

**GEOB 307**  
**BIOGEOGRAPHY AND GLOBAL CHANGE**  
**Winter Term 2 (Jan-Apr), 2020-21**

**Instructor:** Dr. Nina Hewitt

Student hours: Thursday 11am -12 pm (see Canvas for link to join)

**Teaching Assistant:** Lara Grevstad

TA Student hours: During your lab section most weeks and Friday 9-11 am

**COURSE DESCRIPTION:** Biogeography is the study of the distribution of plants and animals on the earth's surface, and the historical, ecological, and human factors responsible. Generally, it is concerned with fundamental processes of evolution, extinction, and dispersal. It asks such questions as: Why are placental mammals dominant in Eurasia and North America while marsupials dominate Australia? Why do Australia and Africa share the same plant families? Why are there so many insect, microbe, and plant species in the tropics and why do their numbers decrease towards the poles? What allows a plant species to live where it does, and what prevents its colonization elsewhere? How are plant and animal distributions today different from in the past, and what implications does this have for their abilities to respond to global changes? Why have islands sustained so many extinctions relative to mainlands and what are the implications for mainland species conservation? This course explores these and similar questions. The goal is to introduce the field of biogeography, understand biodiversity patterns and processes across earth, and how this knowledge can help maintain biological systems in human-dominated, 21st century landscapes. We will explore biogeographic themes through lecture, readings from texts and pivotal scholarly articles, classroom discussion and lab/research assignments.

**LEARNING OBJECTIVES**

- ✓ Explain patterns of species distributions in terms of physical, ecological and historical controls
- ✓ Understand the role of processes that operate at geological and evolutionary time scales (e.g., plate tectonic effects, speciation, extinction) in shaping biogeographic distributions
- ✓ Analyze regional human impacts on species and landscapes from the Pleistocene to present. In particular:
  - Understand responses of ecosystems to environmental change at global to local scales
  - Understand conservation issues such as endangered species, habitats and biodiversity loss
- ✓ Test Hypotheses about biogeographical question (e.g., testing predictions of effects of ecosystem fragmentation on species populations; testing effects of reserve size on species richness)
- ✓ Work with biogeographic data, its graphical representation, interpretation and analysis
- ✓ Improve skills for effective scientific report writing and critical analysis of scholarly literature

**PANDEMIC CHANGES**

Given the COVID-19 pandemic state, the University of British Columbia has directed all UBC programs to postpone or redesign courses to be delivered online. As a result, this course has been redesigned to be delivered online. Participation as measured by feedback on synchronous and asynchronous class activities/responses will count for a greater percentage, while test components have been reduced (see grade scheme, below).

*Statement from the University:* During this pandemic, the shift to online learning has greatly altered teaching and studying at UBC, including changes to health and safety considerations. Keep in mind that some UBC courses might cover topics that are censored or considered illegal by non-Canadian

governments. This may include, but is not limited to, human rights, representative government, defamation, obscenity, gender or sexuality, and historical or current geopolitical controversies. If you are a student living abroad, you will be subject to the laws of your local jurisdiction, and your local authorities might limit your access to course material or take punitive action against you. UBC is strongly committed to academic freedom, but has no control over foreign authorities (please visit <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,33,86,0> for an articulation of the values of the University conveyed in the Senate Statement on Academic Freedom). Thus, we recognize that students will have legitimate reason to exercise caution in studying certain subjects. If you have concerns regarding your personal situation, consider postponing taking a course with manifest risks, until you are back on campus or reach out to your academic advisor to find substitute courses. For further information and support, please visit: <http://academic.ubc.ca/support-resources/freedom-expression>

**Class Time:**

Asynchronous:

**Tuesday 9:30-10:50 am Pacific Time (PT):** Material posted in Canvas. See “Week \_ Resources”

- Note that for the first class, Tuesday, Jan 12, we will meet in person for a course Introduction (in Zoom); The Thursday of the first week will be asynchronous (a pre-recorded lesson or two).

