Biology 3063 Syllabus
Conservation Ecology
Spring 2022

Catalog Course Description: Conservation Ecology BIO 3063 (3 units) + BIO 3063L (1 unit)
An examination of the key concepts and issues at the intersection of conservation biology and ecology, starting with environmental ethics and the valuation of nature and moving to sustainable development and creation care. Students read journal articles and discuss the medical value of biodiversity, zoonotic disease and public health, trophic cascades, toxicology, endocrine disruption, conservation genetics and extinction vortices, de-extinction and species resurrection, shifting baselines, physiological ecology, road ecology, conservation behavior, and community-based conservation. We also explore innovative technology driving advances in conservation such as biologgers, camera traps, and fecal genetic and hormonal analysis. Students complete a team field research project on or near the Point Loma campus to apply the concepts of conservation ecology to the local environment. Prerequisite: BIO 2011.

Instructor: Dr. Mike Mooring
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Office hours:
Make an appointment (office or Zoom)

Teaching Assistants: Timmy Mooring – tbmooring555@pointloma.edu
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Lecture: Tuesday-Thursday from 11:00-12:15 in **Latter Hall 01**
Lab: Thursday 1:30-5:00 PM in **Latter Hall 01** or field trips

Equipment: iClicker2 remote for class participation and quizzes

Optional: Conservation Biology for All, Oxford University Press, 2010; Open access

Student Learning Outcomes: Upon completion of the course, students will be able to…

- Explain the value of biodiversity and the role of conservation in relation to economics, sustainability, and ethical/spiritual considerations.
- Recognize the forces at work to diminish biodiversity and anticipate the consequences of various scenarios based upon ecological principles and case studies.
- Critically read & evaluate journal articles and current events from technical & theoretical perspectives.
- Recognize the environmental symptoms of habitat degradation and biodiversity loss from first hand observations (e.g., field trips and field project).
- Design an original team field project that juxtaposes ecological and conservation issues and communicate the results and conclusions via written and oral presentations.

Foundation of Course Philosophy:

God spoke: "Let us make human beings in our image, make them reflecting our nature so they can be responsible for the fish in the sea, the birds in the air, the cattle and, yes, Earth itself, and every animal that moves on the face of Earth." (Genesis 1:26, The Message)

God says "I make you trustees of My estate." The human family is to join God in the ongoing work of creation. The earth below and the sky above with all their inhabitants are too beautiful and too good to be left alone. They need the tender care and close attention that only God's favored creature can give. (Commentary on Genesis 1:27-28 from The Voice)

Every time we celebrate a conservation success such as the recovery of the white rhinoceros in South Africa, we are strengthened in this present hope that God is working with us to redeem his creation. Furthermore, these present successes are a very real foretaste of even greater things to come on that day when God will fully restore all that He has made. (Dr. Simon Stuart, La Rocha)

COURSE COMPONENTS:

(1) Lectures: We will be covering exciting ground this semester, as conservation ecology is a new and rapidly growing sub-discipline of ecology. My goal is to introduce you to a wide variety of approaches to conservation ecology, many of which may be new to you. We will focus on readings from the primary literature (journal articles) to explore the more specialized topics covered in this course. Reading a journal article is an essential skill for developing scientists and you will have plenty of practice! I am assuming that everyone in this class has a good grasp of basic ecological concepts from lower division classes. If your grasp of ecology is rusty, you may want to brush up with the free access textbook *Conservation Biology for All*. I will typically try to review the basic concepts of the weekly module on Tuesday before we move on to more specialized aspects or a case study on Thursday. Videos, group activities, and advanced topics will be incorporated. The reading assignment will typically be tested in class during the following week using iClicker2 polling.

(2) Journal Articles: Ecology textbooks cover the basics that you have already learned. The advanced topics that we will be covering in this course are rarely found in conventional texts. Peer-reviewed scientific journal articles will be the primary "textbook" for the course. To assist you in your readings, you will be responsible for answering 'guided questions' for each reading. Readings must be done individually! Please DO NOT share files or collaborate on the answers to the reading questions – such actions will be considered plagiarism.

(3) Labs: One cannot really learn ecology without spending some time studying natural ecosystems in the field. To this end, we will initially do 4 class field labs to visit local habitats and collect field data for a team-based field lab assignment. Another 4 lab periods are set aside to collect data for your semester-long team field project. The field project will require about 3 hours per week in the field (on or off campus) to observe, identify, and record living organisms in their natural environment (see below for details). Teams will be organized early in the semester and all field labs plus in-class small group assignments will be done with your team. We may also have guest lectures by local scientists on current developments in conservation ecology.

