BIOL/EVPP 318: Conservation Biology

Spring 2025
Tuesdays and Thursdays 1:30-2:45 pm
Peterson Hall Room 1109 (In-person)
3 Credits

Instructor: Dr. Emily E. Conway
Office: 3048 David King Hall
E-mail: econway6@gmu.edu
Office Hours: in-person or virtual by appointment

Course Description:

The loss of biological diversity is now one of the most rapid forms of environmental change in the modern era. This course covers the causes and consequences of biodiversity loss and discusses approaches for overcoming these threats in ways that balance the needs of people and nature. The class begins by understanding the foundations of the field of conservation biology and how scientists often conceptualize, measure, and map patterns of biodiversity. Additionally, we will also cover how biodiversity drives ecosystem processes and the threats to biodiversity, while the final portion of the course will focus on approaches, models, tools, and techniques that are used to conserve biological diversity. This interactive class emphasizes student involvement and participation. Although there will be regular lectures by the instructor and guest speakers, the course will regularly include student-led in-class discussions of foundational and timely scientific literature.

Learning Outcomes:

These learning outcomes are designed to help students master the skills needed to obtain and be successful in a job working as a conservation biologist in a government agency, non-profit organization, or academia. By the end of this course students will:

- Understand the foundations of the field of conservation biology and how the field has evolved
- Understand the biological and social factors which impact biodiversity as well as the modern drivers of biodiversity change
- Have a baseline understanding of the theories, models, and tools that are used in various conservation disciplines

- Learn how to combine information and approaches from a variety of disciplines in the natural and social sciences to develop effective conservation planning.
- Be able to read and critically evaluate peer-reviewed literature so that one can keep abreast of emerging problems, new techniques, and modern controversies that will form the foundation for extended learning throughout one's career.

Assigned and Optional Readings:

Course materials include articles from the primary literature and occasionally from other media sources. All readings will be posted on Canvas.

Textbook (optional):

Edited by Navjot S Sodhi and Paul Ehrlich. Conservation Biology for All. Open Source: https://conbio.org/publications/free-textbook/

Course Structure:

Lectures: Each week lectures will center on the topics outlined in the course schedule. The **lectures will be the main learning content of the course**, and I will endeavor to post the lecture slides prior to the start of each class. However, please note that this may not always happen, and the portions of the lecture slides may be missing information that can be filled in during lecture. **Attendance is required** and will count towards your final grade. However, if you are unable to attend a lecture, or if you need accommodations, please contact me as soon as possible.

Discussions: Each week there will be **at least one required reading** posted as well as additional readings if you would like to explore the topic more. Readings will pertain to the topic(s) that we are discussing during lecture each week and will help to both build knowledge on the selected topic(s) and to help build proficiency with reading and understanding of primary literature. Prior to the paper discussion, all students will be expected to complete the assigned reading and complete the **reading quiz on Canvas**. Each week, **1-2 students will lead** the discussion of the assigned reading, and all other students are expected to come equally prepared to discuss the paper. Discussions will take place at the start of the class on Thursdays and should last 20-30 minutes. Discussions will consist of a summary overview of the paper during which the discussion lead(s) will: 1) review majors points of the paper, 2) highlight novel methods/results/conclusions, 3) relate the paper to the topics covered previously in the course or to your own knowledge, 4) raise any questions or objections you have with the methods/results/conclusion. Following the summary, the lead students will generate and facilitate discussion with the rest

of the class for the remaining time. **Credit will be earned for both leading and participating in the discussions.**

Discussion Quizzes: Prior to in-class discussions of required readings, students must complete a reading quiz posted on the course Canvas page. These quizzes will serve to prepare everyone for the in-class discussion and to re-iterate key points from the required readings.

Case Study: Each student will be required to **write a 3-page case study report** on the topic of your choice as it relates to the topics covered during the course. Case studies are an important tool that scientists and science communicators can use to analyze a conservation action to not only link theory to practice but also to identify what went well, what problems arose, and make suggestions for future work. More details on this assignment will follow.

Midterm and Final Exam: There will be one midterm exam and a final exam, both will be take-home and open book, but each must be completed independently. The mid-term exam will include material covered in the course up to the previous class period. Whereas the final exam will be designed to encourage you to review and synthesize all course material. Exam questions are not designed to trick you but provide you with the opportunity to demonstrate your learning. Exam questions may be pulled from all class materials including lectures, assigned readings, and discussions.

