

Introduction to Biogeography

This course will present an **integrated** study of the past, present and likely *future* distribution of Earth's biological diversity. The distribution of flora and fauna through space and time and at multiple spatial scales will be discussed. We will be concerned with identifying how abiotic factors such as soils, climate and topography affect the geographic and spatial distribution of individuals, species, communities, ecosystems and biomes. Additionally, we will discuss how biotic and historical factors have influenced past and present distributions. We will also focus on how human modification of the Earth Atmosphere System (EAS) has impacted Earth's biota and what approaches are being taken to aid in understanding and conserving endangered and threatened species and biodiversity.

Time: Tues/Thurs. 10:30 — 12:18 pm (F06)

Location: Derby Hall (DB) 0150

Instructor: Dr. David Porinchu

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Office Hours: Tuesday, Thursday 1-2:30 p.m.

Course Format/Structure:

This will primarily be a lecture-based course. However, a significant component of the class will involve group discussions. These discussions will require active student involvement. Additionally, in-class assignments and lab exercises will provide students with hands-on experience. The lab exercise, i.e. *Paleoenvironmental Lab*, will cover topics and methods that supplement the lecture material. Students will be expected to complete a term paper focusing on a biogeographic topic to be determined in consultation with the instructor. Guidelines for writing term papers will be made available early in the quarter. Students will also make a short presentation on a biome of their choice. Students are strongly encouraged to attend all lectures and obtain notes for those lectures that they may have missed. A make-up exam is possible in the event of a documented emergency or through **prior** consent of the instructor.

Academic Conduct

All students at the Ohio State University are bound by the Code of Student Conduct (see <http://oaa.ohio-state.edu/coam/code.html>). Violations of the code in this class will be dealt with in accordance with the procedures detailed in that code. Specifically, any alleged cases of misconduct will be referred to the Committee on Academic Misconduct.

Disability Statement

Students with physical or learning disabilities requiring alternative accommodations for completing course requirements must make these arrangements in consultation with the University Office of Disability Services (150 Pomerene Hall, 2-3307) and the instructor at the beginning of the quarter.

Reading Materials:

The primary source of material for this course will be the following textbook:
MacDonald, G. M (2003). *Biogeography: Time, Space and Life*. Wiley, New York.
518 pp.

Additional readings will be assigned on a weekly basis. A list of these readings can be found below in the course lecture-reading outline.

Grading:

Mid-term exam	15%
Final Exam	20%
Term paper and presentation	30%
Lab exercise	15%
Biome presentation and write-up	10%
Participation	10%

Course Lecture-Reading Outline

Week 1

Introduction: review of hierarchies (taxonomic, ecologic and trophic), and physical geography basics (global climate, microclimate and soils). Additional topics include introduction to gradients of diversity and how many species exist.

Readings:

- Chapters 1 and 2 – MacDonald, 2003
- Diamond, J. D. 1987. Extant unless proven extinct? Or, Extinct unless proven extant? *Conservation Biology* 1: 77-79.
- May, R. M. 1988. How many species are there on Earth? *Science* 358: 278-279.

Week 2

Discussion of how abiotic factors such as light, temperature and moisture control the distribution of biota. Environmental gradients and the concept of species' niches will also be introduced. Additional topics include discussion of other physical factors and the interaction of abiotic factors on geographical distributions.

Readings:

- Chapter 3 – MacDonald, 2003
- Gaston, K. J., Blackburn, T. M. and Spicer, J. I. 1998. Rapoport's rule: time for an epitaph? *Trends in Ecology and Evolution* 13: 70-74.
- Jansen, D. H. 1967. Why mountain passes are higher in the tropics. *The American Naturalist* 101: 233-249.

Week 3

Discussion of how biotic factors such as predation, competition and symbiosis affect species interactions and community composition. The combined effects of biotic and abiotic factors on biodiversity will be discussed. Additional topics include discussion of ecosystems and biodiversity and biotic assemblages on a global scale.