(4) Canvas: All assignments will be submitted directly to Canvas Modules. Please note that Canvas does not support PAGES – please use Word or PDF formats! Your TAs will be grading all assignments on Canvas and giving you helpful feedback on each assignment through the text box and annotation features. It is your responsibility to review the graders' comments on each assignment so that you understand the expectations for receiving full points and to adjust your understanding of the topic in preparation for exams.

(5) Exams: We will have 3 exams during the year, 2 mid-terms and a final, which will be taken using iClickers in the "self-paced mode". The exams will be held during the Thursday afternoon lab time from 2:30-5:00 pm in Latter 01. I will give you a study guide to help prepare for each exam. There will be no make-ups for those exams unless you have made arrangements with me beforehand. An optional film will be shown before the exam from 1:30-2:30 and you will have the opportunity to do an extra credit assignment aligned to the film.

(6) iClickers: To enable everyone to participate in a large class, I require you to obtain an iClicker2 remote and to bring it to every class to participate in questions posed throughout the period. iClicker questions represent about 10% of your total grade. If your clicker is not already registered, please register your remote at the iClicker website so that your participation is recorded. Clickers are used for class participation (being engaged in class activities) and performance (getting the right answer), and you receive points for both.

(7) Field project: This is an opportunity for you to gain firsthand experience conducting an applied research project. Teams of students will design a project, collect field data during four lab periods and any time needed outside class, and then analyze, write up, and present your research. Each team should expect to spend a minimum of 12 hours of data collection IN THE FIELD during the semester. To accomplish this, each team must plan to use all of the lab period as efficiently as possible (3 hours in the field per lab). If necessary, your team can choose alternative times outside of lab to complete the 12 hours of field data collection, but you are responsible for 12 hours in the field. You will have the opportunity to meet with me to help plan your project. Team members will evaluate each other's contribution at the end of the semester.

Description: The field projects will be conducted either on campus or at nearby sites and will involve systematic data collection in which you will measure variables in the field, and subsequently analyze and write up your results. Your team will be assigned a project, with input from you on preferences. The projects will involve conducting surveys of plants, mammals, birds, reptiles, or insects using survey tools that might include live traps, camera traps, transects, acoustic sound meters, GPS units, and citizen science apps such as *eBird* and *iNaturalist*. Each team will be responsible to submit a project proposal to establish the goals and methods to be used. Following completion of data collection, you will analyze your results and write a journal article style report and an oral presentation (plus Q&A) to the class. At the end of the semester, all team members will complete peer evaluations. Treat this project as seriously as you would treat research for a graduate degree!

Examples of research projects on (or near) PLNU Campus:

1. Camera trap survey of wild mammals
2. Sherman live trap survey of rodents
3. Coastal sage scrub vegetation
4. Insect / invertebrate survey
5. Herpetofauna survey
6. Experimental study of noise pollution
7. Visitor impact on tidepool biodiversity
8. Biogeography study at Famosa Slough
9. Wild parrot and parakeet survey
10. Citizen science observations with apps

(8) Attendance: Regular and punctual attendance is important for optimal achievement in any realm of life, and is a requirement for this course. There will be an attendance sheet passed around, and it is your responsibility to sign it. You may not have another student sign in for you, which will be considered forgery. You are permitted 3 absences without penalty; every absence in excess of 3 will incur a reduction of your Attendance Participation points. Late arrivals are disruptive, so please try to arrive punctually in class.

(9) Late Assignments: The following penalties will apply for all assignments submitted after the due date. If you have a legitimate reason for a late assignment, please tell the grader what happened using the text box when you submit your assignment on Canvas.

- Readings (worth 10 pts): 1 point deducted for each day late (no points after 10 days)
- Labs (usually 20 pts): 2 points deducted for each day late (no points after 10 days)

(10) Technology Etiquette: It is obligatory to use your electronic devices responsibly and with respect for others. In this class, it is simply bad manners to be wired to your smartphone or other device instead of being engaged with class activities. Texting and similar activities are a distraction to your fellow students and to me. To ensure the best learning environment possible, **classroom policy is that all electronic devices are turned off and put away out of sight when class is in session.** Stay focused and do not get distracted!

Laptops: Recent studies have shown that we are currently experiencing an epidemic of 'digital distraction' caused by multi-tasking – moving quickly between tasks on electronic devices in which only partial attention is given to each task. In the classroom setting, studies reveal that the use of laptops for non-course related tasks (e.g., checking emails, social media, browsing) distracts attention from learning and results in reduced academic performance and lowered grades. The reality is that you cannot fully learn new information or master new concepts when distracted by multi-tasking. The evidence indicates that even classmates that see your screen are distracted and their performance reduced. Studies have also shown that students learn better when they have to take notes by hand because they must summarize information in their own words. **I recommend that you do not use your laptops in class** (unless asked to); if you choose to take notes on your laptop, please do not use your laptop for anything incompatible with giving the class your undivided attention.

