



**Department of Biology, School of STEM**

**BIO 2011/2011L | Ecological and Evolutionary Systems (FE) | SP 2025**

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

**Mandatory Field Trip to Catalina Island:**

**Friday, April 4, 2025 – Sunday, April 6, 2025**

**Lectures:** Mondays, Wednesdays, and Fridays | 1:30 pm – 2:25 pm | Latter 02

**Labs:** Thursdays | 8:00 am – 11:00 am (Section 01) or 1:30 pm – 4:30 pm (Section 02) | Rohr Science 40

**Final Exam:** Wednesday, May 7, 2025 | 1:30 pm – 4:00 pm | Latter 02

<b>Instructor:</b>	Dr. Andrew Nosal (he/him)
<b>Phone:</b>	619-849-2656
<b>Email:</b>	anosal@pointloma.edu
<b>Office location and hours:</b>	Rohr Science 140* Mondays and Fridays   9:00 – 10:00 am, and, if needed, other days and times by appointment (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.

**Foundational Explorations (FE) 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**

This course provides an introduction to the principles of ecology, evolutionary biology, and sustainability. Evolution is the unifying theme for all of biology; it encompasses all subdisciplines, from development to medicine to conservation biology. Ecology, on the other hand, helps us to understand and sustain the delicate balance between the living and nonliving world. The introduction to the study of evolutionary

processes will include the basic mechanisms for evolution, the theory of natural selection, the basis of heredity and variation, population structure and genetics, and mechanisms of speciation. Along with these topics we will explore the ways that questions about evolution are answered, and how some Christians reconcile their faith with their acceptance of evolution. The introduction to the study of ecological systems will include an examination of both biotic (living) and abiotic (non-living) elements of the environment that influence the distribution and abundance of organisms. Population, community, and ecosystem level ecology are addressed, especially in light of humans' influence on nature and nature's influence on humans. We will then discuss how we can apply ecological principles to species conservation and consider our responsibility to care for God's creation through sustainability. Our hope is that you develop an appreciation for the complexity and beauty of living systems, and develop awe and respect for the Creator through study of His creation. An inquiry-based laboratory (BIO 2011L) is a co-requisite for BIO 2011.

### **Program and Course Learning Outcomes**

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

1. Assess the status of modern evidence for the theory of biological evolution as an explanation for the diversity, commonalities, and ancestry of living organisms.
2. Articulate the relationship between scientific understandings of evolution and Christian concepts of creation.
3. Describe how interactions between organisms and their environment influence populations, communities, and ecosystems.
4. Develop and defend a position (worldview) on environmental stewardship.
5. Design and conduct an independent investigation applying the processes and tools of scientific inquiry (both hypothesis testing and discovery science) to test biological hypotheses.
6. Prepare and analyze graphs drawing valid scientific conclusions.

### **Foundational Explorations Learning Outcomes (FELOs)**

Foundational Exploration (FE) courses are required to assess a FELO. In this course, we will assess FELO 1D: Critical Thinking – “Students will be able to examine, critique and synthesize information in order to arrive at reasoned conclusions.” This FELO will be assessed by means of a few questions embedded into the final exam. For more information on FE assessment at PLNU, please go to:

<https://assessment.pointloma.edu/academic-assessment/general-education/assessment-plan/>

### **Required Texts and Equipment**

***Campbell Biology in Focus*** (Third Edition), by Urry, Cain, Wasserman, & Minorsky (ISBN 9780134710679)  
*Note: BIO 2010, BIO 2011, and BIO 2012 all use the same textbook; however, only BIO 2010 (not this course, which is BIO 2011) uses the *MasteringBiology* online package. If you are still planning to take BIO 2010, either in the future or concurrently with BIO 2011, it would probably be cheaper to purchase the textbook with access to *MasteringBiology* included, rather than purchasing a standalone access code for *MasteringBiology* later. For example, you might consider purchasing “Campbell Biology In Focus - With Modified MasteringBiology (Looseleaf)” (ISBN 9780135686065).*

***Origins***, by Haarsma & Haarsma (ISBN 9781592555734).

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

### ***iClicker remote*** (iClicker+ or iClicker2)

I will be using iClicker to make our class time more engaging. This will show me what you know, give everyone a chance to participate, and increase how much you learn in class. This will also provide you with feedback on how well you are comprehending course concepts and help you master challenging concepts.

