

Biogeography
Geography 434/634
Biology 490/690

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.

Early people needed to understand the geographic variation of nature to survive, and later scientists began to explain these patterns. The early study of the Geography of Nature became the foundation for entirely new fields of science, including geology, meteorology, paleontology, evolution and ecology. Biogeography then is a synthetic science relying on many different disciplines. The field is so vast that few individuals have depth across the entire field. Since I am a geographer, my strength is the geography in biogeography. My area of research is in paleoecology and paleoclimatology, so I have more experience with historical biogeography than ecological biogeography. Biologists in the class will have a better understanding of some of the biological evidence that we cover in the class and I welcome each of your input. I also work with plants, not animals and while I try to include examples from the animal world, I welcome your input if this is your specialty.

“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 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.” (pg 36 of the text)

Schedule

Lectures: TTH 2:30 - 3:45 P.M. 321 Mackay Science Hall.

Office Hours

TTH 11:30 – 12:30 or by appointment IGT Mathewson Knowledge Center foyer near Peet’s coffee – or in my office immediately after class (325 Mackay Science ph. 784-6346, smensing@unr.edu). You are welcome to drop by my office anytime as well.

Textbook

Biogeography 4th edition. (2010). Lomolino, Riddle, Whittaker & Brown. 2010. 878 pp.

Grading Structure

	Undergrads	Grads
Essay 1	20 (4%)	15 (3%)
Essay 2	30 (6%)	25 (5%)
Essay 3	50 (10%)	35 (7%)
Research Paper		
(pre-proposal –)	(10)	25 (5%)
(draft –)	(20)	25 (5%)
(final paper –)	(70)	75 (15%)
Total	100 (20%)	125 (25%)
Test 1	100 (20%)	100 (20%)
Test 2	100 (20%)	100 (20%)
Test 3	100 (20%)	100 (20%)
TOTAL	500	500

Course grades: Your final course grade will be based on the combined scores from the tests and research project. 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 they will be higher than stated in the syllabus.

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.

Tests: Tests will consist of a combination of multiple-choice, short answer and one essay. The multiple choice questions will focus on factual content you simply need to know to study biogeography. 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.

Writing Assignments

Review Essays – All students

You are required to write 3 review essays on selected readings, one from each of the three groups of readings (see attached reading list). Essays should be 3-5 pages in length 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*).

Your paper must include the following sections clearly identified with subheadings

Key question– Identify the key question(s) being asked and clearly state it in your own words.

Methods used and results - most of these papers are broadly theoretical, but if empirical data are presented, briefly review the methods being used and clearly identify the data being analyzed.

Key arguments - 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 any 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.

Scientific context - 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 (optional) – 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 more recent advances.

Important note about relationship between writing assignments and tests

Each test will have three essay questions, of which you will answer only one. The essay questions will relate to the different readings that were assigned during that class section.

Research Paper – Undergraduate students

Preproposal (10 pts) – Due Oct. 4 - 250 words – Must include a Title, Thesis statement (in bold) and Introduction that explains the significance of this topic. The Introduction must include a minimum of 6 citations, properly referenced. A bibliography of the citations must be attached. For this paper, no internet references are allowed. Topic can be on any subject that might be found in our biogeography textbook

Draft (20 pts) – Due Nov. 8 - 1500 - 2000 words double spaced (not including bibliography) – Must include an Abstract (250 word maximum – this is part of your word count). Must have an Introduction, Discussion section with subheadings to keep sections organized, a Conclusion, and a bibliography with a minimum of 12 citations (none from the internet). Your discussion section must include at least 1 figure with a caption that includes data that you interpret in the discussion to support your argument. NO QUOTES that are not quotable “*Give me liberty or give me death!*”

Final (70 pts) – Due Dec. 8 - Same rules apply as for the draft. You MUST resubmit your edited draft along with your final paper so that I can see the changes/corrections you have made.

