BIOL 1800 – ECOLOGY Summer 2024

Course Description

Welcome to Ecology! In this course, we will study the **interactions between organisms and their environment** across multiple ecological scales, including populations, communities, and ecosystems. During *lecture*, we will survey the earth's **terrestrial and aquatic biomes** and the physical forces that shape them; the **evolutionary ecology** of organisms and their diverse life history strategies; the **behavioral ecology** of predators and prey, parasites and hosts, and mutually beneficial partners; and the **ways in which humans alter the earth's climate and life systems**. During *laboratory sessions*, we will adopt a hands-on approach centered around four central themes. We will (1) **engage with the natural world** by spending time in local forests and nature-themed institutions; (2) **collect ecological data** using multiple field-based approaches; (3) **analyze ecological data** with statistical tests implemented through the R programming language; and (4) **communicate ecological findings** to scientific and non-scientific audiences. Each of these themes is critical to inquiry and discovery in the ecological sciences, and will provide practical tools for students to observe, understand, and ultimately protect the natural world and its marvelously diverse array of habitats and species.

Course Details (N.B., all times are EST)

Lecture:	M/T/W/Th @ 8:30am - 10:25am
Laboratory:	M/W @ 10:50am – 12:45pm
Professor:	Dr. Alexandra DeCandia ald86@georgetown.edu Office Hours - T @ 10:50am - 12:45pm (Reiss 422)

Learning Goals

The faculty in Department of Biology have a deep interest in developing new and using the best practices of biology pedagogy. We have developed a set of department-wide learning goals describing fundamental concepts in biology as well as developing insight into the process and product of biological science. The Biology Department learning goals **emphasized in this course** include:

- 1. Integration of new knowledge into existing scientific frameworks
 - a. Ability to interpret scientific text, primary literature and presentations
 - b. Ability to critique scientific text, primary literature and presentations
 - c. Ability to structure and contextualize understanding with proper references to literature
 - d. Ability to speculate on meanings of scientific data and on possible future directions
 - e. Ability to place (relate) biology into other scientific disciplines
- 2. Engagement with scientific inquiry
 - a. Ability to evaluate the significance and context of the area of investigation
 - b. Ability to use texts, primary literature, presentations and mathematical models to stimulate questioning and develop scientific hypotheses
 - c. Ability to appropriately design and perform experiments and to construct mathematical models in order to text scientific hypotheses
 - d. Ability to interpret data to evaluate hypotheses and place findings into an intellectual framework to plan further experiments
- 3. Representing and interpreting data in quantitative and statistically meaningful forms

- a. Ability to distinguish between and work rigorously with qualitative and quantitative data
- b. Ability to construct and interpret visual representations of quantitative data
- c. Ability to use probability and statistical analyses to evaluate and interpret data
- 4. Communicating scientific understanding in oral and written forms
 - a. Ability to communicate scientific understanding to both scientific and general audiences
 - b. Ability to present scientific ideas arguing from evidence
 - c. Ability to write and speak precisely
 - d. Ability to stimulate interest of the audience
- 5. Appreciating the epistemology of science
 - a. Ability to understand how the history of scientific thought has shaped the development of scientific principles
 - b. Ability to understand how scientific principles are applied to interpret new data
 - c. Ability to understand the limitations of methodologies as they affect the interpretation of data
 - d. Ability to understand the biological basis of scientific debate and the role of probability (certainty and uncertainty) in science
 - e. Ability to appreciate and participate in a scientific community as a forum for scientific thinking, research, debate and progress
- 6. Organization of molecular, cellular, organismal and ecological systems
 - a. Understand what are the building blocks of biological systems
 - b. Understand the relationship between structure and function
 - c. Understand the hierarchy of biological organizations (e.g., individual, population; community ecosystem; atoms, molecules, cell, tissue, organ, systems)
 - d. Understand behavior of molecules, cells, organisms
- 7. The origins and evolution of biological systems
 - a. Understand evidence for evolution and natural selection
 - b. Understand how phylogenetic concepts are used to formulate and test hypotheses
 - c. Understand the mechanisms of evolution and their actions at the molecular, developmental and phenotypic levels
 - d. Understand variation and evolution
- 8. The flow of biological information
 - a. Understand the central dogma of information flow
 - b. Understand how genetic information is exchanged between cells
 - c. Understand the epigenetic modulation of information systems
 - d. Understand how signals are used as biological information
- 9. The flow of energy and matter in biological systems
 - a. Understand metabolic pathways
 - b. Understand the mechanisms of harvesting energy from organic and inorganic sources
 - c. Understand food webs, biogeochemical cycles (e.g., nitrogen and carbon cycles)
- 10. Interdependence and interactions within biological systems and their emergent properties
 - a. Understand the interactions between genetic and environmental factors leading to emergent properties of phenotypes

