

# Fall 2020

## GEOG 323: Biogeography

Instructor: Dr. Kendra Chritz  
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Office Hours: By appointment

Lecture time: 10:15am – 11:45am MW

GTFs:  
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Office hours: TBD

Weekly lab sections:  
M 2 – 3 pm, Saban  
M 3:30 – 4:30pm, Saban  
T 8 – 9 am, Kozlowski  
T 9:30 – 10:30am, Kozlowski

**Course overview:** Why are National Parks and reserves located where they are? Why are there more species of animals in the tropics than at the poles? Are we living in the sixth mass extinction event in Earth's history? Why are there elephants in Africa and Asia, but not in Europe or North America? These are all questions that can be answered with Biogeography. Biogeography is the study of the spatial patterns of biological diversity and its causes, from the beginning of life until now. Biogeographers synthesize information from many fields, including ecology, evolution, geology, paleontology, and climatology. This course will provide the ecological, environmental and historical foundations for the distribution and abundance of species and how they have changed through time. We will also explore the relevance of biogeography during a time of increasing human impact and climate change.

The course will roughly follow the material presented in the textbook, *Biogeography: An Ecological and Evolutionary Approach* (9<sup>th</sup> Ed.). We will begin with a history of the field of Biogeography and how evolutionary thinking is intimately tied to the field. We will then discuss important concepts, including evolutionary mechanisms, earth history, and plate tectonics, as well as concepts of the ecological niche and patterns of distribution at various taxonomic levels. We will also study ecological concepts, how species are patterned and disperse on the landscape, and how these patterns have changed over recent time (e.g, the Quaternary). In the second part of the course, we delve into historical biogeography and study why continents and islands have

unique assemblages of species, and the effects of megaextinctions, and biotic interchanges between continents. We will also return to ecological concepts in a detailed examination of the equilibrium theory of island biogeography. We will end with looking at modern biodiversity and ecological crises, and how biogeographical knowledge can inform critical modern environmental issues, such as species collapse, conservation, human-wildlife interactions and climate change.

Prerequisite: GEOG 141 or GEOL 103 or GEOL 203 or BI 370.

### **Course objectives:**

- To develop an appreciation for the historical and ecological factors that influence the patterns of life on earth.
- To survey the scientific revolutions of evolution, plate tectonics, and molecular ecology that shaped the path to modern biogeography.
- Using the lab assignments, to understand the scientific method and how to test hypotheses using inferential statistics.
- To understand the processes that affect how biotas respond to a changing climate, and the challenges we face today and in years to come.

### **Course format**

Given the unique nature of remote learning, the course format has been modified to allow for maximum flexibility and as much one-on-one interaction as you would like. Lectures will be prerecorded with Panopto and posted to Canvas during class time. During class time, I will be available in my personal Zoom meeting room, wherein you can drop in and ask me questions. Please make it a habit to watch the lecture during class time, it will ensure that you don't fall behind in the material and can ask me questions about the lecture as they arise.

Labs will be administered via live instruction through Zoom.

### **Course grading:**

The final grade scale is as follows: A+: >98; A: 92-98; A-: 90-92; B+: 88-90; B: 82-88; B-: 80-82; C+: 78-80; C: 72-78; C-: 70-72%; D+: 68-70; D: 62-68; D-: 60-62; F: <60. I may occasionally offer extra credit, but there are no guarantees. Grades will be updated on Canvas, which is also where course announcements will be posted. You may make an appointment with me at any time to discuss your grade(s) and progress in class.

I do not round up grades at the end of term without justification. It is unfair to your peers. Don't ask me to do this. However, if there is an assignment or exam question you would like me or your GEs to reassess, we will happily do so.

### **Exams**

There will be two exams, each covering about 1/2 of the course and each worth 20% of your total grade. These exams will be administered through Canvas and are open book/open note. Be warned, though: these exams will involve more than just rote memorization, including critical

thinking, short essays and working through problems you may not have seen in lecture. You should study just as much for these exams as you would otherwise.

The exams will be available to take anytime over a 24 hour period on the exam day. You will have 1 hour 20 minutes to complete the exam once you start the clock. **You can't stop the exam and return to it later – the clock starts when you begin the test. You cannot work on the exams in groups. Evidence of group work will result in a 0 score.**

Lab Reports: There will be five lab reports for a total of 50% of your grade. Weighting of the grades will increase with expectations and complexity of the lab:

- Lab 1: Trees, adaptations across the continents: 5%
- Lab 2: Virtual Megatransect: 10%
- Lab 3: Forests and fires 15%
- Lab 4: Island biogeography: 15%
- Lab 5: Invasive species: 5%. Lab 5 will be graded as credit/no credit: ALL questions must be answered to get credit!

### Contacting me

I am available via email or for Zoom meetings outside of the course time. You are welcome to email me questions up until 12am the night before an exam. If you are located in Eugene, we can meet in person in a socially-distanced fashion.

**Academic Integrity:** All students are expected to complete assignments in a manner consistent with academic integrity. Students must produce their own work and properly acknowledge and document all sources (ideas, quotations, paraphrases). Students can find more complete information about the University of Oregon's Policy on Academic Dishonesty in the University of Oregon Student Handbook or <http://integrity.uoregon.edu/>. If you find yourself in trouble, or if you are aware of academic dishonesty occurring, please talk to one of the instructors.