What the research shows about laptops and learning:

1. **It is hard not to check other things, which impairs your learning although you might not be aware of it.** See "Students can't resist multitasking, and it's impairing their memory"

2. **Even if it doesn't impair your learning, it impairs someone else's learning.** See "Laptop multitasking hinders classroom learning for both users and nearby peers"

3. **You write more but learn less. Writing your notes creates synthesis which increases your learning.** See "The Pen Is Mightier Than the Keyboard"

Grading Criteria

Points are estimates and may change

- Attendance Participation……..... 50 pts
- iClicker Polling quizzes…….. 45 pts
- Journal Article Readings (15 @ 10 pts) … 150 pts
- Lab and Field Trip reports (8 @ 20 pts) …160 pts
- Exams (3 @ 100 pts) ……..… 300 pts

TOTAL POINTS…… **735 pts**

LETTER GRADES:			
A	90%	C	70%
A-	88%	C-	68%
B+	86%	D+	66%
B	80%	D	60%
B-	78%	D-	58%
C+	76%	F	< 58%

PLNU INSTITUTIONAL POLICIES

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.

General Education: This course is one of the components of the General Education Program at Point Loma Nazarene University, under the category of "Exploring an Interdependent World." By including this course in a common educational experience for undergraduates, the faculty supports an introduction to the natural and social sciences as tools for exploring the world, with emphasis on collecting and interpreting empirical data for both theoretical and practical purposes. 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 cultures.

PLNU Attendance and Participation Policy: Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in 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. See Academic Policies in the Undergraduate Academic Catalog.

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 includes plagiarism, fabrication, deception, or impersonation. Plagiarism is the act of presenting information, ideas, or concepts as one's own when in reality they are the result of another person's creativity and effort. Such acts include copying assignments from another student, or copying and pasting answers from the reading into your answer – both involve using someone else's words as if they were your own. Much of the learning process involves articulating the answer in your own words, so bypassing this step will almost guarantee an inadequate understanding of the material. Please write using your own words, and no copy-pasting! A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination. See Academic Policies for definitions of kinds of academic dishonesty and 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 (a) 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 Copyright Policy: PLNU, 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 Final Examination Policy: Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on this syllabus. No requests for early examinations or alternative days will be approved unless you have 3 final exams scheduled on the same day or another compelling reason.

BIO 3063 LECTURE SCHEDULE – SPRING 2022

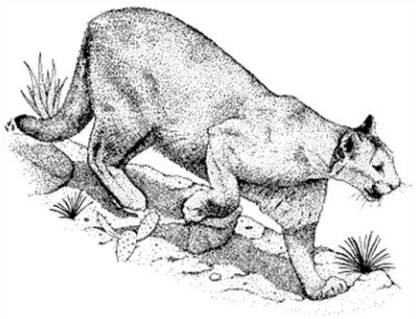
WEEK	DATES	TOPIC	READING
1	Jan 13	Introduction and Conservation Ethics	*Reading 1*
2	Jan 18-20	Emerging Disease and Biodiversity	*Reading 2*
3	Jan 25-27	Medical Value of Biodiversity	*Reading 3*
4	Feb 1-3	Toxicology and Endocrine Disruption	*Reading 4*
5	Feb 8-10	Lost Predators and Trophic Cascades	*Reading 5*
6	Feb 15-17 Feb 17	Shifting Baselines and Ocean Conservation ► **Exam 1**	*Reading 6*
7	Feb 22-24	Conservation Genetics and Genomics	*Reading 7*
8	Mar 1-3	De-extinction and Species Resurrection	*Reading 8*
9	Mar 8-10	SPRING BREAK	
10	Mar 15-17	Conservation Endocrinology	*Reading 9*
11	Mar 22-24	Physiological Ecology and Biologgers	*Reading 10*
12	Mar 29-31 Mar 29	Camera Trapping Revolution ► **Exam 2**	*Reading 11*
13	Apr 5-7	Road Ecology and Movement Ecology	*Reading 12*
14	Apr 12 Apr 14	 EASTER RECESS	
15	Apr 19-21	Conservation Behavior	*Reading 13*
16	Apr 26-28	Community-based Conservation	
17	**May 5**	► **Final Exam (Thursday) 10:30-1:00**	

