



Department of Biology, College of Natural and Social Sciences

BIO 3033/3033L | Marine Biology | Fall 2024

4 units (3 hours of lecture and 3.5 hours of lab, weekly)

Lectures: Mondays, Wednesdays, and Fridays | 1:30 pm – 2:25 pm | Rohr Science 40

Labs: Thursdays | 1:30 pm – 5:00 pm | Sator Hall 105

Final Exam: Wednesday, December 18, 2024 | 1:30 pm – 4:00 pm | Rohr Science 40

Instructor:	Dr. Andrew Nosal (he/him)
Phone:	619-849-2656
Email:	anosal@pointloma.edu
Office location and hours:	Rohr Science 140* Mondays and Fridays 9:00 – 10:00 am, and also other days and times as needed (please e-mail Dr. Nosal to make appointment) <i>*Note that Rohr Science (across from Sator and Latter Halls) is not the same as Rohr Hall (other side of campus).</i>

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.

Course Description

A wide-ranging exploration of life in the oceans, including the physical characteristics of the ocean, and the ecology, diversity, and adaptations of marine organisms to their environment. Course components include lectures, discussions, laboratory exercises, field trips, scientific writing, and a deep dive into the primary literature in this field. Throughout the course we will also explore human impacts on the marine environment. Finally, we hope you will further your appreciation for complexity and immensity of God’s Creation. An inquiry-based laboratory (BIO 3033L) is a co-requisite for BIO 3033 and a pre-requisite for both BIO 3033 and BIO 3033L is BIO 2011.

Program and Course Learning Outcomes

By the end of this course, you will be able to:

1. Describe the general physical properties of the marine environment, specific marine habitat types, and the biotic and abiotic challenges of living in these habitats;
2. Classify organisms based on taxonomy (based on shared derived traits), lifestyle, and habitat;
3. Identify morphological and physiological adaptations of marine organisms and relate these to the biotic and abiotic challenges of living in different marine habitats;
4. Describe how marine organisms influence (interact with) each other and their environment;
5. Describe how marine organisms have been affected by anthropogenic impacts;
6. Predict how marine organisms will respond to ongoing anthropogenic impacts, including climate change, and describe how this will likely affect humans;
7. Collect and analyze data using appropriate scientific methods and make valid and reliable interpretations.

Required Texts and Equipment

Marine Biology: Function, Biodiversity, Ecology (6th Edition) by Levinton, J.S. (2021)

You may purchase (new or used) or rent a hard copy of the textbook, or the online e-book. You are encouraged to check the [PLNU Bookstore](#) to find the best option for you.

Supplementary readings and videos will also be assigned; these will be available on Canvas.

Course Credit Hour Information

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 4-unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 150 total hours meeting the course learning outcomes.

Assessment and Grading

Assessment	Percentage of Final Grade
Exam 1	15%
Exam 2	15%
Final Exam	20%
Lecture Assignments (including CREATE articles)	10%
Journal Article Project	10%
Lab Assignments and Reports	25%
Lecture and Lab Participation & Professionalism	5%
Total	100%

The following scale will be used to determine your final course letter grade (students will receive the same grade for both lecture and lab):

93.0% ≥	A	73.0% ≥	C	< 77.0%
90.0% ≥	A- < 93.0%	70.0% ≥	C-	< 73.0%
87.0% ≥	B+ < 90.0%	67.0% ≥	D+	< 70.0%
83.0% ≥	B < 87.0%	63.0% ≥	D	< 67.0%
80.0% ≥	B- < 83.0%	60.0% ≥	D-	< 63.0%
77.0% ≥	C+ < 80.0%		F	< 60.0%

Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the [Class Schedules](#) site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

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 your professor or the [Office of Spiritual Life and Formation](#).

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.

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

Use of Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) is not permitted, and use of these tools will be treated as plagiarism.

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 drop date or, after that date, receive an “F” grade.

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.

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.

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 requires 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.

PLNU Recording Notification

In order to enhance the learning experience, please be advised that this course may be recorded by the professor for educational purposes, and access to these recordings will be limited to enrolled students and authorized personnel. Note that all recordings are subject to copyright protection. Any unauthorized distribution or publication of these recordings without written approval from the University (refer to the Dean) is strictly prohibited.

Course Format

This course consists of highly interactive ‘lecture’ sessions that will employ Socratic dialogue, using probing questions to guide classroom discussion. Students are expected to come to class prepared, having completed the scheduled readings and homework questions, ready to participate in classroom activities. ‘Lecture’ sessions will regularly consist of class discussions, PowerPoint presentations, board work, videos, breakout groups, and student sharing. The goal of ‘lecture’ sessions is to review and highlight elements of assigned readings, answer students’ questions, and apply concepts learned to new issues. A co-requisite laboratory session will apply concepts learned in ‘lecture’ to real-world situations.