### Accessible Education

It is important to me that everyone has equal opportunity to excel in this course. If you need any specific accommodations in order to participate fully, please inform me of your particular needs, along with documentation from the Accessible Education Center. If accommodations need to be made for exams or lectures, you must inform me at least 1 week prior to the scheduled exam or lab period, after establishing accommodations with an AEC advisor. Please see the Accessible Education Center ([www.aec.uoregon.edu](http://www.aec.uoregon.edu)) for specific guidelines.

Because this term will be online only, the AEC testing center will not be operational and the office will operate remotely. If you are registered with AEC, they will inform me of your needs for test taking and I will adjust how long the test is available to you via Canvas.

### Course Schedule

Week	Date	Topic	Readings
1	Sept. 30	Introduction, syllabus and history of biogeography	Chapter 1

2	Lab 1	<i>Trees: adaptations across the continents</i>	Zoom lecture, set up
	Oct 5	Evolution and plate tectonics	Chapters 5, 6
	Oct 7	Introduction to dispersal	Chapter 2
3	Lab 2	<i>The Virtual MegaTransect</i> <b>Tree lab due by Friday Oct. 16 at 11:59pm</b>	Zoom lecture, set up
	Oct 12	The ecological niche, distributions of species	Chapter 2
	Oct 14	Ecoregions and biomes	Chapter 3
4	Lab 2	<i>The Virtual MegaTransect</i> <b>MegaTransect lab due Friday Oct. 23 at 11:59pm.</b>	Analysis and write up
	Oct 19	Dispersal syndromes, barriers and limits to distributions	Chapter 8
	Oct 21	Patterns of biodiversity: local gradients to global biodiversity hotspots.	Chapter 4
5	Lab 3	<i>Forests and Fires</i>	Zoom lecture, set up
	Oct 26	Midterm exam, will cover weeks 1-4	
	Oct 28	Ice Ages and paleoclimate	Chapter 12
6	Lab 3	<i>Forests and fire</i> <b>Fire lab due Friday, November 6 at 11:59pm</b>	Analysis and write up
	Nov 2	Vicariance biogeography, mammals and paleontology	Chapter 10
	Nov 4	No class – Election Day	
7	Lab 4	<i>Island biogeography</i>	Zoom lecture, set up
	Nov 9	The Theory of Island Biogeography	Chapter 7, Whittaker et al. 2017
	Nov 11	Phylogenetics, vicariance biogeography and <i>Nothofagus</i>	Chapter 8
8	Lab 4	<i>Island biogeography – data analysis</i> <b>Island Biogeography lab due Friday, November 20 at 11:59pm</b>	Analysis and write up
	Nov 16	Case studies in historical biogeography	TBD
	Nov 18	The Great American Interchange and Amazonian biodiversity	McCarthy Ch. 5
9		<i>No labs this week – Happy Thanksgiving!</i>	
	Nov 23	Pleistocene megafaunal extinctions	Chapter 13
	Nov 25	The Anthropocene and the Great Acceleration	TBD
10	Lab 5	<i>Invasive species in-class reports</i>	
	Nov 30	Conservation Biogeography	Chapter 14
	Dec 2	Final review and recap	
	Dec 8	Final exam – covering weeks 5-10	

### **Laboratories:**

The five laboratory topics roughly correspond with current lecture topics. Most labs involve two meetings and involve the collection and interpretation of data. In order to complete the labs, you will need to download Google Earth Pro and iNaturalist for smartphone (you can also use a web version if you don't have a smartphone). ***Please only contact the GE of your section for questions or concerns about the labs.***

The tree adaptations lab involves going out into wherever you live and using iNaturalist to observe and identify trees in your natural environment. You are to create inventive hypotheses regarding the adaptive role of differences in related species. If you are unable to go outside due to covid restrictions, natural disasters or you do not have access to a smartphone or digital camera, you can complete the assignment by looking at trees other people have catalogued in your area using iNaturalist.

The virtual mega-transect lab meets during only one week and involves more independent work. This involves comparing vegetation structure with climate variables across continental transects (using online resources).

The fire lab will use the Global Forest Watch project ([www.globalforestwatch.org](http://www.globalforestwatch.org)) and other online tools to study the biogeography of fire and forest change around the world.

The island biogeography lab uses a simulation of the processes that lead to species richness on an island.

The invasive species lab will consist of a film. Meeting on week 10 involves short presentations of a particular invasive species. The assignment will involve extra reading and thinking about invasive species.

Each lab will culminate in a lab report in which you are to answer specific questions. While it is helpful to discuss the labs amongst each other, and many labs are performed in groups, ***the lab reports are to be completed individually.*** Note the due dates for lab reports on the syllabus: lab reports are due at the lab meeting time. For each day late, grades will decrease by 5% of the total possible lab grade.

Read the lab before each lab meeting.

### **Final remarks**

I have designed this course to be as flexible as possible, knowing that many of you are learning from home and may have a difficult time balancing this course with your other obligations, finding fast and secure wifi, challenging schedules, etc. Even though the format of the course is different, the material of the course is the same as was delivered in person (except for one lab assignment).

This is an unusual time, and switching to remote learning is challenging for everyone – you, me, your GTFs, the administration and all of the supporting departments of the university. Some things might change on short notice, and there will certainly be bumps along the way. Both me

and your GTFs will do our best to be communicative with you about any potential changes and issues as soon as they arise. We also understand that during this time, there is a heightened chance of you, your friends or your family members becoming sick. If you or someone close to you becomes sick and you are struggling to participate fully in the course, please notify us as soon as possible. We will work with you to get you through the term successfully.