- b. Understand the plasticity of biological systems (e.g., learning, behavior)
- c. Understand the intercellular and inter-organismal communications and interactions
- d. Understand how population and species interactions lead to the organization of ecological communities

Expectations & Policies

Attendance & Deadlines: Ideally, students will attend all lectures and laboratory sessions. However, I have built flexibility into the course in response to the COVID-19 pandemic. For lecture, attendance inperson is preferred (with masking optional). However, lecture recordings will be available through the Canvas Panopto page. *Please do not come to lecture if you are feeling unwell*. There will be no virtual option for laboratory sessions. If you are unable to attend lab due to a health-related reason, religious holiday, University-sanctioned activity, or documented family or medical emergency, please email me as soon as possible so that we can make alternative arrangements. With regard to deadlines, assignments submitted late to Canvas will lose 1 point every 24 hours and will not be accepted after three days. Allowances will be made for the exceptions listed above if they are properly documented and brought to my attention *before* the deadline. I do not accept excuses for late or missing work resulting from computer crashes, lost files, or inability to access Canvas or other Internet resources.

Reading: The required text for this course is *Ecology* (6th Edition) by William D. Bowman and Sally D. Hacker (ISBN-13: 978-0197614051 and ISBN-10: 0197614051). The 6th Edition is available in print and online through Oxford Learning Link (which provides additional resources). As *Ecology* editions 3, 4, 5, and 6 are largely the same, you can opt for an older edition of the text. However, if you do so, be sure to reference the Canvas document that aligns chapter numbers across editions. Any additional readings from outside this text will be made available through Canvas. Course readings are meant to complement – and not replace – lecture material. Therefore, I highly recommend that you stay up to date with all readings. Some students benefit from doing the reading before lecture as a primer for topics covered; others benefit from doing the reading after lecture to reinforce concepts covered.

Canvas: The Canvas Web site for this course can be accessed at <u>https://canvas.georgetown.edu</u>. You will find a copy of this syllabus, announcements pertaining to the course, lecture slides, lab handouts, and any additional materials used in lecture or lab. You will submit all assignments through Canvas. If I need to contact you outside of class, I will e-mail your Georgetown account (@georgetown.edu). If you check a different account, set up your GU account to automatically forward emails to that address.

Weather & Timing: Many of our labs will be outdoors even if the weather is less than ideal, so come prepared to be outside in the forecasted conditions. On occasion the planned laboratory may be changed at the last minute, so please be flexible! While our lab is scheduled to meet for 3 hours, biology doesn't always operate on such a neat timetable. Labs involving field trips off campus may run slightly longer than our scheduled time and some labs will not require the full time. I will try to warn you in advance if I think a lab may run late; if you have another class or conflict that prevents you from staying past our scheduled time, please let me know before the lab session.

Academic Integrity: Ecology is a collaborative discipline, and you will work closely with other students throughout this course. I encourage you to discuss the concepts from class and lab and how to best interpret or present your results. However, all written work must be produced independently unless it is specified that you can work together on the assignment. You will submit most assignments through TurnItIn.com, a resource that can help you learn to use and cite sources properly. As a general rule, sharing a file (other than raw data) is sharing too much. Copying or paraphrasing from published sources or from other students, failing to give full credit for quotations or ideas, consulting unauthorized sources during an exam, or attempting to pass any work done by others as your own are

examples of plagiarism. Plagiarism is a violation of the Georgetown University Honor System (https://honorcouncil.georgetown.edu). Moreover, it is simply wrong, and undermines the mutual trust on which an academic community must be based. Academic dishonesty in any form will not be tolerated in this course; students found in violation are subject to academic penalties that include, but are not limited to, failure of the course, termination from the program, and revocation of degrees already conferred. All students are expected to adhere to the following pledge: "In pursuit of the high ideals and rigorous standards of academic life I commit myself to respect and to uphold the Georgetown University honor system: To be honest in every academic endeavor, and to conduct myself honorably, as a responsible member of the Georgetown community as we live and work together."

