Geography/Environmental Studies 167
Biogeography: The Study of Plant and Animal Distributions
Summer 2016

Instructor: Tom Bell (thomas.bell@lifesci.ucsb.edu)

SUBJECT TO CHANGE (6/20/2016)

Lecture: MTWR 11:00 – 12:05 pm, Ellison Hall 3621
Discussion Section: W 12:30 – 1:50 pm, HSSB 3202
Office hours: M 12:30 – 2:00pm and by appointment, Ellison Hall 5843

Teaching Assistant: Nate Emery (nathan.emery@lifesci.ucsb.edu)
Office Hours: 10:30 – 11:30 am, Noble Hall 1113

Class website: www.tomwbell.net/biogeography

Course Description: An introduction to the field of biogeography through primary literature spanning over 250 years. The course will begin will a firm background in readings from early prominent biogeographers including Carl Linnaeus and Charles Darwin. We then move on to discuss Earth's history and its relationship to vicariance as well as how other factors, such as ecology, climate, and *Homo sapiens* have affected species ranges. We will then discuss how the synthesis of biogeographical theories led to a revolution in biogeograpical methodology. Lastly, we will touch on the diversification of species across space and time and discuss modern biogeographical insights and experiments on islands.

Goals: By the end of the class you will have a firm rooting in the field of biogeography. My hope is that by reading and synthesizing the primary literature of this diverse field, you will be able to apply this knowledge to your current or future studies or research. Most importantly, you will be able to observe the world around you in a new way and have insights on why the plants and animals you see everyday are there and how they got there.

Reading Materials:

> Foundations of Biogeography: Classic Papers with Commentaries. Eds. M. Lomolino, D. Sax, J. Brown. (On reserve at the Davidson library)

Grades: After the first class, you will be expected to come to class having read the material and ready to discuss the core themes and how they relate to other readings in the course. There will be one midterm and a final exam that will give you the opportunity to synthesize the readings and associated lecture material. The discussion section is a large portion of your grade and is mandatory. Grading will be determined as follows:

Lecture Discussion and Participation 20%

Discussion 30%

Leader – 12%
Question Master – 12%
Representative Participation – 6%

Midterm 25%

Final Exam 25%

Lectures: Lectures will occur 4x per week (M-Th). Due to the accelerated nature of this course it is essential that you attend every lecture. Lectures will consist of an explanation of that day's reading along with how it relates to the field of biogeography overall. I will also bring in examples of other foundational papers and the recent literature, which we will not have the opportunity to read as a class. The last 15 – 20 minutes of lecture will be devoted to answering your questions on the reading and discussing the core concepts and nuances of the reading together. You will be expected to add to the discussion, not necessarily every lecture, but for the majority of the in class discussions.

Discussion Section Structure: Each Discussion Section will be broken up into parts. We will start with small groups summarizing the paper/article and build up the discussion to the whole class. Everyone will rotate among roles as well as group composition. Everyone will get to know everyone else by the end of the course. No biogeographic isolation in the class ;)

Discussion Section Roles:
Leaders = These folks are responsible for knowing the article thoroughly and will be responsible for presenting a summary of the article to their peers in the beginning of each section. The summary includes important themes, topics, opinions and greater context of the work. What are the key points of the article? What is the author trying to convey? Are there any themes of the article that you think are important to share?

Question Masters = These folks are responsible for thinking past the article. They will come to class with 5-10 well-thought out questions that spark conversation and discussion. These questions are NOT memorization-based questions; this is not a pre-med biology class. This is an opportunity to flex your mind and generate some really great discussion. Why did this article matter when it was written? Why does it matter now? Be you and creative! **Be prepared to respond to your peer's answers**

Representatives = You are an active member of the greater population. You have read the article and are interested to hear what the leader has to say. Be prepared to discuss questions proposed by the Question Master and participate in the overall discussion.

