



Department of Geography & Geoinformation Science

## Biogeography: Space, Time, and Life

**GGs 321-001 | Syllabus - Spring 2023**

*Class Meetings: T- 10:30 am – 1:15 pm | Exploratory Hall 2310*

*Course Credit hours: 3.00*

Contact Details for Instructor	
Name	: Maction Komwa, PhD
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Office hours	: M: 10:30 am – 11:30 am   T- 2:00 pm - 3:00 pm

### Course Description:

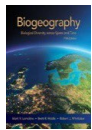
A survey of the relationship between distribution of plants and animals on the earth surface and the physical geography and environmental characteristics.

Recommended Prerequisite: GGS 122 or permission of instructor.

### Course overview

The science of biogeography is one of the most interdisciplinary endeavors as it links the disciplines of ecology, biology, and geography. The core principles of biogeography are to (i) document the distribution of plants, animals, and microbes on the surface of the Earth and (ii) understand the processes that contribute to the variable patterns in distribution of biota. The former principle is a re-visitation of the tools and methodologies employed by naturalists and the subsequent products that they produce. The second principle, the more mechanistic initiative, is the one that is interdisciplinary as the distribution of each biome, community, species and population reflects a unique combination of factors based on biology (e.g., inherent growth and physiology), geography (e.g., role of disparate landscape types in controlling dispersal and migration), and ecology (e.g., interactions among competing species). An added incentive to understand biogeography is the resurgence in a host of applied issues that require biogeographical skills and knowledge, including climate change, conservation of species, invasive species, evolution, biodiversity, and land use planning.

### Required Textbooks:



Lomolino M.V., B.R. Riddle, R.J. Whittaker, and J.H. Brown. 2016.  
Biogeography: Biological diversity across space and time, 5th edition.  
Published by Sinauer Associates is an imprint of Oxford University Press  
ISBN 10: [0878934944](#) ISBN 13: [9780878934942](#)

### Recommended Textbook:

David Quammen. The Song of the Dodo: Island Biogeography in an Age of Extinction. Scribner, 1997

### Learning Outcomes

By the end of the course, you will be able to:

- Understand the science of Biogeography
- develop a broad understanding of how physical geography and the environment influence distribution of plants and animals on the earth's surface.
- understand the linkages between patterns and processes across a range of spatial and temporal scales.
- provide critical understanding of key concepts related to ecological and historical biogeography.

- Identify important events in the earth's geological history and their impact on biodiversity today.
- apply geospatial techniques to investigate spatial patterns of species, biomes, and ecosystems.
- Using the lab assignments, students will demonstrate an understanding of the methods of scientific inquiry.

### Course Communication Policy

- Students are required to regularly check their George Mason email/Blackboard for announcements or updates related to the course.
- All students are expected to use their George Mason email account for all course communication. I will not acknowledge any email that is sent through other platforms.
- You should feel free to send me email if you have any questions regarding something that you do not understand. Although I will not instantly answer your e-mail, I will reply to your e-mail within 24-48 hours and if you don't get my response please feel free to remind me or ask to confirm if I have received your email.
- Please do not wait until the day of the work is due to ask questions.

### Course Assignments and Grading Breakdown

Students are expected to submit high quality assignments during this course via the Blackboard. All assignments are to be completed according the dates outlined in the syllabus.

Course Assignment Requirements Description	Percentage (%)
Discussion Forum	5%
Practice Online Quizzes	5%
Class Discussion Leaders	2%
Biogeography Lab	25%
Exam 1	15%
Exam 2	20%
Group Poster Project Draft	3%
Group Poster Project	25%

Grades will be assigned based on the distribution scheme below

Range	Letter Grade	Grade description	Range	Letter Grade	Grade description
93 - 100	A	Excellent	77 - 79	C+	Above satisfactory
90 - 92	A-	Very Good	70 - 76	C	Unsatisfactory
87 - 89	B+	Good with merit	60 - 69	D	Unsatisfactory
83 - 86	B	Good	<60	F	Failure
80 - 82	B-	Above satisfactory			<i>There is No C- grade</i>

### Description of Assignments

#### 1. Discussion Forums [5%]

Class discussion is an important part of any college experience. You will have a structured opportunity to interact with each other through guided questions related to class topics. This will consist of your posting followed by comments or response, questions on your classmate's posting. Your contribution will be rated according to the scientific content, critical thinking and concept application based on the rubric posted through the Blackboard.

#### 2. Biogeography Lab [25%]

You will be introduced to a number of concepts aligned to Biogeography. Examples include the Theory of Island Biogeography, spatial scale, size and distance and its impact on biogeographic processes, species distribution etc. Additional activities will include simulation colonization and extinction on Islands, Campus Outdoor Education/Field Trips, other Virtual Field Trips and Google Earth Tours to observe natural world and explore ecological processes and the human impacts on ecosystems transformation, just to mention a few. We will also be introduced to geospatial technologies using ArcGIS Pro.