Artificial Intelligence in the Classroom: The goal of this course and any tool used to submit work is to enhance your own learning and understanding, not to undermine or stifle it. AI tools (like chatGPT) may be used as you would any other reference source – to help generate ideas and brainstorm. It is not a replacement for your original work. As with other reference tools, the use of such tools must be appropriately acknowledged and cited. It is also your responsibility to assess the validity and applicability of any AI output; you bear the final responsibility of your work. The use of AI tools is limited to those that are currently free to the public to use and open access. For any questions on the use of AI in the classroom, please ask the instructor.

Accommodations & Support: I am committed to supporting student learning and success in this course. If you would benefit from academic accommodations, please file a formal request with the Academic Resource Center (ARC). You can reach the ARC by emailing arc@georgetown.edu, calling 202-687-8354, or visiting their office located in the Leavey Center Suite 338. Please note that we cannot offer retroactive accommodations. If you are in need of additional support regarding your spiritual, physical, mental, and social well-being, please consult the following webpages:

• <u>https://campusministry.georgetown.edu/; https://studenthealth.georgetown.edu/self-care;</u> <u>https://instructionalcontinuity.georgetown.edu/guide-for-students/campus-resources-for-students/</u>

Office of the Student Ombuds: Looking for additional resources? Consider contacting the Ombuds when you want to talk to a caring professional about a University-related issue but don't know where to turn. The OSO is a confidential and safe space that is independent of formal university organizations or structures where students can discuss their concerns, share their experiences, ask questions and explore their options. The Ombuds can help you problem-solve, identify your goals, and empower you to think through ways to navigate complex situations. Some reasons for you to visit the office may be to address academic concerns, clarify administrative policies, discuss interpersonal conflicts, seek coaching, mediation or facilitation to handle a sensitive situation, advise you on the process to file a formal complaint if you are experiencing bias, harassment, bullying or other forms of intimidation, identify other appropriate campus resources, and allow you to safely express your frustrations and concerns. Request an in-person or zoom appointment with the Main Campus Ombuds by writing <u>studentombuds@georgetown.edu</u> or calling 202-784-1081. The OSO is located in Room 207 of the Reiss Building. Find more information at <u>studentombuds.georgetown.edu</u>

Diversity & Inclusion: I am here to support you as ecologists, as students, and as individuals. Per the university tenet of *cura personalis*, I strive to create an inclusive and welcoming learning environment where students of all abilities, races, ethnicities, creeds, gender identities, sexual orientations, lived experiences, and socioeconomic statuses are seen, heard, and valued within our community. As a participant in course discussions, you should strive to honor the diversity of your classmates.

In an ideal world, science would be objective. However, much of science is subjective and is historically built on a small subset of privileged voices. In this class, we will make an effort to consider numerous perspectives from a diverse group of scientists, but limits still exist on this diversity. I acknowledge that it is possible that there may be overt and covert biases in the material due to the lens

with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Please contact me with suggestions to improve the quality of the course materials. Furthermore, I would like to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities. To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official records, please let me know.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come talk with me. If you prefer to speak with someone outside of the course, your academic dean or the Office of Student Affairs are excellent resources.
- We are all on the continuum of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.

Sexual Misconduct: Georgetown University and its faculty and staff are committed to supporting survivors and those impacted by sexual misconduct, which includes sexual assault, sexual harassment, relationship violence, and stalking. Georgetown requires faculty members, unless otherwise designated as confidential, to report all disclosures of sexual misconduct to the University Title IX Coordinator or a Deputy Title IX Coordinator. If you disclose an incident of sexual misconduct to a professor or staff member in or outside of the classroom (with the exception of disclosures in papers), that faculty or staff member must report the incident to the Title IX Coordinator, or Deputy Title IX Coordinator. The coordinator will, in turn, reach out to the student to provide support, resources, and the option to meet. Please note that the student is not required to meet with the Title IX coordinator and no action will be taken without the student's awareness. More information about reporting options and resources can be found on the Sexual Misconduct Website: https://sexualassault.georgetown.edu/resourcecenter. If you would prefer to speak to someone confidentially, Georgetown has a number of fully confidential professional resources that can provide support and assistance. These resources include:

- Health Education Services: Sexual Assault Response and Prevention: sarp@georgetown.edu
- Counseling and Psychiatric Services (CAPS): 202.687.6985

Additional resources are included below:

- Georgetown Self-Care Resource Guide: <u>https://studenthealth.georgetown.edu/health-promotion/self-care/</u>
- Georgetown Wellness Wheel: <u>https://studenthealth.georgetown.edu/hoya-wellness-wheel/</u>
- Georgetown Guide to Recognizing Students in Distress: https://studentaffairs.georgetown.edu/studentoutreach/facultystaffresources/