You are required to bring an iClicker remote to participate in my iClicker activities during every class. I will be allowing participation with iClicker remotes only (iClicker+ or iClicker2); you may NOT use the iClicker app on your smartphone, tablet, or laptop.

#### ***Academic Integrity Information:***

iClicker activities fall under the provisions of our campus academic honesty policy. Students must not engage in academic dishonesty while participating in iClicker activities. This includes but is not limited to:

- Answering polling questions while not physically in class
- Looking at other students' devices while answering live questions
- Using more than one iClicker remote or account at a time

Violation of these rules will be handled according the PLNU Academic Honesty Policy (see below).

### **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**

<u>Assessment</u>	<u>Percentage of Final Grade</u>
Midterm Exam 1	10%
Midterm Exam 2	10%
Midterm Exam 3	10%
Final Exam	15%
Quizzes	15%
Miscellaneous Assignments	15%
Special Projects	5%
Lab Assignments and Reports	20%
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%

***Three Midterm Exams (10% each) and one Final Exam (15%):***

Students are expected to take the exams on the days scheduled unless they have a written excuse cleared by the instructors. If there is an approved conflict you will be expected to take the exam prior to the scheduled time. Missing an exam due to illness will require medical verification. Unexcused misses will result in a zero grade. You will have two weeks from the time exams are handed back to discuss possible corrections, after which the grade becomes permanent. Exams will cover all material assigned, including assigned chapters from "Origins." In addition to the material that will be covered in lecture, each exam may include questions from material assigned but not discussed directly in class. This is intended to begin developing the skills necessary for independent learning.

***Quizzes (15%):***

Quizzes will cover both course content and reading material. One goal of the quizzes is to hold students accountable for assigned readings and other material. Some quizzes will be available on Canvas (online), others will be in class. You will be given fair notice and have an adequate window in which to complete the quiz. If taking the quiz online, no quizzes will be accepted after the time window has expired. For online quizzes, you will generally have about 20 minutes to complete the quiz, you may not have discussions with other students, and they will be deployed using the Honorlock system in Canvas.

***Miscellaneous Assignments (15%):***

There will be several different assignments that relate to the course material. All assignments will be listed on Canvas and you will be given fair notice as to when they are due.

***Special Projects (5%):***

There will also be a reflection project assigned during the semester related to the intersection of faith and science (details will be provided in class). You will also complete a service-learning project during the semester (details will be provided in class).

***Laboratory Assignments and Reports (20%):***

Various worksheets and reports will be assigned, related to material covered in lab.

**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.

**Content Warning**

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive various types of information. In BIO2011/BIO2011L, all of the class content, including that which may be intellectually or emotionally challenging, has been intentionally curated to achieve the learning goals for this course. The decision to include such material is not taken lightly. These topics include issues related to the intersection of science and faith, evolution, climate change, and environmental stewardship. If you encounter a topic that is intellectually challenging for you, it can manifest in feelings of discomfort and upset. In response, I encourage you to come talk to me or your

friends or family about it. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of biology, and I will support you throughout your learning in this course.

## **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](mailto: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](http://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](mailto:counselingservices@pointloma.edu) or find a list of campus pastors at [pointloma.edu/title-ix](http://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, iClicker questions, 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* – any changes will be announced in class and on Canvas.)

**Day Date Topics Covered**

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**Week 1:**

MON	1/13	Introduction to Course and Team-Based Pedagogy
WED	1/15	Nutrient Cycling in Ecosystems
THU	1/16	LAB: Ecospheres
FRI	1/17	Energy Flow through Ecosystems

**Week 2:**

MON	1/20	<i>NO LECTURE – MARTIN LUTHER KING JR. DAY</i>
WED	1/22	Community Trophic Structure
THU	1/23	LAB: Measuring and Conserving Species Diversity
FRI	1/24	Gallery Walk: How Ecosystems Function