FIELD TRIP - LAB SCHEDULE 2022 Thursdays 1:30-5:00 PM

DATE	ACTIVITY	
Jan 13	Instrumental versus Intrinsic Valuation of Nature	
Jan 20	► Birds and Island Biogeography at Famosa Slough	Field lab
Jan 27	► Sunset Cliffs Tidepools (choose a day to go with your team)	Field lab

- Thurs 1/27: -0.2 @ 12:3
- Fri 1/28: -0.9 @ 12:56
- Sat 1/29: -1.4 @ 1:42
- Sun 1/30: -1.9 @ 2:25
- Mon 1/31: -1.9 @ 3:06
- Tues 2/1: -1.7 @ 3:45
- Wed 2/2: -1.4 @ 4:23
- Thurs 2/3: -1.9 @ 4:59

Feb 3	► Bayside Trail and north-south facing slopes	Field lab
Feb 10	► San Diego Zoo – IUCN Status	Field lab
Feb 17	**Exam 1** Extra Credit Film @ 1:30 | Exam @ 2:30	
Feb 24	► 1- Team Field Project	Field project
Mar 3	► 2- Team Field Project	Field project
Mar 10	SPRING BREAK	
Mar 17	► 3- Team Field Project	Field project
Mar 24	► 4- Team Field Project	Field project
Mar 31	**Exam 2** Extra Credit Film @ 1:30 | Exam @ 2:30	
Apr 7	Lab 6 - *Zooniverse* Camera Trap Project	Online lab
Apr 14	EASTER RECESS	
Apr 21	Lab 7 - Wildlife Collision Project	Online lab
Apr 28	Presentation of field project reports	
May 5	► **Final Exam (Thursday) 10:30-1:00**	



Conservation Ecology Readings – 2022

Reading	Topic	Citation	Due Tues before class
1	Conservation Ethics	Krajick K (2006). The lost world of the Kihansi Toad. *Science* 311: 1230-1232. McCauley DJ (2006). Selling out on nature. *Nature* 443: 27-28. Maguire LA, Justus J (2008). Why intrinsic value is a poor basis for conservation decisions. *BioScience* 58: 910-911.	Jan 18
2	Emerging Diseases and Biodiversity	Keesing F et al. (2010). Impacts of biodiversity on the emergence and transmission of infectious diseases. *Nature* 468: 647-652.	Jan 25
3	Medical Value of Biodiversity	Chivian E (2013). Global environmental threats: Why they are hard to see and how a medical model may contribute to their understanding. *Cardiovascular Diagnosis & Therapy* 3: 93-104.	Feb 1
4	Ecotoxicology	Hayes TB et al. (2010). Atrazine induces complete feminization and chemical castration in male clawed frogs (*Xenopus laevis*). *PNAS* 107: 4612-4617.	Feb 8
5	Trophic Cascades	Terborgh J. et al. (2001). Ecological meltdown in predator-free forest fragments. Science 294: 1923-1926.	Feb 15
6	Shifting Baselines	Pauly D (1995). Anecdotes and the shifting baseline syndrome of fisheries. *Trends in Ecology & Evolution* 10: 430. Giglio VJ et al. (2015). Depletion of marine megafauna and shifting baselines among artisanal fishers in eastern Brazil. *Animal Conservation* 18: 348-358.	Feb 22
7	Conservation Genetics	Shaffer ML. 1981. Minimum population sizes for species conservation. *BioScience* 31: 131-134.	Mar 1
8	De-Extinction	Ben-Nun IF et al. (2012). Induced pluripotent stem cells from highly endangered species. *Nature Methods* 8:829–831.	Mar 15
9	Conservation Endocrinology	Bhattacharjee S. et al. (2015). Glucocorticoid stress responses of reintroduced tigers in relation to anthropogenic disturbance in Sariska Tiger Reserve in India. *PLOS ONE* 10: 1-13.	Mar 22
10	Physiological Ecology	Pagano et al. (2018). High-energy, high-fat lifestyle challenges an Arctic apex predator, the polar bear. *Science* 359: 568–572.	Mar 29
11	Camera Trap Revolution	Tobler MW, Powell GVN (2013). Estimating jaguar densities with camera traps: Problems with current designs… *Biological Conservation* 159: 109-118.	Apr 5
12	Road Ecology	Espinosa S, Branch LC, Cueva R (2014). Road development and the geography of hunting by an Amazonian indigenous group: Consequences for wildlife…*PLOS ONE* 9: 1-21.	Apr 12
13	Conservation Behavior	Cremona T, Spencer P, Shine R, Webb JK (2017). Avoiding the last supper. *Conservation Genetics* 18: 1475-1480. Indigo N, Smith J, Webb JK, Phillips B (2018). Not such silly sausages… *Austral Ecology* 43: 592–601.	Apr 26