Your Expectations of Me

My goal is to maintain a warm and inclusive learning environment. Teaching and learning are inherently interactive and thus social and emotional; thus, I will never intentionally intimidate or embarrass you.

Instead, I will try to challenge, empower, and inspire you. I will be friendly, fun, and approachable, but never at the expense of integrity, thoroughness, and fairness. I invite your questions and challenges (I make mistakes too) whenever they arise. In addition to your teacher, I am also your mentor and advocate; feel free to approach me with any question or concern about this class or otherwise. I am committed to mastery of the material I am teaching, to punctuality, accountability, organization, and preparedness. I will have assignments and exams graded and e-mails answered in short order, and I will make myself as available to students as possible.

My Expectations of You

I expect you to attend every lecture and lab session, arriving slightly *early* so we can begin on time. You should arrive prepared, having completed any assignments due as well as the scheduled readings. I expect a certain decorum in the classroom. Please respect your fellow students and me, as I will respect you. Your cell phones should be turned off or silenced and put away (out of sight, out of your hands) during class, unless you have prior approval from me (e.g., you have a child in daycare, a relative in hospice, etc.).

To succeed in this course, you must attend every lecture and lab, complete all assigned readings by their due date, and submit assignments on time. When completing assigned readings, read *actively* and *do not ignore the figures*. That means not merely skimming and/or highlighting. Reading actively means taking notes and drawing concept maps while reading and developing insightful questions you can bring to class. Most importantly, COME TO OFFICE HOURS EARLY AND OFTEN! I love helping students and office hours are perfect for me to work with you individually or in small groups. Coming to office hours early and often is bound to improve your grade! I am personally invested in your success; however, you must be proactive and seek out help as needed. You must take ownership of your education! Lastly, use this general rule of thumb to self-assess your learning: if you truly understand the material, you should be able to teach it (explain it) clearly and concisely to another student.

I prefer that you take notes by hand, as several recent studies have shown that handwriting notes improves learning and retention over typing notes on a computer. One reason is that using your computer can be distracting, with countless temptations to engage with social media, e-mail, etc. The other reason is that handwriting notes is slower, which means you must actively distill in real time the lecture material to the most important points. This vital processing step is lost when you type notes because you can probably type fast enough to write every word being said. Nevertheless, if, for whatever reasons, you feel typing your notes in class works best for you and your learning style, I will be happy to accommodate this. Please just talk to me.

If you know ahead of time you will miss class for a valid reason (e.g., interview for graduate/medical school, competing in an intercollegiate athletic event, etc.), please notify me AT LEAST TWO WEEKS ahead of time. Alternative arrangements *may* be possible, but are not guaranteed. If you unexpectedly miss class for a valid reason (e.g., severe illness, family emergency, etc.), contact me as soon as possible; you may be asked to provide proof of absence (e.g., a doctor's note). Note that other travel plans (e.g., leaving PLNU early for Spring Break, Easter Break, or similar) DO NOT count as a valid reason to miss class and may not be accommodated.

Land Acknowledgement

I want to acknowledge that the land on which we gather is the traditional and unceded territory of the Kumeyaay Nation. I want to pay respect to the citizens of the Kumeyaay Nation, both past and present, and their continuing relationship to their ancestral lands.

Tentative Course Schedule (*subject to change – changes will be announced in class and on Canvas.*)

Note: Assigned textbook chapters and sections are indicated in parentheses and should be completed before lecture begins (1:30 pm) on the date indicated.

