participation:

Class attendance/participation is a very important part of learning. Along with class assignments and quizzes, they will count for 20% of your final grade.

You are responsible for notifying the instructor of any known excused absence at least one week before the date of that absence.

Percentage breakdown

2 exams (15% each)	30%
Lab Notebook/Field Participation & Reports	25%
Independent Project Lab Report	15%
Final Presentation	10%
<u>Quizzes/Assignments/Participation</u>	<u>20%</u>
TOTAL	100%

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

Regular assignments turned in late will be graded as follows: 5% reduction per day up to 3 days late; more than 3 days late = no credit.

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

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.

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 drop date or, after that date, receive the appropriate grade for their work and participation.

Face masks are required at all times.

Class participation/attendance is a very important part of learning. Be responsible and show up for class.

Make-ups for any missed assignments or activities will only be given if a legitimate excuse is given prior to the absence. The format of this make-up will be at the instructor's discretion.

Missed exams, with a documented excuse, must be made up within one week of the date on which they are given.

The first week of classes will be remote via Zoom. Guidelines for participation via Zoom can be found below:

1. Show up to Zoom on time.
2. Turn on the camera and make sure your camera is turned on for the entire length of the class.
 - a. If you need to have camera turned off an email **MUST** be sent to me prior to class otherwise I will consider this an unexcused absence.
 - b. Excused reasons for intermittent camera being off: need to use the restroom, may need to protect roommate
3. Participate with professor and peers by unmuting AND/OR using the chat.
4. Make sure you are in a quiet space (when possible) free of distractions.
 - a. Students will not get participation points if they are driving in a car, at work etc.
 - b. You should reserve this class time just like you would if you were face to face.
5. Once PLNU returns to face-to-face learning, unless you have an EAC accommodation (i.e., Isolation/Quarantine, Concussion, Remote Accommodation), you may not participate via remote learning.
6. Please keep in mind that PLNU's absence policy states that you may not surpass 20% of our class sessions.

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 or hybrid 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, microphone, or webcams compatible with their computer available to use. Please note that any course with online proctored exams require a computer with a camera (tablets are not compatible) to complete exams online.

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

BIO 4073 Spring 2022 TENTATIVE Schedule (Underlining indicates reading)

Week	Week	MONDAY Lecture	WEDNESDAY Lecture	FRIDAY Lecture	WEDNESDAY Lab
1	1/09	(Meet on Tuesday) Intro to BIO4073; History of Marine Ecology	<u>Text Chapter 1</u> ; Patterns in the Marine Environment 1	Patterns in the Marine Environment 2	No Lab
2	1/16	Martin Luther King Jr. Day - No class	<u>Text Chapter 2</u> ; Primary Production 1	<u>Text Chapter 2</u> ; Primary Production 2	Barnacle settlement experiment set-up (-0.8'@4:27PM)
3	1/23	<u>Text Chapter 3</u> ; Marine Microbial Secondary Production 1	<u>Text Chapter 3</u> ; Marine Microbial Secondary Production 2	<u>Text Chapter 3</u> ; Marine Microbial Secondary Production 3	Literature Review
4	1/30	<u>Text Chapter 4</u> ; Secondary Production 1	<u>Text Chapter 4</u> ; Secondary Production 2	<u>Text Chapter 4</u> ; Secondary Production 3	Barnacle expt. Check1 (-1.4'@4:23PM)
5	2/06	<u>Text Chapter 8</u> ; Continental Shelf Seabed 1	EXAM #1	<u>Text Chapter 8</u> ; Continental Shelf Seabed 2	No Lab – EXAM #1
6	2/13	<u>Text Chapter 6</u> ; Rocky & Sandy Shores 1	<u>Text Chapter 6</u> ; Rocky & Sandy Shores 2	<u>Text Chapter 6</u> ; Rocky & Sandy Shores 3	Barnacle expt. Check2 (-0.9'@3:26PM)
7	2/20	<u>Text Chapter 7</u> ; Pelagic Ecosystems 1	<u>Text Chapter 7</u> ; Pelagic Ecosystems 2	<u>Text Chapter 7</u> ; Pelagic Ecosystems 3	Plankton Tow lab (+2.4'@3:22PM)
8	2/27	<u>Text Chapter 5</u> ; Estuaries 1	<u>Text Chapter 5</u> ; Estuaries 2	<u>Text Chapter 5</u> ; Estuaries 3	Dog Beach lab (-1.2'@3:16PM)
9	3/06	Spring Break – No class	Spring Break – No class	Spring Break – No class	No Lab
10	3/13	<u>Text Chapter 9</u> ; The Deep Sea 1	<u>Text Chapter 9</u> ; The Deep Sea 2	<u>Text Chapter 9</u> ; The Deep Sea 3	Barnacle expt. Check3 (-0.7'@3:22PM)
11	3/20	<u>Text Chapter 10</u> ; Mangrove Forests 1	<u>Text Chapter 10</u> ; Mangrove Forests 2	<u>Text Chapter 10</u> ; Mangrove Forests 3	Meiofauna lab (+2.6'@2:35PM)
12	3/27	<u>Text Chapter 11</u> ; Coral Reefs 1	EXAM #2	<u>Text Chapter 11</u> ; Coral Reefs 2	No Lab – EXAM #2
13	4/03	<u>Text Chapter 12</u> ; Polar Regions 1	<u>Text Chapter 12</u> ; Polar Regions 2	<u>Text Chapter 12</u> ; Polar Regions 3	OPEN LAB (+2.5'@2:16PM)
14	4/10	<u>Text Chapter 13</u> ; Fisheries 1	<u>Text Chapter 13</u> ; Fisheries 2	Easter Recess – No Class	OPEN LAB (-0.2'@1:23PM)
15	4/17	Easter Recess – No Class	<u>Text Chapter 17</u> ; Climate Change 1	<u>Text Chapter 17</u> ; Climate Change 2	OPEN LAB (+3'@1:23PM)
16	4/24	Independent Project open work period	Independent Project open work period	Independent Project open work period	OPEN LAB (-0.1'@2:01PM)
17	5/01	FINAL EXAM (Student Presentations) (10:30AM-1:00PM)			