Through these activities, you will be able to investigate the range and distribution of a species at varying scales to determine why a species is found in location x not y; perform a graphical analysis of species richness; explore endangered species; examine tree distribution for a specific location e.g North America, etc.

Detailed instructions regarding these Biogeography Labs will be posted through the Blackboard. In addition to using ArcMap, you will familiarize yourself with an open source Maxent program for maximum entropy modelling of species' geographic distributions.

([https://biodiversityinformatics.amnh.org/open\\_source/maxent/](https://biodiversityinformatics.amnh.org/open_source/maxent/))

### **3. Class Discussion Leaders [2%]**

During the semester, you will lead a discussion on a topic assigned by the instructor from the readings of that week. This will be the opportunity for you to apply newly learned skills from the topic under discussion, learn to analyze arguments critically, practice synthesizing conflicting views, or relate material to your own life experience. Discussion leaders will formulate three to five questions pertaining to the subject matter. A variety of question types such as exploratory, cause and effect, analytical, action, and hypothetical should be created. More importantly, the questions should challenge the class to deepen their understanding of the issue under discussion. The questions should include page references to the reading assignment, and they must be submitted by 5 pm the evening before your assigned class period. Points will be deducted for not adhering to the instructions.

After the discussion, the discussion leaders will have the responsibility to write up a set of answers to their reading questions, then provide a summary of the class discussion. The summary report should be about 650-700 words in length.

### **4. Examination [35%]**

There will be 2 Exams [Exam 1 and Mid-Term Exam]. The exam will be mostly objective in nature with questions that will allow students to analyze, apply, and synthesize lecture, videos and homework concepts and reading material. Exam may include multiple-choice, true-false, matching, fill-in the blank, and short answer questions.

### **5. Group Poster Draft [3%]**

You will be required to provide a draft of your group poster with the outline in the final weeks of the semester. This will help you organize your ideas into words so that you can get feedback accordingly.

### **6. Group Poster Project [25%]**

As part of your final project, you will create a group poster that summarizes your research work aligned to Biogeography. You will present your posters during the last week of our class meeting. Our class session during that week will function as a research conference with student presenters reviewing poster content and answering questions from the audience. The session will be open to other students who are not enrolled in this course. Full details of the assignment will be provided in class and instructions will be posted through the Blackboard.

### **7. Practice Online Quizzes [5%]**

All practice quizzes will be completed through the Blackboard and will be *OPEN BOOK*. The aim of the assignment is for you to familiarize with the terms used in the course, identify what you know and what you don't know. This learning process will help you feel more confident about the material and be prepared for Exam.

### **Late Submissions Policy**

- Due dates for all assignments are provided in the course schedule as well as the Blackboard. Unless otherwise specified all assignments are due on those dates. It is the responsibility of the student to ensure that the assignments are submitted by the established due date.
- Late submission to a given assignment have 5 points deducted from their possible score for each day the submission is late. Late work will only be accepted by the instructor at the instructor's discretion.
- SafeAssign - all written work that you submit in this course will go through SafeAssign software

- (through the Blackboard) to facilitate the instructor's routine checks for academic integrity.
- In some subjects/assignments no late assignments will be accepted for credit. Such assignments include discussion forum and end of chapter quiz.
  - No make-up Exams or extensions on assignments will be given without a valid reason that is supported by documented evidence.
  - Work is **NOT** accepted via e-mail, unless the instructions specifically say otherwise. Submit your work through the Blackboard accordingly.
  - Please do not wait until the last minute (11:59 pm – Eastern Time) for you to complete your assignment - computers are machines and sometimes they cannot be reliable (e.g. power outage, wireless connection problem etc.) and cannot be held accountable for your excuse.

### **A “Life Happens Pass”**

You will be given a “Life Happens Pass” for only 1 written assignment. An automatic 48-hours extension will be given as long as you inform your instructor in writing.

### **Student Responsibilities**

- Review the course material and follow the course calendar.
- Work at full pace to avoid missing class activities.
- Be active participants in discussion forum throughout the course period.
- Communicate with you instructor to ask for help or clarification of an assignment or class activities.
- Respect the privacy of other classmates and the instructor in this virtual classroom.
- Express differences of opinion in a polite and sensible way.
- Keep an open mind to the constructive criticism from classmates and use it to improve your work.
  - We are in this class to share information and learning from each other.
  - By sharing and discussing each other's ideas, you will be able to examine your own thoughts and feelings hence, making the course interesting and enjoyable!
- Use good grammar and spelling in all your assignments and discussions.
- Write your message in formal language

### **Academic Integrity**

George Mason University operates under an honor system, which is published in the University Catalog and deals specifically with cheating, attempted cheating, plagiarism, lying, and stealing. You are therefore expected to take this course in adherence to GMU and Department standards for Academic Integrity.