Synchronous:

**Thursday 9:30-10:50 am PT**

While there is some flexibility in this online course, students in the Pacific and those that are similar (across North and South America, other zones within a few hours of us), should make themselves available to meet virtually at this time. For students in time zones that are quite different especially those to the West of Vancouver, the session will be recorded and available over a 24 hour period following video processing and uploading. They may obtain attendance/participation points by submitting reflection/responses to these sessions. Please email the instructor if you are in a distant time zone and will want to use this option by the second week of classes and be prepared to schedule a time when you can listen to the recorded zoom and take notes over the subsequent day (Friday). More details will be provided during week 1.

Meetings will be via Zoom. Links to the Zoom meetings can be accessed in the left sidebar in Canvas (click and then look for the appropriate meeting day/time in the Zoom page).

**Lectures:** As stated above, Tuesday lectures will be recorded (and asynchronous), Thursday class will be held synchronously (9:30 - 10:50 AM, Pacific Time), and recorded for those who cannot attend.

**Labs:** Labs will happen synchronously most weeks (see Canvas, “Weekly Resources” pages to determine which). There will be day and evening times available. Choose one that fits your time zone and schedule.

**LEARNING MATERIALS**

**Required Course text:**

Biogeography (Fifth Edition) (2017) by M.V. Lomolino, B.R. Riddle, and R.J. Whittaker.

We recommend the eBook option, which is available through the UBC Bookstore under the course materials listing. Students may, alternatively, purchase eBook copies on the RedShelf eBook platform by

visiting the following link: <https://www.redshelf.com/book/673344/biogeography-673344-9781605356662-mark-vlomolino-brett-r-riddle-robert-j-whittaker>

Students may also use the 4th Edition of Biogeography (2010) if they have access to a copy. However, the lectures will follow the 5th Edition.

**Supplemental readings** will consist of a series of book chapters and journal articles will be indicated on the course website on Canvas and are available via the UBC library. A schedule of weekly readings will be provided in Canvas

Readings should either be done prior to or immediately following the class for which they are scheduled. Reading material is designed to challenge your knowledge and assumptions, as well as to inform you. You are expected to struggle through difficult aspects of the readings, although you are not expected to come to class an expert on those topics. Class meetings are there to assist you with difficult aspects of readings and address your questions. In many cases, the text-book readings and select excerpts from the popular science literature should be interesting and accessible. Articles from academic journals will enhance your academic experience and mastery of the subject matter.

**Course Website:** All other course materials (slides, recordings, assignments and tests/quizzes) will be available on Canvas. Students are responsible for checking the website regularly to participate fully in the course and for course updates. The website will include copies of the course syllabus, lecture slides and information related to lectures, lab assignments, and required readings. NOTE: The posted materials do not represent a complete set of class notes - the slides are meant to facilitate in-class activities, discussions and learning.

#### **GETTING HELP WITH THE COURSE:**

If you have questions pertaining to lecture material we encourage you to bring your questions to your TA during your lab section or to Student Hours with the professor. You may also post questions on the relevant discussion board in Canvas and a TA or professor will respond.

Questions about missed assignments, missed exams, requests to write an examination at Access & Diversity, may be directed to the TA or professor via email. We will check the course email regularly during business hours. Remember that email is a formal and public method of communication. Do not write anything that you do not want on the permanent, public record.

#### **COURSE STRUCTURE & EVALUATION**

**Lessons, recordings and participation:** Lecture recordings and slide sets may be accessed via the weekly Resource Pages – the pages entitled “Week \_ Resources Pages” located at the top of each weekly module in Canvas – by the class time for which they are scheduled. on the weekly module for the course website in Canvas after each class. Note that these are simple outlines and do not substitute for doing readings, listening to lectures (recorded or synchronously) and good note-taking. Students who are more engaged in course material tend to achieve higher grades, and they tend to understand and enjoy of the material more. Test material comes directly from lecture and exercises provided in class.

During synchronous Thursdays and some of the lab sessions, the TA and I will factor participation in labs and synchronous activities (or participation exercises for those unable to attend that day), and this will be factored into your grades at the end of the semester. Note that students are responsible to keep

pace with course materials and announcements. During synchronous lessons, I welcome participation in class whenever students wish additional information on course concepts. Some of your grade will consist of quality and completion of in-class group activities below:

**In Class/Lab Group Activities:**

These in-class/lab activities will run throughout, will occur in pairs or groups, and take place during 2 of the lab sessions and 2 of the synchronous Thursday lessons. They will include all or some of:

