

Biogeography
Geography 434/634
Biology 490/690

Schedule

Lectures: MW 4:00 - 5:15 P.M. 321 Mackay Science.

Office Hours

MW 2:30 – 3:30 or by appointment. 325 or 327 Mackay Science (ph. 784-8056, or jheaton@unr.edu). You are welcome to drop by my office anytime.

Textbook

Biogeography 3rd edition. (2006). Mark Lomolino, Brett Riddle, and James Brown. 845pp.

Course Description

Biogeography is concerned with the distribution, ranges and limits of plants and animals. It includes the study of modern distributions (Ecological biogeography) as well as the study of past distributions (Historical biogeography). Although this dichotomy is somewhat arbitrary, it provides a convenient structure for studying the subject. Ecological biogeography includes the examination of modern distribution patterns in relation to factors such as climate, soils and competition. Historical biogeography examines the long-term changes in distribution patterns over geologic time and in relation to changes in plate tectonics, evolution and climate change. The patterns we see today are created by a combination of the past and the present, and it is impossible to understand modern ecology without this long-term perspective.

Biogeography is a synthetic science relying on many different disciplines, including biology, geography, geology, paleontology, anthropology, ecology, evolutionary biology, systematics, agronomy and oceanography. The field is so vast that few individuals have depth across the entire field. Though I am a geographer, I am also a biologist, splitting my degrees between B.S. and M.S. in Biology and Ph.D. in geography. My areas of research are in desert ecology, reptiles, habitat modeling and management of natural resources on public lands, so I have more experience with ecological biogeography than historical biogeography. Biologists in the class may find that they can provide unique and insightful perspectives on some of the biological evidence that we cover in the class. On the other hand, the Geographers in the class may find that they can provide unique and insightful perspectives on some of the geographical evidence we cover in class. We have a unique opportunity to share across the two founding disciplines that anchor the field of Biogeography. I welcome each of your input.

“Given the long list of biogeography’s conceptual achievements – in themselves the seeds of whole disciplines – one can easily comprehend how it has become impossible for one person to understand and follow completely all aspects of the field. Students of biogeography can either be frustrated by their inability to comprehend all the subtleties of this awesome body of knowledge, or they can be challenged and encouraged by the prospect of using biogeography as a focal point

to synthesize many separate disciplines and to acquire a unique perspective on the development, diversity, and distribution of life on Earth.” (pg 36 of the text)

Grading Structure

	Undergrads	Grads
Essay 1	30 (7%)	15 (3%)
Essay 2	50 (11%)	25 (5%)
Essay 3	70 (16%)	35 (7%)
Grad presentation		
(proposal – TBD)		25 (5%)
(draft presentation outline– TBD)		25 (5%)
(presentation – TBD)		75 (15%)
Test 1	100 (22%)	100 (20%)
Test 2	100 (22%)	100 (20%)
Test 3	100 (22%)	100 (20%)
TOTAL	450	500

Course grades: In this class, I use a system of pluses and minuses when grading, i.e. A, A-, B+, B etc. with grade point values of 4.0, 3.7, 3.3, 3.0, and so on. The cutoff between grades of A- and B+ will be 90%, between B- and C+ 80% , between C- and D 70% and between D and F 60%. In some cases, the cutoff boundaries for points may be shifted downward slightly, but in no case will they be higher than stated in the syllabus.

Tests: Tests will consist of a combination of multiple-choice, short answer and essay. The multiple choice questions will center on factual content you will have memorized. The short answers will be problem solving questions, interpretations of data, and short synthesis of ideas. The essays will be conceptual and analytical and relate to readings from the textbook and assignments. Tests always focus on the topics covered since the last test, however some concepts pop up more than once during the semester, and may show up on several tests.

Essays: You are required to write 3 (three) review essays on selected readings, one from each of the three groups of readings (see attached reading list). Essays will typically be about 3 pages in length and must not be more than 5 pages, double spaced. The goal is to clearly synthesize the main points of the paper in your own words. This literature represents examples of good, concise scientific writing worth emulating. Note that there is a fair amount of specialized terminology so be prepared to read with a dictionary at hand. The purpose of the assignments is to increase literacy skills in **writing** (*ability to write a complete, well constructed essay or paper using correct vocabulary, grammar, spelling and punctuation*) and **comprehensive reading** (*reading for the main ideas in a manuscript and the ability to articulate these ideas in written annotation*). You are free to follow your own style and organization, but you are required to include the following elements...

Review – identify the key question(s) being asked. The reader should have a comprehensive understanding of this piece of literature after reading your essay.

Most of these papers are broadly theoretical, but to the extent that they present empirical data, briefly review the methods being used and clearly identify the data being analyzed.

