Point Loma Nazarene University, Biology Department
BIO 668: Evolution
Summer 2015, 3 units

PLNU Mission
To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course description

The concept of evolution is viewed as the central theme unifying all of biology. In this course evolutionary processes will be discussed in their genetic, historical, religious, and ecological contexts. Topics covered include the agents of evolution, speciation, macroevolutionary trends in evolution, human evolution, and the relationship between scientific understandings of evolution and Christian concepts of creation. These topics will be addressed from the perspective of teaching for conceptual understanding. The class includes a combination of lecture, discussion, lab, data analysis, and a field trip to a museum.

Course learning outcomes

1. You will able to explain the central concepts relating to the mechanisms of biological evolution and current understanding of the key events in the evolutionary origin of our own species.
2. You will demonstrate an understanding of typical experimental methods and data analysis used in the study of biological evolution.
3. You will analyze and present representative research papers in evolution.
4. You will access and use data and journals used in evolutionary biology.
5. You will examine the science and faith relationship in the context of evolutionary biology.

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 3-unit class delivered over 3 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Instructors and contact information

Your instructors are ready and willing to help when needed; however, due to a variety of changing circumstances each week during the course, it is not possible schedule regular office hours. It will work best to contact one of us by e-mail to arrange a time to meet in person or to talk via phone.

April Cordero Maskiewicz, Ph.D. AprilMaskiewicz@pointloma.edu
Rohr Science 111, (619) 849-2328

Darrel Falk, Ph.D. DarrelFalk@pointloma.edu
Rohr Sociology 115 (Cell: 619-787-7260)

Class sessions and attendance

- Mondays, Tuesdays, Wednesdays, and Thursdays from 1:00 PM – 5:30 PM
- Rohr Science 119, Taylor Hall Room 312 & Taylor Hall Lab 311 (depending on what we are doing)

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 (1.5 class

meetings), the faculty member has the option of filing a written report which may result in de-enrollment. If the absences exceed 20 percent (2.5 class meetings), the student may be de-enrolled without notice. If the date of de-enrollment is past the last date to withdraw from a class, the student will be assigned a grade of W or WF consistent with university policy in the grading section of the catalog. See Academic Policies in the (undergrad/graduate as appropriate) academic catalog.

Texts used in the course

Three books and several online readings are required for this course. Electronic versions of all three books are available for under $10.

Books:

- Daniel Lieberman. (2013). The Story of the Human Body: Evolution, Health and Disease. Vintage.
- Eugene E. Harris. (2014). Ancestors in our Genome: The New Science of Human Evolution. Oxford University Press.
- Elizabeth Kolbert. (2014). The Sixth Extinction: An Unnatural History. Henry Holt and Company.

Journal Articles:

A handout explaining how to access articles on the PLNU library is posted on Canvas

One of the following is suggested as a reference for background reading:

Reece, J. et al. *Campbell Biology*, San Francisco: Pearson Benjamin Cummings

Brooker, R., Widmaier, E., Graham, L., & Stiling, P. *Biology*, San Francisco: McGraw-Hill

Miscellaneous class information

It is important that you bring a laptop to class every class session to fully participate in the activities. On the field trip, a clipboard is important, as well as good walking shoes.

Tuition refund schedule

100% refund if dropped after 1-2 sessions
75% refund if dropped after 3-4 sessions
50% refund if dropped after 5 sessions
25% refund if dropped after 6-7 sessions
0% refund if dropped after 8-12 sessions

Assessment: *The assignments will be weight as follows:*

Journal article analyses (individuals)……..	35%
Other class assignments (individuals or pairs)…….	20%
Exams: three (3) @ 15% each (individuals)……..	45%
TOTAL	100%

Grading scale

A 90% B 80% C 70% D 60% F 50%

Final course grades will be recorded with – added to the lowest 2% and + added to the highest 2% within each range. For example, 91% = A- and 88% = B+

Data analysis and discussion assignments

Summaries will focus on a report of the data, an appropriate analysis of the data, and a clear conclusion (claim) with clear justification of how the data presented supports the claim.