- Biogeography of North American Oak Distributions (during one of the lab sessions, to help get students prepared for their species distribution reports):
- Virtual Field Trips (during one of the lab sessions): Students will explore a couple of sites representing subalpine and alpine ecosystems of Southern BC, and Needleleaf Rainforests of Coastal BC. A set of activities will be designed to explore and analyze the information presented and a short report will be completed in pairs
- Island Biogeography in a Conservation framework (during a synchronous Thursday): Details TBD
- Invasive Zebra Mussels (during asynchronous Thursday): Details TBD

**Labs and Lab Assignments:** Your lab section is an opportunity to interact regularly with a smaller group of students, and we will work to foster developing a learning community in these sessions. Labs are intentionally scattered throughout the day to make attendance possible from (we hope) anywhere in the world.

To further your understanding of earth's systems, you will complete **2 main written lab** assignments and additional mini-lab activities. The scheduled laboratory times are opportunities for the students to meet with teaching assistants to get assistance. We strongly recommend you attend each week. Your TA will provide you with full instructions on how to complete each lab, facilitate working in small groups to go through the lab, and answer questions that arise. Please **use the lab session to ask any questions** you may have.

The Research/lab reports will be based on work completed during labs. Students will produce individual reports for the first assignment. The second main assignments will be conducted in pairs or groups. A presentation of the results of the second assignment will be made to the lab section. Reports will be submitted through the Canvas site. The lab assignments will include:

1. Controls on North American Oak Species' Distributions (5%). See Canvas

2. Species Distribution Report (15%)

The distribution and range of a species can be considered one of the fundamental units in biogeography. How it is manifested in space and the connection to biogeographic influences is important in understanding the dynamics of the populations of the species, how they are responding to environmental changes and where the important changes are occurring. In this assignment, students will explore a species, its distribution, and how it relates to aspects of the species' environment. Information on geographic range represented on different biodiversity resource sites will be obtained, and attempt to explain why differences may occur. A list of potential species and sites will be provided, but students may suggest their own taxa. Each student will submit a report based on their chosen species. Details will be provided in the first lab periods. Due Friday, Feb 26.

3. Virtual Field trips: (4%): BC Alpine and West Coast ecosystems; Details TBA

4. Ecosystem Responses to Climate Change Group Report (9%: report; 4%; presentation; 13% total) Students will be introduced to different approaches used to measure and assess vegetation and soil responses to climate change. Data from a study examining responses of Arctic tundra ecosystems to climate change will be the basis for the exercise. Students will learn methods to analyze and interpret the data, and will prepare a formal scientific research report of their findings (maximum 10 pages, including figures and tables). Presentations of the results will be given in the lab class to promote discussion of the results, which will contribute to the final reports. Details will be provided in the lab periods. Due on Tuesday, April 13.

**Weekly Quizzes in Canvas:** A set of questions based on lectures each week will be available on (most) Fridays on Canvas for a limited period (Friday to Monday). These are designed to test your knowledge and help you to review and stay engaged with the material presented. There will be a total of 7-8 quizzes occurring between Weeks 2 and Week 13, due on Fridays just before midnight (11.59 pm) Pacific Time. Quiz Grading: Your lowest quiz score will be dropped (best 7 of 8).

**Note:** should you choose to wait until after 5 pm Pacific Time on the due date to complete a quiz, you agree to accept the consequences of any technical issues you encounter with the quiz platform. We are only able to respond to messages received prior to 5 pm. Note also: There are **no makeups** – If you neglect to complete a quiz by the due date, you will forfeit that quiz. If this happens just once, all of the remaining (7) completed quizzes will count toward your quiz grade.

**Exam:** In addition to the 7-8 weekly quizzes, **There will be a final exam during the April exam period (TBA).** The exam is designed to assess your mastery of the learning objectives. The exam will cover the material from the lectures, textbook and other readings, and lab exercises and will include short answer, diagram interpretations, and essay questions. The final exam will be cumulative ONLY insofar as the topics discussed in the second half of the course are integrally linked to the topics introduced in the first part of the course, but will focus on material in the last 2/3 of term. The final exam will be available on Canvas for 24 hours, however, you will have a limited amount of time (about 120 minutes) to complete the exam once you start it. Additional details of the exam, including format, study topics and tips, will be provided on Canvas within 1 week of the exam. The exam will take place during the normal exam period.