Readings:

- Chapter 4 – MacDonald, 2003
- Roemer G. W., Donlan C. J. and Courchamp, F. 2002. Golden eagles, feral pigs, and insular carnivores: How exotic species turn native predators into prey. *Proceedings of the National Academy of Sciences* 99: 791-796.
- Savidge, J. A. 1987. Extinction of an island forest avifauna by an introduced snake. *Ecology* 68: 660-668.

Week 4

Presentation and student-led discussion of community formations and biomes.

Readings:

- Chapter 6 – MacDonald, 2003

Week 5

Discussion of major forms of disturbance, including fire, flooding and wind. Additional physical disturbances such as avalanches, volcanic eruptions and pathogens will also be reviewed.

Readings:

- Chapter 5 – MacDonald, 2003
- Swetnam, T. W. 1993. Fire history and climate-change in giant sequoia groves. *Science* 262: 885-889.
- Wootton, J. T. 1998. Effects of disturbance on species diversity: a multi-trophic perspective. *American Naturalist* 152:803-825.

Week 6

Discussion of life and the geologic timescale, plate tectonics and Quaternary climate change. Additional topics will include climatic relicts, early spread of mammals, the Cretaceous extinction event and the rise of flowering plants.

Readings:

- Chapter 7 – MacDonald, 2003
- Erwin, D. H. 2001. Lessons from the past: Biotic recoveries from mass extinctions. *Proceedings of the National Academy of Sciences* 98: 5399-5403.
- Steadman, D. W. and Martin, P. S. 2003. The late Quaternary extinction and future resurrection of birds on Pacific islands. *Earth-Science Reviews* 61: 133-147.

Week 7

Discussion of the processes of dispersal, colonization and invasion and the role of geography in evolutionary processes. Additional topics include Darwin's theory and Darwin's finches, controversies with evolutionary theory, evolution and human race(s) and Social Darwinism.

Readings:

- Chapters 8,9 – MacDonald, 2003
- Gould, S. J. and Eldredge, N. 1993. Punctuated equilibrium comes of age. *Nature* 366: 223-227.
- Grant, B. R. and Grant, P. R. 2003. What Darwin's finches can teach us about the evolutionary origin and regulation of biodiversity. *Bioscience* 53: 965-975.

Week 8

The role of humans as a factor in evolution and extinction. Specific reference will be made to: animal and plant domestication, the spread of agriculture and pre-historic and historic extinctions. Additional topics will include the role of humans in mega-faunal extinctions and the environmental impact of early human cultures.

Readings:

- Chapters 11,12 -- MacDonald, 2003
- Barnosky, A. D., Koch, P. L., Feranec, R. S., Wing, S. L. and Shabel, A. B. 2004. Assessing the causes of Late Pleistocene extinctions on the continents. *Science* 306: 70-75.
- Martin, P. S. 1973. The discovery of America. *Science* 179: 969-974.
- Pennisi, E. 2004. Ice ages may explain ancient bison's boom-bust history. *Science* 306: 1454.

Week 9

Discussion of the relationship between geography, biodiversity and conservation. Further discussion will focus on understanding how a geographical perspective can inform strategies for species conservation and biodiversity conservation. Additional topics include the Island Biogeography, the biogeographical consequences of global climate change, design of nature reserves, habitat restoration and conservation and biodiversity hotspots.

Readings:

- Chapter 14,15 – MacDonald, 2003
- Diamond, J. M. 1975. The island dilemma: Lessons of modern biogeographic studies for the design of natural reserves. *Biological Conservation* 7: 129-146.
- Meadows, M. 2001. Biogeography: does theory meet practice? *Progress in Physical Geography* 25: 134-142.
- Myers, N. 2003. Biodiversity hot spots revisited. *Bioscience* 53: 916-917.
- Soule, M. E. 1985. What is conservation biology? *Bioscience* 35: 727-734.

Week 10

Students will present their term paper topics and lead discussion.