It will be made clear which assignments are to be completed in pairs and which are not. *No late assignments will be accepted*.

Journal article analyses
The assigned journal articles make up the required reading for the course. In order to prepare for the class discussion on each article, students will read each article, with the emphasis on understanding the problem that motivated the research and the main points that the article makes. Some articles are original research articles, while others are review articles. The analysis will vary depending on the type of article. While some effort should be made to understand the research methods, as well as the data analysis, the focus should be on the evidence to support or reject the major ideas, concepts, theories, and hypotheses in the paper.

Exams
Take-home exams will be posted on Canvas each Friday by noon, and will be due (via e-mail to both professors) by midnight on Saturday. Exams are open book/open internet and will require integration of course content to demonstrate understanding. While working and studying in groups is encouraged during the week, each take-home exam must represent each person's own work and is not to be done in consultation with others. All questions seeking clarification of the test questions MUST be directed to the instructors, not to other students. Late exams will be penalized 20% for being up to 24 hours late. No exams will be accepted after that time unless arrangements have been made prior to the exam date.

Academic dishonesty
Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. As explained in the university catalog, 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. Violations of university academic honesty include cheating, plagiarism, falsification, aiding the academic dishonesty of others, or malicious misuse of university resources. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for a) that particular assignment or examination, and/or b) the course following the procedure in the university catalog. Students may appeal also using the procedure in the university catalog. For further information, see "Academic policies" in the PLNU graduate catalog at:
http://catalog.pointloma.edu/content.php?catoid=9&navoid=932#Academic_Honesty

Spiritual Care
PLNU strives to be a place where you grow as a whole person. To this end we provide resources for our graduate students to encounter God and grow in their Christian faith. At the Mission Valley campus we have an onsite chaplain for graduate students, Rev. Nancy Pitts who is available during class break times across the week. If students have questions, a desire to meet with the chaplain, or prayer requests send a message to: gradchaplainmissionvalley@pointloma.edu
Additional resources for your Christian faith journey can be found here:
http://www.pointloma.edu/experience/faith/graduate-student-spiritual-life

Graduate Academic Accommodations Policy
While all students are expected to meet the minimum academic standards for completion of this course as established by the instructor, students with disabilities may request academic accommodations. At Point Loma Nazarene University, students must request that academic accommodations by filing documentation with the Disability Resource Center (DRC), located in the Bond Academic Center. Once the student files documentation, the Disability Resource Center will contact the student's instructors and provide written recommendations for reasonable and appropriate accommodations to meet the individual needs of the student. See Academic Policies in the PLNU graduate academic catalog here:
http://catalog.pointloma.edu/content.php?catoid=9&navoid=932#Academic_Accommodations

FERPA policy

In compliance with federal law, neither PLNU student ID nor social security number should be used in publicly posted grades or returned sets of assignments without student written permission. This class will meet the federal requirements by returning papers individually and posting grades n Canvas so that only students have access to their grades. Also in compliance with FERPA, you will be the only person given information about your progress in this class unless you have designated others to receive it in the "Information Release" section of the student portal. See Policy Statements in the graduate academic catalog.

Calendar on next page

Schedule for PLNU Evolution course 2015

Monday, June 22	Tuesday, June 23	Wednesday, June 24	Thursday, June 25
Primary topic – **MECHANISMS OF EVOLUTION** *Background reading*: chapters on Darwin, evolution of populations, and systematics			