Grading: Form matters! (points off for poor grammar, typos, incorrect citation practices, missing citations in bibliography, wrong format in the bibliography, lack of a proper caption for a figure etc.)

Research Paper - Graduate students

Everything noted in the undergraduate research paper section applies to graduate students as well (although the point structure is different and your requirements are greater – see below). Graduate students can write either a research review paper on a topic of their choosing, an original research paper (not necessarily your thesis research but this might be acceptable), or a grant proposal. All topics must be approved by the instructor before you proceed. In your pre-proposal, you must specify a journal or granting agency you would submitting to and your final paper must be written in the style of that journal (or formatted following a specific RFP. You must submit the instruction to authors or RFP with your pre-proposal. In the event that you change your topic, you must resubmit a new pre-proposal and have it regarded.

Graduate student research papers should follow all instructions of the journal of choice in length and formatting of their paper excluding references, figures and tables. As a guide, your paper will probably be between 3500 and 4000 words, double spaced, not including references, tables and figures. You must include at a minimum one table with data, and 2 figures – one being a map of the potential study area/or area of interest, and the other of data. Grant proposals should respond to a specific request for proposals (RFP) and follow the formatting required by the funding agency.

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.

Readings for essays:

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 (Simpson’s essay on Mammals and Land Bridges is listed twice because I like it so much). I have listed those writings here. The 18th paper is the papers read for Darwin and Wallace at the Linnean Society meeting in 1858 that laid out the original concepts of natural selection.

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 Jan. 31, but if you choose Janzen’s paper (1.2c), it will be due on Feb. 7, 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 – Sept. 8

- 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

Pleasure reading “The Man who know Islands” an excerpt from “Song of the Dodo” David Quammen.

1.2. Dispersal, Barriers & Corridors - Due Sept. 15

- 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 Sept. 22

- 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 six papers listed)

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

2.1. Earth History, Continental Drift – Due Oct. 6

- 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. 13

- 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: 963-974

2.3. Invasion and Interchange – Due Oct. 20

- 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. 10

- 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. 17

- 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. Whitaker (1967). *Biological Reviews* 42: 207-264.

3.3. Diversity Gradients – Due Dec. 1

- 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.

	Schedule		
Date	Lecture	Text Reading	Writing due dates
Aug. 30	1) Wallace, Darwin & History	Ch. 1 & 2	
Sept. 1	2) Physical geography	Ch. 3	
6	3) Distributions of species	Ch. 4	
8	4) Communities & Biomes	Ch. 5	1.1
13	5) Dispersal and Immigration	Ch 6	
15	6) Barriers and Corridors		1.2
20	7) Speciation	Ch. 7	
22	8) Extinction		1.3
27	Test #1		
29	9) Plate tectonics	Ch. 8	
Oct. 4	10) Tectonic history		Preproposal
6	11) Glacial cycles	Ch. 9	2.1
11	12) Biogeographic response to glaciation		
13	13) Glaciation and the Great Basin		2.2
18	14) Fundamental geographic patterns	Ch. 10	
20	15) Invasion & Interchange		2.3
25	16) The Great American Interchange		
27	Test #2		
Nov. 1	17) Phylogenetic systematics (guest lecture)	Ch.11	
3	18) Cladistic biogeography (guest lecture)	Ch 12	
8	19) Species area relationships	Ch. 13	Draft Research Paper
10	20) Equilibrium theory of island biogeography		3.1
15	21) Insular communities	Ch. 14	
17	22) Evolutionary trends on islands		3.2
22	23) Working session - research papers		
24	Thanksgiving Holiday		
29	24) Diversity gradients	Ch. 15	
Dec. 1	25) Geography of Extinctions	Ch. 16	3.3
6	26) Global climate change		
8	27) Conservation biogeography	Ch. 17	Final Research Paper
13	28) Humans – domestication and agriculture		
15	Test #3 – Thursday Dec. 15th 12:30 – 2:30 PM		