Plan of Action (flexible):

Each Wednesday → 4 Leaders & 4 Question Masters

- Split into groups of 6 with 1 Leader and 1 QMaster in each.
- First 20 minutes – Four Groups of 6
  - Everyone introduces one another
  - Leaders summarize article for their peers
- 5 minutes
  - QMasters meet and confer
- ~40 minutes – Two Groups of 12
  - QMasters pose questions to everyone in group
  - QMasters also provide comments on peer responses, facilitate discussion
- ~15 minutes – Whole Class
  - Present conclusions
  - Nate presents thoughts and poses questions to all

Field Trip: There will be a field trip to the California central coast during one weekend of the class. We will leave UCSB on a Friday morning and return on Sunday afternoon. We will explore the diverse systems on the CA coast from intertidal rocky reefs, coastal bluffs, redwood forests, streams, chaparral, mountain peaks, and oak woodland and savanna, all of which occur over a distance of ~20km! We will be camping at the Los Padres National Forest Ponderosa Campground.

Course Schedule

Week 1 – Classical Biogeography: Early Perspectives

Jun 20 – Age of Enlightenment: From Paradisiacal to Pattern
Reading: Linnaeus p. 14, Buffon p. 16

Jun 21 – Phytogeography and 'Degeneration'
Reading: Humboldt, p.49

Jun 22 – Darwinism, Natural Selection, and Dissimilarity
Reading: Gray, p.134
Discussion Reading: Darwin, p.140

Jun 23 – Wallacea and the Importance of Time to Biogeography
Reading: Ekman, p.245

Week 2 – Earth History, Vicariance, and Dispersal

Jun 27 – Plate Tectonics: An Unstable Earth
Reading: Wegener p.277

Jun 28 – Using Phylogeny to Infer Vicariance
Reading: Brundin, p.295

Jun 29 – Panama and the Great American Interchange
Reading: *continue* Brundin, p.295
Discussion Reading: Marshall et al. 1982 p.419

Jun 30 – The Role of Regular 'Accidents'
Reading: Grinnell, p.456

Week 3 – Species Ranges

Jul 4 – **HOLIDAY**

Jul 5 – Blending History and Ecology for Plant Distributions
Reading: Wulff, p.513

Jul 6 – Fundamental Niches and Tropical Mountains
Reading: Janzen, p.594
Discussion Reading: Elton, p.575

Jul 7 – The Role of Humans in Species Ranges and Extinction
Reading: Martin, p.641

Week 4 – A Revolution in Biogeographical Methods

Jul 11 – **Midterm Exam**

Jul 12 – The Importance of Systematics and *Rassenkreise*
Reading: Hennig, p.679

Jul 13 – Panbiogeography
Reading: Croizat, p. 690
Discussion Reading: Nelson, p. 728

Jul 14 – Parsimony and Cladistic Biogeography
Reading: Nelson, p. 686

Week 5 – Diversification -or- Why are there so many species?

Jul 18 – Darwin's Finches and the Origin of *Sub*species

Reading: Lack, p. 833

Jul 19 – Equilibrium and Non-Equilibrium Diversity: Valentine vs. Raup

Reading: Raup, p. 901

Jul 20 – Why are there ***so*** many species in the tropics?

Reading: Haffer, p. 908

Discussion Reading: Bush, p. 915

Jul 21 – The Biogeography of Coastal California

Reading: *None*

Jul 22 – 24 – Field Trip to Central Coast Range (meet at TBD, at 8AM)

Week 6 – The Importance of Islands – Islands as Natural Laboratories

Jul 25 – The Equilibrium Theory of Island Biogeography

Reading: MacArthur & Wilson, p. 970

Jul 26 – Experimental Biogeography of Islands

Reading: Simberloff & Wilson, p.985

Jul 27 – Nonequilibrium Theories of Biogeography

Reading: Brown, p. 989

Discussion Reading: Diamond, p. 1001

Jul 28 – **Final Exam**