Topics:
• Introduction to course/each other
• Introduction to the science & faith conversation
• Darwin vs Lamarck
• *Peromyscus polionotus* case study – analysis of data. Hoekstra, et al. research
• Natural selection simulator
• Natural selection lecture
• Petrie et al research: Peacocks and "good genes"? Analysis of data
• Simulator – genetic drift
• Summary of the day's concepts
	Topics:
	• Check your understanding
	• Discuss London Mosquitos article
	• Phylogenetic Trees lab
	  ○ Morphological traits
	  ○ Genetics
	• Diving Beetles case study – analysis of data
	• Coevolution lecture
	• Summary of the day's concepts
		Topics:
		• Case studies of Evolution research
		  ○ *Teleogryllus oceanicus* crickets. Zuk et al., 2006
		  ○ Guppies in Trinidad. Resnick et al. (1990-2002)
		  ○ Human impacts on fish
		• Life History lecture
		• Calculating Life History traits
		• Summary of the day's concepts
			SAN DIEGO NATURAL HISTORY MUSEUM
			Meet 1:00pm at the Natural History Museum, Balboa Park, North door entrance.
			
			Topics:
			• Fossil evidence
			• Adaptations
			• Explanation of take-home exam

Monday, June 29	Tuesday, June 30	Wednesday, July 1	Thurs., July 2
Primary topic – **THE EVOLUTIONARY ORIGIN OF HOMO SAPIENS** *Background reading*: chapters on hominin paleontology and genetics			

Topics:
• Debrief museum visit
• Debrief exam
• Biodiversity on earth – short lecture
• Radiometric dating simulator
• Radiometric dating misconceptions
• Jigsaw speciation articles
  ○ TBD
  ○ TBD
  ○ TBD
• Whale evolution case study
• Summary of the day's concepts
	Topics:
	• Origin of Bipedalism
	• Group discussion of *Ardipethicus* Science article
	• Changing climate, Changing food supply
	• Group discussion of PNAS article on rethinking early hominin evolution
	• The Emergence of *Homo erectus*
	• "This Just Out" NY Times article on recent jaw bons discovery
	• Summary of the day's concepts
		***Topics*:**
		• Expanding Capabilities of *Homo erectus*
		• "This Just Out" NY Times article on *erectus* find in Republic of Georgia
		• Skull lab and debrief
		• Evolution and Christian Faith
		• Summary of day's concepts
			Topics:
			• The Rise of Modern Humans
			• Group discussion of research article on origin of prolonged childhood
			• The quest to find our closest ape relative through genetic analysis
			• Group discussion of article on construction of species trees
			• Pseudogenes as a means of exploring species lineage (Group activity)
			• Gene trees and why they can differ from species trees
			• Summary of day's concepts

Mon., July 6	Tues., July 7	Wed., July 8	Thurs., July 9
Primary topic – **THE GENETIC BASIS OF THE ORIGIN OF HOMO SAPIENS & IMPACT OF HUMAN ARRIVAL ON OTHER SPECIES** *Background reading*: chapters on Population Genetics, Ancient DNA, and The Sixth Extinction			
Topics: • Resolution of Gene Tree/Species Tree mystery • Group discussion of article on orangutan genes in human genome • Estimating population sizes in evolutionary history • Group activity: How do we know that population size was smaller in evolution of modern humans? • Natural Selection (NS) vs Genetic Drift (GD) • Prepare lesson: Why NS predominates in some circumstances and GD in others • Summary of day's concepts	***Topics:*** • Effect of small population size in human evolution • Prepare Lesson: SNP's and how they demonstrate "Out of Africa" • Genetic origin of our species • "Gene Surfing" – Group Activity • Gene sweeps and positive selection • The molecular basis of lactase persistence • "This Just Out" (Group Activity): Whole Genome Scans for Positive Selection in human history. • Summary of day's Concepts	***Topics:*** • Ancient DNA as a tool for exploring human evolution • Neanderthal and Denisovan genomes • Evidence for Interbreeding • Ramifications of interbreeding • Summary of day's concepts	***Topics:*** • Extinction events in earth's history • Human impact on biodiversity in pre-history • Effect on biodiversity in the immediate future • Summary of days' concepts