Please familiarize yourself with the honor code, especially the statement on plagiarism

(<http://www.gmu.edu/org/honorcouncil/guidelines.htm>). I will respond to acts of academic misconduct according to university policy concerning plagiarism. In such cases Plagiarism will result in a failing grade of the assignment in question and/or for the course.

### **Disability Accommodations**

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit <http://ds.gmu.edu/> for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: [ods@gmu.edu](mailto:ods@gmu.edu) | Phone: (703) 993-2474.

### **Diversity and Inclusion**

George Mason University is committed to providing equal opportunity and an educational and work environment free from any discrimination on the basis of gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age and ability, marital status, pregnancy status, or genetic information. George Mason University shall adhere to all applicable state and federal equal opportunity/affirmative action statutes and regulations.

## Sexual Harassment, Sexual Misconduct, and Interpersonal Violence

As a faculty member, I am designated as a “Responsible Employee,” and must report all disclosures of sexual assault, interpersonal violence, and stalking to Mason’s Title IX Coordinator per University Policy 1412. If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as Student Support and Advocacy Center (703-380-1434) or Counseling and Psychological Services (CAPS) (703-993-2380). You may also seek assistance from Mason’s Title IX Coordinator by calling 703-993-8730 or emailing [cde@gmu.edu](mailto:cde@gmu.edu).

## Student Privacy

George Mason University strives to fully comply with FERPA by protecting the privacy of student records and judiciously evaluating requests for release of information from those records. Please see George Mason University’s student privacy policy <https://registrar.gmu.edu/students/privacy>.

## Student Support Services

George Mason University has several academic support and other resources to facilitate your success. Some of these resources are presented below:

- i. Counseling and Psychological Services: (See <http://caps.gmu.edu/>)
- ii. Learning Services, University Career Services: <http://careers.gmu.edu/>)
- iii. The Writing Center (See <http://writingcenter.gmu.edu/>)
- iv. University Catalog: (See <http://catalog.gmu.edu/>)
- v. University Policies: (See <http://universitypolicy.gmu.edu>)
- vi. Student Support and Advocacy Center: See <http://ssac.gmu.edu>)
- vii. Full detailed Student Support Resources on Campus – check the Stearns Center for Teaching and Learning Website below: <https://stearnscenter.gmu.edu/knowledge-center/knowning-mason-students/student-support-resources-on-campus/>

## Absences & Accommodations

- **Religious Holidays:** Please refer to George Mason University’s calendar of religious holidays and observations (<http://ulife.gmu.edu/calendar/religious-holiday-calendar/>). It is the student's responsibility to speak to the instructor in advance should their religious observances impact their participation in class activities and assignments.
- **Absence for documented illness:** Students who miss multiple virtual classes due to prolonged illness should seek medical care and provide documentation of such to the Dean’s Office, which will communicate with the student's professor(s). A prolonged absence may necessitate the student’s withdrawal from the course or from the University for the semester.
- **At the discretion of the professor:** There may be cases where an absence is undocumented but is, nevertheless, excused by the professor (e.g., absence due to a death in the family). Students should initiate a conversation with their professors about the nature and duration of the absence, in advance of the absence whenever possible.

When absences are excused, students remain responsible for all assigned work, and shall be provided with the opportunity to make up, without penalty, any work that they have missed.