**Week 3:**

MON	1/27	Eutrophication and Dead Zones
WED	1/29	Case Study: Rise of Slime and the Shifting Baseline Syndrome
THU	1/30	<i>NO LAB – WILL COMPLETE ON CATALINA ISLAND</i>
FRI	1/31	Keystone Species

**Week 4:**

MON	2/3	Hydrothermal Vent Communities
WED	2/5	Introduction to Evolution and Natural Selection
THU	2/6	LAB: Exam 1
FRI	2/7	Introduction to Population Growth

**Week 5:**

MON	2/10	Exponential Growth
WED	2/12	Logistic Growth
THU	2/13	<i>NO LAB – WILL COMPLETE ON CATALINA ISLAND</i>
FRI	2/14	<i>NO LECTURE – PRESIDENT FULCHER INAUGURATION –</i> Compete Measure of Acceptance of Evolutionary Theory (MATE) Survey

**Week 6:**

MON	2/17	Case Study: Galapagos Finches
WED	2/19	Reproductive Isolating Mechanisms and Speciation
THU	2/20	LAB: EvoDots
FRI	2/21	Introduction to Phylogenetics

**Week 7:**

MON	2/24	Cladistics, Monophyletic, Paraphyletic, and Polyphyletic Groups
WED	2/26	Case Study: Canary Island Lizards
THU	2/27	LAB: Phylogenetics
FRI	2/28	<i>Origins</i> Book Discussion

**Week 8:**

MON	3/3	Allele, Genotype, and Phenotype Frequencies
WED	3/5	Hardy-Weinberg Equilibrium
THU	3/6	LAB: Exam 2
FRI	3/7	Causes of Microevolution

**No class this week – Spring Break**

MON	3/10	NO LECTURE – SPRING BREAK
WED	3/12	NO LECTURE – SPRING BREAK
THU	3/13	NO LAB – SPRING BREAK
FRI	3/14	NO LECTURE – SPRING BREAK

**Week 9:**

MON	3/17	Patterns of Selection
WED	3/19	Importance of Sexual Reproduction in Evolution and Sexual Selection
THU	3/20	LAB: Hardy-Weinberg
FRI	3/21	Case Study: Crickets in Hawaii

**Week 10:**

MON	3/24	Life-History Strategies
WED	3/26	Coevolution, Evolutionary Arms Races, Aposematism, and Mimicry
THU	3/27	LAB: Skulls I
FRI	3/28	Case Study: Cuckoo Brood Parasitism

**Week 11:**

MON	3/31	<i>Video Lecture: Species Interactions, Symbioses, and Radiometric Dating</i>
WED	4/2	Case Study: Whale Evolution
THU	4/3	<i>NO LAB – WILL COMPLETE ON CATALINA ISLAND</i>
FRI	4/4	<i>NO LECTURE – Required Catalina Island Field Trip</i>
SAT	4/5	<i>Required Catalina Island Field Trip</i>
SUN	4/6	<i>Required Catalina Island Field Trip</i>

**Week 12:**

MON	4/7	Evolutionary Developmental Biology
WED	4/9	Threats to Environment and Biodiversity I
THU	4/10	LAB: Environmental Water Quality II
FRI	4/11	<b>Exam 3</b>

**Week 13:**

MON	4/14	Mini Conference: Environmental Water Quality Posters
WED	4/16	Threats to Environment and Biodiversity II
THU	4/17	<i>NO LAB – EASTER BREAK</i>
FRI	4/18	<i>NO LECTURE – EASTER BREAK</i>

**Week 14:**

MON	4/21	<i>NO LECTURE – EASTER BREAK</i>
WED	4/23	Threats to Environment and Biodiversity III
THU	4/24	LAB: Skulls II
FRI	4/25	Ecological Effects of Climate Change I

**Week 15:**

MON 4/28 Ecological Effects of Climate Change II  
WED 4/30 Case Study: Temperature-Dependent Sex Determination in Sea Turtles  
THU 5/1 [LAB: Climate Change](#)  
FRI 5/2 Solutions to Climate Change and Two Kinds of Sustainability

**Finals Week:**

WED 5/7 **Final Exam (cumulative), 1:30 – 4:00 PM, in lecture classroom (Latter 02)**