Day	Date	Topics Covered
WED	9/4	Ocean Basins and Bathymetry (1: Historical Background of Marine Biology; 1: Habitats and Life Habits: Some Definitions; 2: Open Oceans and Marginal Seas; 2: Topography and Structure of the Ocean Floor)
THU	9/5	BATHYMETRY
FRI	9/6	Seawater Properties (2: Ocean Above the Seabed; 3: Effects of Climate Change on Sea Level, Circulation, Ocean Chemistry, and Biological Factors)
MON	9/9	Wind and Water Circulation (2: Circulation in the Open Sea: Patterns and Causes)
WED	9/11	Thermohaline Circulation (2: Seawater Density and Vertical Ocean Circulation; 3: Effects of Climate Change on Sea Level, Circulation, Ocean Chemistry, and Biological Factors)
THU	9/12	WATER PROPERTIES
FRI	9/13	Waves (2: Edge of the Sea)
MON	9/16	Coastal Processes (2: Edge of the Sea)
WED	9/18	Tides (2: Edge of the Sea; 16: Rocky Shores and Exposed Beaches)
THU	9/19	SCRIPPS PIER (FIELD TRIP)
FRI	9/20	El Nino-Southern Oscillation (3: Climate Change: Oscillations and Long-Term Trends; 3: Climate Oscillations)
MON	9/23	Viruses and Prokaryotes (8: Marine Viruses; 8: Marine Bacteria and Archaea; 13: Big Picture: Domains of Life; 13: Bacteria)
WED	9/25	Unicellular Protists (8: Eukaryotic Phytoplankton; 8: Protistan Zooplankton and Ciliates; 14: Kingdom Protista)
THU	9/26	TIJUANA RIVER ESTUARY (FIELD TRIP)
FRI	9/27	Macroalgae (13: Seaweeds)
MON	9/30	Marine Angiosperms (13: Seagrasses; 16: Spartina Salt Marshes - Ecosystem Engineers, Geographic Extent, and Setting; 16: Mangrove Forests)
WED	10/2	Catchup and Review for Exam 1
THU	10/3	PROTISTS AND PLANTS
FRI	10/4	C.R.E.A.T.E. Article 1 Discussion (Shark Navigation)
MON	10/7	Sponges, Cnidarians, and Comb Jellies (14: Phylum Porifera; 14: Phylum Cnidaria; 8: Jellyfish and Siphonophores; 8: The Comb Jellies)
WED	10/9	Marine Worms (14: Phylum Platyhelminthes - 14: Phylum Pogonophora)
THU	10/10	LAB PRACTICAL (on protists and plants) and EXAM 1 (through marine angiosperms)
FRI	10/11	Molluscs (9: Cephalopods; 14: Phylum Mollusca)
MON	10/14	Arthropods (14: Phylum Arthropoda; 8: Crustacean Zooplankton)
WED	10/16	Lophophorates (14: Phylum Bryozoa - 14: Phylum Phoronida)
THU	10/17	BIRD ROCK TIDE POOLS (FIELD TRIP)
FRI	10/18	Echinoderms and Invertebrate Chordates (14: Phylum Echinodermata; 14: Phylum Chordata; 8: Salps and Larvacea)

MON 10/21 **Fishes I** (9: Fish)
 WED 10/23 **Fishes II** (9: Fish)
 THU 10/24 **NO LAB – FALL BREAK**
 FRI 10/25 **NO LECTURE – FALL BREAK**

MON 10/28 **Fishes III** (9: Fish)
 WED 10/30 **Sharks of Southern California**
 THU 10/31 **INVERTEBRATE SLIDES AND DISSECTIONS**
 FRI 11/1 **Marine Reptiles** (9: Marine Reptiles)

MON 11/4 **Sea Birds** (9: Marine Birds)
 WED 11/6 **Catchup and Review for Exam 2**
 THU 11/7 **BONY FISH AND SHARK DISSECTIONS**
 FRI 11/8 **C.R.E.A.T.E. Article 2 Discussion** (Shark Migration and Philopatry)

MON 11/11 **Seals, Sea Lions, and Walruses** (9: Mammals)
 WED 11/13 **Sirenians** (9: Mammals)
 THU 11/14 **EXAM 2 (from sponges to sea birds)**
 FRI 11/15 **Whales and Porpoises** (9: Mammals)

MON 11/18 **Sea Grass Beds** (17: Sea Grass Beds)
 WED 11/20 **Estuaries** (16: Estuaries)
 THU 11/21 **LA JOLLA SEA LIONS AND BIRDS (FIELD TRIP)**
 FRI 11/22 **Salt Marshes and Mangroves** (16: Spartina Salt Marshes; 16: Mangrove Forests)

MON 11/25 **NO LECTURE – THANKSGIVING BREAK**
 WED 11/27 **NO LECTURE – THANKSGIVING BREAK**
 THU 11/28 **NO LAB – THANKSGIVING BREAK**
 FRI 11/29 **NO LECTURE – THANKSGIVING BREAK**

MON 12/2 **Open Ocean** (10: Diel Vertical Migration; 11: Nutrients Required by Phytoplankton)
 WED 12/4 **Deep Sea** (10: Descending to the Depths; 18: Deep-Sea Gradient; 18: Deep-Sea Hotspots of High Diversity; 18: Pressure Change)
 THU 12/5 **JOURNAL ARTICLE PRESENTATIONS**
 FRI 12/6 **Kelp Forests** (17: Rocky Reef-Kelp Forest System; 17: Kelp Forests)

MON 12/9 **Coral Reefs I** (17: Coral Reefs; 17: Ocean Warming and Ocean Acidification)
 WED 12/11 **Coral Reefs II** (17: Coral Reefs; 17: Ocean Warming and Ocean Acidification)
 THU 12/12 **BIRCH AQUARIUM (FIELD TRIP)**
 FRI 12/13 **Catchup and Review for Final Exam**

WED 12/18 **Final Exam (cumulative, but focusing on material from marine mammals to course end)**
During final exam time slot, 1:30 PM – 4:00 PM, in lecture classroom (Rohr Science 40)