Pregnancy Modifications and Adjustments: Georgetown University is committed to creating an accessible and inclusive environment for pregnant students. At any point throughout their pregnancy students may request adjustments/modifications based on general pregnancy needs or accommodations based on a pregnancy-related complication or medical need. Students may also request accommodations following labor and delivery based on a complication or medical need. To request pregnancy modifications, please complete the <u>SCS Pregnancy Modification Request Form:</u> <u>https://forms.gle/ZBfASxui7u13A8TU6</u>. More information about pregnancy modifications can be found on the Title IX Georgetown University Website: <u>https://titleix.georgetown.edu/title-ix-pregnancy/student-pregnancy/</u>

Intellectual Property & Copyrights: The materials used in Georgetown University courses generally represent the intellectual property of the course instructor and may not be disseminated or reproduced in any form for public distribution (*e.g.*, sale, exchange, uploading to off-university sites) without my written permission. Course materials include all written or electronic documents and materials including the syllabus, presentations such as power point slides or videos, assignments, current and

past examinations, or any other documents or files provided. Course materials may only be used by students enrolled in the course for academic purposes. Course readings (book chapters, articles, reports) posted to Canvas are copyrighted material. These works are made available to you through licensed databases or fair use. They are also protected by copyright law, and may not be further disseminated or reproduced in any form for distribution without permission of the copyright owner. More information about intellectual property and copyright and intellectual property can be found at: https://www.library.georgetown.edu/copyright

Assignments & Grading

Your grade in this course will be determined by the following assignments (points at right):

Laboratory Assignments	
Observation Report	25
Pond Productivity Report	25
Shinrin-yoku Reflection	10
Climate Change Report	25
Abundance Report	30
Behavior at NZP Report	25
BioBlitz Report	10
Microbiome Report	30
NMNH Report	10
Conservation Case Study	15
Three Exams (non-cumulative)	
Unit 1 Exam	60
Unit 2 Exam	60
Unit 3 Exam	60
Science Communication Project	
Part 1: Brainstorming	5
Part 2: Planning	10
Part 3: Project & Presentation	15
TOTAL4	115

Course grades will follow these percentages: A = 93.34-100%; A- = 90.00-93.33%, B+ = 86.67-89.99%; B = 83.34-86.66%; B- = 80.00-83.33%, etc.

Regrade requests must be made in writing within one week of handing back assignments. You must explain why your answer is a better match to the question than how it was graded; note that the entire assignment will be re-examined at that time.

Date	Day	Lecture Topic	Reading Due (6e)	Lab Topic	Lab Due
10-Jul	Μ	Intro to Ecology / Weather vs. Climate	CH 1-2	Observing the Natural World	
11-Jul	Πh	Terrestrial Biomes & Aquatic Environments	CH 3	1	ı
15-Jul	Μ	Environmental Variation	CH 4-5	Pond Productivity	Observation Report
16-Jul	Τ	Energy Production & Flow	CH 20-21	1	1
17-Jul	Μ	Global Climate Change	CH 25	Shinrin-yoku / Science Comm.	Pond Productivity Report
18-Jul	Πh	EXAM 01	I	1	ı
22-Jul	Μ	Evolutionary Ecology & Life History	CH 6-7	Responding to Climate Change	Shinrin-yoku / Sci Comm.
23-Jul	Τ	Behavioral Ecology / Distribution & Abundance	CH 8-9	1	ı
24-Jul	Μ	Populations Dynamics	CH 10-11	Estimating Abundance	Climate Change Report
25-Jul	Th	Competition, Predation, & Parasitism	CH 14,12	1	ı
29-Jul	Μ	Mutualism and Commensalism	CH 13,15	Behavior at NZP	Abundance Report
30-Jul	Τ	EXAM 02	1	1	ı
31-Jul	Μ	Communities & Species Diversity	CH 16, 19	BioBlitz / Science Comm.	Behavior Report
1-Aug	Th	Biogeography & Community Change	CH 18,17	1	ı
5-Aug	Μ	Conservation Biology & Landscape Ecology	CH 23-25	Microbiome Diversity	BioBlitz / Sci Comm.
6-Aug	Τ	Conservation Case Study Debate	Primary Literature	-	-
7-Aug	Μ	Science Communication Project Presentations	I	Scavenger Hunt at NMNH	Microbiome Report
8-Aug	Th	EXAM 03	-	-	-