**Course Calendar:** Faculty reserves the right to alter the schedule as necessary, with notification to students.

Week	Date	Topic Description	Textbook Chapters	Assignment   Activity Due date (Time is consistent - 11:59 pm)
1	1/24	Course Overview	Chapter 1	Self-introduction through the Bb – due 1/29
		<b>UNIT 1: INTRODUCTION TO THE DISCIPLINE</b>		
		<b>The Science of Biogeography</b>   What is Biogeography?		
2	1/31	The Science of Biogeography continue <ul style="list-style-type: none"> <li>Explain how biogeography is related to conservation and climate change</li> </ul>	Chapter 1	<a href="#">Online Discussion 1: [Check Bb]</a> <ul style="list-style-type: none"> <li>Initial Post due Wednesday</li> <li>Comments due Sunday</li> </ul> <b>Quiz #1 – due 2/5</b>
3	2/7	The History and Reticulating Phylogeny of Biogeography <ul style="list-style-type: none"> <li>Knowledge of Biogeography through time</li> <li>Globalization of the Geography of Nature</li> <li>Examine major shifts in biogeographical knowledge</li> </ul>	Chapter 2	<a href="#">Online Discussion 2: [Check Bb]</a> <ul style="list-style-type: none"> <li>Initial Post due Wednesday</li> <li>Comments due Sunday</li> </ul> Group Formation for Final Poster Project <b>Discussion Leaders</b>
4	2/14	<b>UNIT 2. THE GEOGRAPHIC AND ECOLOGICAL FOUNDATIONS OF BIOGEOGRAPHY</b>		
		<b>The Geographic Template</b> <ul style="list-style-type: none"> <li>Definition and Components of the Geographic Template</li> <li>Early maps and cartography</li> <li>Obtaining Geo-Referenced Data</li> <li>Analyzing Biogeographic Patterns using the GIS revolution</li> </ul>	Chapter 3	<i>Lab 0: Introduction to GIS [Bonus Lab] – due 2/19</i> Tentative Topic Description for Research Project/Poster – 4/17  <b>Quiz #2 – due 2/19</b>
		Exam 1 - Review		
5	2/21	<b>Exam 1</b>		
6	2/28	<b>Distributions of Species: Ecological Foundations</b> <ul style="list-style-type: none"> <li>The Distribution of Species and Populations</li> <li>The relationship between distribution and abundance</li> <li>What Limits the Geographic Range?</li> <li>Population growth and demography</li> </ul> <i>Campus Field Trip – Examining Tree Cover and distribution</i>	Chapter 4	<i>Lab 1: Trees: adaptations or distribution across the continents - due 3/5</i>  <b>Discussion Leaders</b>
7	3/7	The Distribution and Dynamics of Communities, Biomes, and Ecosystems <ul style="list-style-type: none"> <li>Distribution of ecological communities</li> <li>Temporal patterns: Ecological succession</li> </ul> <i>Campus Field Trip – Examining the distribution of ecological communities</i>	Chapter 5	<b>Quiz #3 – due 3/10</b> Progress Report on Research Project/Poster [Outline] – 3/7

Week	Date	Topic Description	Textbook Chapters	Assignment   Activity Due date (Time is consistent - 11:59 pm)
8	3/14	<i>Spring Recess (No classes)</i>		Nothing is due during Recess
9	3/21	<b>UNIT 3. BIOGEOGRAPHIC PROCESSES AND EARTH HISTORY</b>		
		Dispersal & Immigration <ul style="list-style-type: none"> <li>• Dispersal as an ecological process</li> <li>• Dispersal as a historical biogeographic event</li> </ul>	Chapter 6	<a href="#">Online Discussion 3: [Check Bb]</a> <ul style="list-style-type: none"> <li>○ Initial Post due Wednesday</li> <li>○ Comments due Sunday</li> </ul> <i>Lab 2: Mapping exercise regarding the large-scale movement of species – due 3/26</i> <b>Discussion Leaders</b>
10	3/28	<u>EXAM 2</u>		EXAM 2
11	4/4	Speciation and Extinction <ul style="list-style-type: none"> <li>• The evolution of species concepts</li> <li>• Ecological processes</li> <li>• Extinctions in the fossil record</li> </ul>	Chapter 7	<a href="#">Online Discussion 4: [Check Bb]</a> <ul style="list-style-type: none"> <li>○ Initial Post due Wednesday</li> <li>○ Comments due Sunday</li> </ul> <b>Discussion Leaders</b>
12	4/11	<b>UNIT 5. ECOLOGICAL BIOGEOGRAPHY</b>		
		Island Biogeography <ul style="list-style-type: none"> <li>• Patterns in Species Richness and Models of Diversity Dynamics</li> <li>• Explain why island evolution is different from that on continents</li> <li>• The Song of the Dodo: Island Biogeography –</li> </ul>	Chapter 13  Read David Quammen	<i>Lab 3: Graphical analysis of species richness. – due 4/16</i> <b>Draft – Project/Poster – due 4/16</b>
13	4/18	<b>UNIT 6. CONSERVATION AND THE FRONTIERS OF BIOGEOGRAPHY</b>		
		Biogeography of Humanity, Biological Diversity, and Conservation Biogeography <ul style="list-style-type: none"> <li>• The Dynamic Biogeography of Humanity</li> <li>• The Biodiversity Crisis and Conservation Biogeography</li> </ul>	Chapter 15	<i>Lab 4 Mapping Invasive species or endangered species – due 4/23</i> <b>Final Quiz – due 4/23</b> <b>Discussion Leaders</b>
14	4/25	Glaciation and Biogeographic Dynamics of the Pleistocene   Poster Presentation Preparation	Chapter 9	-
15	5/2	<i>Poster Session Presentation</i>		<i>Poster Session Presentation</i>