Identify the key arguments (points/conclusions) in the paper and provide examples/evidence that the author uses to support these arguments. Most of the papers have a main point, but address many related concepts as well. Do not limit your review to only the main point, but be comprehensive in identifying additional ideas discussed in the paper.

To the extent possible, place the paper within the larger context of biogeographic thought. While each paper is already listed as relating to a particular concept, identify all of the biogeographic concepts discussed in the paper and note the different fields of study the author brings to bear on their subject. Is this a relatively narrow study focused on a disciplinary question, or does the paper present a broad set of ideas? Who does the author cite and what ideas do they build on?

Critique – You are not required to critique the ideas presented, although you are free to do so if appropriate. You are welcome to cite other papers or note advances in thought that followed the publication of this paper.

Note that each successive essay is worth more than the previous. This is because I expect your writing to improve with each assignment. The first essay has the fewest points so that if you are unfamiliar with this type of writing and lack experience with reading primary scientific literature, you will not lose significant points in your first effort. You should treat this first essay as a learning experience and make your very best effort, but not be discouraged if the grade is low. I will provide specific comments on the first two writing assignments designed to help you improve your writing. I expect you to take the comments seriously and apply them to subsequent essays in an effort to improve your critical analysis and writing abilities. The third assignment will have few comments since you will have no further opportunity in this class to respond to critiques.

Graduate students: Graduate students are required to perform additional work in all 600 level courses. In this course graduate students will be required to research and present a lecture on a list of possible topics. All topics must be approved by the instructor before you proceed. You are required to submit a one page proposal (double-spaced) for your lecture. In the event that you change your topic, you must resubmit a new proposal and have it regarded. Proposals and drafts lectures have points and will be graded with ample feedback for revisions.

Policy on late work: For any assignment, 10% will be deducted from the total possible points for every day an assignment is late. All due dates are specified in this syllabus, and there is sufficient time to do all the required work. Please endeavor to work diligently throughout the semester, and not just as due dates approach.

Academic Dishonesty: Academic dishonesty is against university as well as the system community standards. Academic dishonesty is defined as: cheating, plagiarism or otherwise obtaining grades under false pretenses. **Plagiarism is defined** as submitting the language, ideas, thoughts or work of another as one's own; or assisting in the act of plagiarism by allowing one's work to be used in this fashion. **Cheating is defined as** (1) obtaining or providing unauthorized information during an examination through verbal, visual or unauthorized use of books, notes, text and other materials; (2) obtaining or providing information concerning all or part of an examination prior to that examination; (3) taking an examination for another student, or arranging for another person to take an exam in one's place; (4) altering or changing test answers after submittal for grading, grades after grades have been awarded, or other academic records

once these are official. For more details, see
http://www.cis.unr.edu/ecatalog/Default.aspx?article_list_id=11076.

Students with Disabilities: If you have a disability for which you will need to request accommodations, please contact me and the Disability Resource Center (Thompson Building, Suite 101) as soon as possible to arrange for appropriate accommodations. For more details, see <http://www.unr.edu/stsv/slservices/drc/index.asp>.

Readings for essays: Recently, an edited volume of classic papers entitled “Foundations of Biogeography” has been published that provides a ready library of some of the best and most influential scientific papers published in the field over the last two centuries. The editors are also the authors of our textbook, and therefore the selections provide an opportunity to read more deeply from original texts that are cited in our textbook. I have selected 17 papers from this book that in my estimation are examples of clear writing on a topic I estimate to be of more general interest. I have listed those writings here. The one exception is the papers read for Darwin and Wallace at the Linnean Society meeting in 1858 that laid out the original concepts of natural selection, available on the internet.

Scanned PDFs of each paper will be available on WebCT. If you would like to view the book, a copy has been placed on reserve in the Main Library. You are welcome to browse through the book and identify other papers you prefer to read, but this must be approved by the instructor beforehand.

“Foundations of Biogeography: Classic Papers with Commentaries,” (2004), Lomolino, Mark V., Sax, Dov F., and Brown, James H. University of Chicago Press, Chicago. 1291 pp. ISBN 0-226-49237-0

GROUP 1 (choose only 1 of the seven papers listed)

All students are required to write an essay on one paper in GROUP 1.

The essay will be due on the date given for that paper. Dates roughly correspond with the week that that topic appears on the syllabus. For example, if you choose to write an essay on the Darwin/Wallace paper (1.1b), it will be due on Sep. 9, but if you choose Janzen’s paper (1.2c), it will be due on Sep. 16, and so on. This is to allow you flexibility in your schedule and ideally to distribute my grading load more evenly throughout the semester.