### Evaluation

Lab Assignments (2 reports + 2 mini group assignments)	37%
Participation and engagement with synchronous lessons and group activities	10%
Weekly quizzes in Canvas (Best 6 of 7)	18%
Exam on lecture material during the April exam period (focused on Weeks 4-12)	35%
<b>TOTAL</b>	<b>100%</b>

### COURSE POLICIES

**Learning online (aka Netiquette):** Regarding mutual respect in an online community: We ask you to be respectful and professional - don't write anything you wouldn't say in class. All writing on online forums/discussions, in-class chat sessions, and emails must reflect mutual respect among users. These are public methods of communication. Do not post anything you do not want to be made public. As with all academic writing, these should have correct spelling, grammar, and style. Online participation and

active engagement in discussions and break out groups are essential parts of an online learning community. We encourage you to turn on webcams if you feel safe and comfortable doing so. If not please consider adding a profile picture. More on Netiquette can be found [here](#).

**Policies on missed assignments and exams:**

Due dates for the assignments, quizzes, weekly/bi-weekly activities, and exams are fixed. **Late quizzes and activities will not be accepted**, so plan ahead to submit yours on time. Assignments will be deducted 10% per day. Extensions will not be granted, except for medical or compassionate reasons. If you anticipate needing an extension on an assignment, please email us. Furthermore, if you missed an assignment for the first time and the course is still in-progress, speak with the instructor immediately to find a solution for your missed coursework. If this is not the first time you have requested concession or classes are over, fill out Arts Academic Advising's [online academic concession](#) form immediately, so that an advisor can evaluate your concession case. If you are a student in a different Faculty, please consult [your Faculty's webpage on academic concession](#), and then contact your instructor if appropriate.

The final exam is scheduled by UBC. Students who miss the Final Exam will need to obtain an academic deferral from their faculty to sit an alternate exam.

**Academic honesty:** Plagiarism and cheating may be punished by failure of the assignment, exam or course. Examples of plagiarism, defined as using someone else's work as your own, and cheating include but are not limited to:

- using the same words, phrases, or ideas from a source without citations
- copying and pasting material from the internet, class slides, or textbook (key words, sentence fragments, or paragraphs) on an assignment or exam
- submitting the same answers as another student on an assignment, even if you worked together. You cannot work with other students on exams.

All submitted work *must* be in your own words. If you have questions about what qualifies as plagiarism or cheating, ask the professor or TA's. "I didn't know it was plagiarism" is not a valid excuse. For more on this, see the Syllabus and Course Information module on Canvas.

Please make sure to watch this [video](#) on Academic Integrity. More information on academic honesty is also available through that link.

**Engagement in synchronous and asynchronous lectures**

It is important that you watch asynchronous lectures as they are assigned and attend synchronous meetings. Since we don't meet in person during class time it may be tempting to procrastinate watching lectures, but unwatched lectures will pile up quickly and will make it difficult to take weekly quizzes, participate in activities, and complete assignments. It has been demonstrated that students who attend classes not only achieve better grades, but have a better understanding and enjoy course content better. To succeed, you will need to actively engage, take good notes, keep up with lectures and text readings, and reach out to the teaching team if you need help.

**Policy for students representing UBC, BC or Canada** (at academic or sports events): We fully support students involved with official organizations and teams that travel during the term; however, with this privilege comes additional responsibility. You are responsible for providing formal documentation identifying the organization you represent and potential schedule conflicts with this course. In the event that you are travelling and unable to attend an exam, you must schedule a secondary exam before you depart.

**Personal Pronouns:** Canvas now allows users to display their personal pronouns (e.g., she, he, they) next to their name throughout the platform. Displaying your pronouns can help make sure instructors and students use the right pronouns when referring to you. You can also look for that information about other people to ensure you use the right words for other people, which helps create an inclusive and welcoming climate online. To choose a set of pronouns to display, go to Account then Settings and then to Edit Settings. Canvas currently limits users to one set of pronouns. For technical questions, please fill out a ticket at <https://web.it.ubc.ca/forms/isf/>. For broader questions about pronouns, check out the [Gender Diversity FAQ](#) from the Equity & Inclusion Office or contact [trans.inclusion@equity.ubc.ca](mailto:trans.inclusion@equity.ubc.ca)

