Course: Biogeography ESPM C125/GEOG C148/IB C166 Fall 2021

Background

The goals of the course are to (a) examine how geographically-linked characteristics of populations and species influence their potential for evolution and extinction; and (b) provide an overview of the approaches for studying the interplay between geographic ranges, environment, evolution, and extinction. In general, lectures will focus on teaching key biogeographic principles and the relevance of biogeography in forecasting global change. Lab sections will focus more on case studies and controversies.

Instructors: Rosemary Gillespie, Jeff Chambers; GSIs Maria Pettis, Kathy Nagel

Time and Place:

Lecture -T/TR 9:30am-11am Lab - F 12 noon - 3pm or 3pm - 6pm

Prerequisites: Bio 1B or similar

Brief Description: 4 units. Three hours of lecture and three hours of lab per week. Explores how biogeographic processes influence the ecology and evolution of species, communities, and ecosystems. Provides insights into the effects of global change on biota.

Instructors: Rosemary Gillespie <u>gillespie@berkeley.edu</u> Office hours: TBA

Jeff Chambers <u>iqchambers@berkeley.edu</u> Office hours: TBA

Maria Pettis <u>maria pettis@berkeley.edu</u> GSI. Office hours: By appointment Kathy Nagel <u>knagel@berkeley.edu</u> GSI. Office hours: By appointment

Textbook: *Preferred*: Biogeography, Fifth Edition, Mark V. Lomolino, Brett R. Riddle, and Robert J. Whittaker, Sinauer Associates. *Low cost option*: Biogeography, Fourth Edition, Mark V. Lomolino, Brett R. Riddle, Robert J. Whittaker, James H.

Brown, Sinauer Associates

GRADING:

Midterm: 20% Open book, open notes. Short answer questions. Via bCourses. This will include

all material from lectures, including the discussion topics.

Final: 30% Same format as midterm, covering material from throughout the semester.

Lab: 40% Each lab will culminate in a lab report or one page essay in which students are to

answer specific questions. During lab students will work together on assignments or debate discussion prompts in the same pre-assigned small groups throughout the semester. Discussion prompts will also be used to evaluate student participation and

understanding.

Participation: 10% Students will participate in lecture discussions with a 20 minute group

"discussion time" (~5 students each in 7 groups randomly assigned); for some discussions, there will be additional material to read that bears on the topic. At the end of the week, each student will submit a brief outline based on lecture discussions (via Assignments on bCourses) (a paragraph of ~100-150 words) of your perspective on the points raised, or results from your further explorations on the topics. These outlines should reflect the discussion and participation (rather than answers that are

correct or incorrect), and will be graded as such.

Syllabus

Week/		
dates		
1:	Aug 24: NO CLASS	
Aug 23-27	Aug 26: Chapter 1. The Science of Biogeography	
1145 23 27	Discussion assignment: How do you determine the value of a species?	JC
	Aug 27: No Lab	
2:	Aug 30: Chapter 2. The History and Reticulating Phylogeny of Biogeography- We go	
Aug29-Sep3	through the European colonial influences on biogeography	
	Discussion assignment: What is (western) science? What is "indigenous science"? See	
	https://www.esf.edu/indigenous-science-letter/ and read a few sections from Wilder et al 2016,	
	The importance of indigenous knowledge in curbing the loss of language and biodiversity.	
	BioScience, 66,499-509.	RG
	Sept 2: Chapter 2. The History and Reticulating Phylogeny of Biogeography - Start	NO
	with the foundation of modern biogeography	
	<u>Discussion assignment:</u> Given that biogeography involves finding commonalities across regions,	
	is there a way to incorporate placed-based indigenous science? How? OR: How does indigenous science differ from citizen science? What are the differences and commonalities?	
	Sept 3: <i>LAB</i> : iNaturalist - Data collecting, sampling protocols, GPS, GBIF.	
3:		
Sep6-10	Sep 7: Chapter 3. The Geographic Template 2: Visualization and Analysis of	
Sepo-10	Biogeographic Patterns	
	<u>Discussion assignment:</u> Which state variable factor(s) is/are the primary determinant(s) of vegetation patterns northern coastal California:	
		JC
	Sep 9: Chapter 3. The Geographic Template 2: Visualization and Analysis of	
	Biogeographic Patterns	
	<u>Discussion assignment:</u> Ecosystem development over time and remote sensing Sep 10: <i>LAB</i> – Discussion & take home essay	
4:		
Sep13-17	Sep 14: Chapter 4. Distributions of Species: Ecological Foundations - How do we look at species ranges	
Sep13-17	<u>Discussion assignment:</u> Mapping and examining ranges of organisms	
	Sep 16: Chapter 4. Distributions of Species: Ecological Foundations - Interactions	
	affecting distributions	RG
	<u>Discussion assignment:</u> Looking at databases that focus explicitly on interactions - different kinds	
	of databases (GLOBI, kbase, EASIN, etc)	
	Sep 17: <i>LAB</i> : Jupyter notebooks I. Databasing, digitization.	
5:	Sep 21: Chapter 5. The Distribution and Dynamics of Communities, Biomes, and	
Sep20-24	Ecosystems	
	<u>Discussion assignment:</u> Succession and global change	
	Sep 23: Chapter 5. The Distribution and Dynamics of Communities, Biomes, and	JC
	Ecosystems	
	<u>Discussion assignment:</u> Global biome patterns and mechanisms	
	Sep 24: <i>LAB</i> : Remote sensing	
6:	Sep 28: Chapter 6. Dispersal and Immigration - Vicariance vs dispersal	
Sep27-Oct1	<u>Discussion assignment:</u> Why is (or was) the debate between vicariance and dispersal so fraught?	
	Sep 30: Chapter 6. Dispersal and Immigration - Dispersal attributes	RG
	<u>Discussion assignment:</u> You will be randomly assigned a species that colonized Hawaii. Based on	KG
	its characteristics, from what direction do you think it colonized?	
	Oct 1: <i>LAB</i> Dispersal, colonization; sticky traps	
7:	Oct 5: Chapter 7. Speciation and Extinction- Population divergence and speciation	
Oct 4-8	<u>Discussion assignment:</u> Genetic drift experiment using M&Ms?	
	Oct 7: Chapter 7. Speciation and Extinction - Adaptive radiation and extinction	
	<u>Discussion assignment:</u> Consider why mammal extinctions over the last 8-15k years have been (1)	RG
	almost absent in Hawaii; (2) very high in Australia; (3) very high in N America; and (4) relatively	
	low in Africa	
	Oct 8: <i>LAB</i> : Jupyter notebooks II. Genomics	

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