1.1. Darwin, Wallace & the theory of natural selection - Due – Sep. 9

- a) Excerpts from “On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life,” Charles Darwin (1859)
- b) The Darwin-Wallace Papers read at the Linnean Society in 1858
Available to download at <http://www.linnean.org/index.php?id=48>

1.2. Dispersal, Barriers & Corridors - Due Sep. 16

- a) Mammals and Land Bridges, George Gaylord Simpson (1940), *Journal of the Washington Academy of Sciences* 30:137-163.
- b) The biota of long-distance dispersal, I: Principles of dispersal and evolution, Sherwin Carlquist (1966). *The Quarterly Review of Biology* 41: 247-270.
- c) Why mountain passes are higher in the tropics, Daniel H. Janzen (1967). *American Naturalist* 101: 233 – 249.

1.3. Speciation – Due Sep. 23

- a) Excerpt from “Systematics and the Origin of Species,” Ernst Mayr (1942).
- b) Excerpts from “Darwin’s Finches,” David Lack (1947).

GROUP 2 (choose only 1 of the five papers listed)

All students are required to write an essay on one paper in GROUP 2.

2.1. Earth History, Continental Drift – Due Oct. 7

- a) Excerpt from “The Origin of Continents and Oceans,” Alfred Wegner (1924)
- b) The bearing of certain paleozoogeographic data on continental drift, Anthony Hallam (1967). *Palaeogeography, Palaeoclimatology, Palaeoecology* 3:201-241.

2.2. Glacial patterns – Due Oct. 21

- a) The late Quaternary vegetational history of the equatorial mountains, John R. Flenley (1979). *Progress in Physical Geography* 3:488-509.
- b) The Discovery of America, Paul S. Martin (1973). *Science* 179:969-974.

2.3. Invasion and Interchange – Due Oct. 26

- a) Excerpt from “The Ecology of Invasions by Animals and Plants,” Charles S. Elton (1958)
- b) Mammals and Land Bridges, George Gaylord Simpson (1940), *Journal of the Washington Academy of Sciences* 30:137-163.

GROUP 3 (choose only 1 of the six papers listed)

All students are required to write an essay on one paper in GROUP 3.

3.1. Island Biogeography – Due Nov. 4

- a) Adaptive shift and dispersal in a tropical ant fauna, Edward O. Wilson (1959). *Evolution* 13: 122-144.
- b) Mammals on mountaintops: Nonequilibrium insular biogeography, James H. Brown (1971). *The American Naturalist* 105: 467-478.

3.2. Assembly Rules and Communities – Due Nov. 16

- a) Competition and the structure of ecological communities, Charles S. Elton (1946). *Journal of Animal Ecology* 15: 54-68.
- b) Gradient analysis of vegetation, Robert H. Whittaker (1967). *Biological Reviews* 42: 207-264.

3.3. Diversity Gradients – Due Nov. 23

- a) Latitudinal gradients in species diversity: A review of concepts, Eric R. Pianka (1966). *The American Naturalist* 100: 33-46.
- b) Species density of North American Recent mammals, George Gaylord Simpson (1964). *Systematic Zoology* 13: 57-73.

Date	Lecture	Schedule	Text Reading	Essay due dates
Aug. 24	Introduction			
26	Wallace, Darwin & Biogeographic History		Ch. 1 & 2	
31	Physical geography		Ch. 3	
Sep. 02	Distributions of species		Ch. 4	
07	HOLIDAY: Labor Day			
09	Communities & Biomes		Ch. 5	1.1
14	Dispersal and Immigration		Ch 6	
16	Barriers and Corridors			1.2
21	Speciation		Ch. 7	
23	Extinction			1.3
28	Test #1			
30	Plate tectonics		Ch. 8	
Oct. 05	Tectonic history			
07	Glacial cycles		Ch. 9	2.1
12	Biogeographic response to glaciation			
14	Phylogenetic systematics (guest lecture)		Ch. 11	
19	Cladistic biogeography (guest lecture)		Ch 12	
21	Fundamental geographic patterns		Ch. 10	2.2
26	Invasion & Interchange (Mortinson)			2.3
28	Test #2			
Nov. 02	Species area relationships		Ch. 13	
04	Equilibrium theory of island biogeography			3.1
09	Insular communities		Ch. 14	
11	HOLIDAY: Veteran's Day			
16	Evolutionary trends on islands (Heckendorn)			3.2
18	Diversity gradients		Ch. 15	
23	Geography of Extinctions		Ch. 16	3.3
25	NO CLASS: Give Thanks			
30	Climate change			
Dec. 02	Conservation biogeography		Ch. 17	
07	Test #3			
08	Dead Day			
Dec. 14	Final, Monday Dec. 14th 4:30 – 6:30PM			