**University Policies:** UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available on the [UBC Senate website](#).

**Statement from UBC for students taking this course abroad:** During this pandemic, the shift to online learning has greatly altered teaching and studying at UBC, including changes to health and safety considerations. Keep in mind that some UBC courses might cover topics that are censored or considered illegal by non-Canadian governments. This may include, but is not limited to, human rights, representative government, defamation, obscenity, gender or sexuality, and historical or current geopolitical controversies. If you are a student living abroad, you will be subject to the laws of your local jurisdiction, and your local authorities might limit your access to course material or take punitive action against you. UBC is strongly committed to academic freedom, but has no control over foreign authorities (please visit <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,33,86,0> for an articulation of the values of the University conveyed in the Senate Statement on Academic Freedom). Thus, we recognize that students will have legitimate reason to exercise caution in studying certain subjects. If you have concerns regarding your personal situation, consider postponing taking a course with manifest risks, until you are back on campus or reach out to your academic advisor to find substitute courses. For further information and support, please visit: <http://academic.ubc.ca/support-resources/freedom-expression>

**Tentative Schedule of Lectures, Labs and Readings** (see Canvas for updates)

The schedule below is a suggested one, which I reserve the right to alter as the course proceeds. Changes will be announced and posted in Canvas. It is the student's responsibility to check the website regularly and remain informed of changes.

DATES	LECTURE TOPICS	READINGS	LAB
Week 1: Jan 11-15	<b>Introductory Concepts:</b> Introduction to the course; Review of concepts	Chap 1, 2	No Lab
W2: Jan 18-22	<b>A. Geographic and Ecological Foundations:</b> Biogeographic patterns and species distributions; Species ranges and dynamics	Chap 3, 4  14 pp, 523-38; (skim Chap 5 – Terrestrial biome descriptions)	In-Lab Activity: <b>Lab 1: Biogeography of NA Oaks</b>
W3: Jan 25-29	<b>B. Earth History and Biogeographic Processes:</b> Dispersal and Colonization; Evolution and Speciation - Oceanic Islands Focus	Chap 6, Chap 7, pp, 179-207; Chap 13, pp. 481-519	Introduction to <b>Lab 2: Species Distribution Report</b> (Submit group activity from week 2)
W4: Feb 1-5	Paleoecology: Geologic Time and Changing Continents - Focus: Great American Biotic Interchange	Chap 8  Chap 10	SD Report consulting with TA. Bring your species, sources and questions to lab
W5: Feb 8-12	- Development of Flora and Fauna into the Present - Biogeographic Divisions and Lineages	Chap 11	No Lab: Work on SD Report
Feb 15-19	<b>Study Week</b>	---	---
W6: Feb 22-26	Quaternary and Holocene Environmental Change; <b>Humans as a force of Evolution:</b> Domestication	Chap 9 pp. 271-304)  Chap 15, pp. 589-604	<b>Lab 3: Virtual Field Trips</b> Details TBA SD Reports Due
W7: Mar 1-5	<b>Humans as a Force of Extinction:</b> Pleistocene Megafauna Extinctions; Modern Extinction	Chap 9 pp. 305-10 Chap 7, pp 208-14	Introduction to <b>Lab 4a: Climate Change Report:</b> Intro to Data on warming experiments

W8: Mar 8-12	<b>C. Biogeography, Diversity and Conservation:</b> Geography of Biodiversity	Chap 14, pp. 556-85; Articles: Karieva; Myers et al.	Climate Change Report: <b>Lab 4b: Data analysis</b>
W9: Mar 15-19	Species-Area relationship; Island Biogeography Theory	Chap 13 pp. 444-80	CC Report: Help on data analysis and report writing
W10: Mar 22-26	Island Biogeography and Conservation	Chap 15 pp. 605-33	No Lab – work on presentation
W11: Mar 29-Apr 2	<b>D. Biogeography in the Anthropocene</b> Climate Change and Ecosystem processes	Scholarly article TBA	Presentations on CC Reports
W12: Apr 5-9	Global Change, Non-Analog Ecosystems and Related Policy Dilemmas	Scholarly article TBA	No lab – work on CC Report
W13: Apr 13	Wrap up; Review		CC Report due