Late Work Policy

There will be a 24-hour grace period on all assignment due dates. If assignments are submitted 2-7 days late, there will be a 25% reduction in points earned. If assignments are submitted more than 7 days late, there will be a 50% reduction in points earned. Please try your best to submit all assignments on or before the due date to avoid penalty but turning in your work late is better than not turning it in at all.

If you need an extension for any assignment, you must contact me at least 24 hours in advance of the due date to request one.

Grading:

	Points:
Attendance	125 points (5 points/class, 25 class meetings)
Discussion Lead	50 points
Discussion Participation	120 points (10 points/discussion, 12 paper discussions)
Discussion Quizzes	120 points (10 points/discussion, 12 paper discussions)

Case Study Rough Draft	25 points
Case Study Peer Review	25 points
Case Study Final Draft	100 points
Midterm Exam	100 points
Final Exam	200 points
Total	**865 points**

Grading Policies: Grades will be awarded using the following grade cut-offs: 100-98 = A+; 98-93 = A; 92-90 = A-; 89-87 = B+; 86-83 = B; 82-79 = B-; 78-77 = C+; 76-70 = C; 69-60 = D; ≤ 59 = F.

Course Schedule:

Date	Lecture Topic	Required Readings	Supplemental Readings	Exercise (Due Date)
Part 1: Foundations of Conservation Biology				
Tuesday 1/21 Week 1	Introduction to course			
Thursday 1/23 Week 1	Overview of Conservation Biology Paper Discussion	Kareiva, P., & Marvier, M. (2012). What is conservation science?. *BioScience*, *62*(11), 962-969. Soulé, M. E. (1985). What is conservation biology?. *BioScience*, *35*(11), 727-734.		Discussion Quiz due prior to lecture
Tuesday 1/28 Week 2	Biodiversity concepts and measurements			
Thursday 1/30 Week 2	Global patterns and drivers of diversity Paper Discussion	Gaston, K. J. (2000). Global patterns in biodiversity. *Nature*, *405*(6783), 220-227.		Discussion Quiz due prior to lecture
Part 2: Importance of Biodiversity				

Tuesday 2/4 Week 3	Ecosystem functions and services – an overview			
Thursday 2/6 Week 3	Biodiversity and ecosystem services Paper Discussion	Evers, C. R., Wardropper, C. B., Branoff, B., Granek, E. F., Hirsch, S. L., Link, T. E., ... & Wilson, C. (2018). The ecosystem services and biodiversity of novel ecosystems: A literature review. *Global ecology and conservation*, *13*, e00362.		Discussion Quiz due prior to lecture
Tuesday 2/11 Week 4	Biodiversity and ecosystem functioning			
Thursday 2/13 Week 4	Biodiversity modelling Paper Discussion	Pollock, L. J., O'connor, L. M., Mokany, K., Rosauer, D. F., Talluto, M. V., & Thuiller, W. (2020). Protecting biodiversity (in all its complexity): new models and methods. *Trends in Ecology & Evolution*, *35*(12), 1119-1128. Sequeira, A. M., Bouchet, P. J., Yates, K. L., Mengersen, K., & Caley, M. J. (2018). Transferring biodiversity models for conservation: Opportunities and challenges. *Methods in Ecology and Evolution*, *9*(5), 1250-1264.		Discussion Quiz due prior to lecture
Part 3: Threats to Biodiversity				
Tuesday 2/18 Week 5	Extinction			
Thursday 2/20 Week 5	Habitat loss and degradation Paper Discussion	Haddad, N. M., Brudvig, L. A., Clobert, J., Davies, K. F., Gonzalez, A., Holt, R. D., ... & Townshend, J. R. (2015). Habitat fragmentation and its lasting impact on Earth's ecosystems. *Science advances*, *1*(2), e1500052.		Discussion Quiz due prior to lecture

Tuesday 2/25 Week 6	Habitat fragmentation			
Thursday 2/27 Week 6	Overharvesting Paper Discussion	Liu, H., Gale, S. W., Cheuk, M. L., & Fischer, G. A. (2019). Conservation impacts of commercial cultivation of endangered and overharvested plants. *Conservation Biology*, *33*(2), 288-299.		Discussion Quiz due prior to lecture
Tuesday 3/4 Week 7	Invasion			
Thursday 3/6 Week 7	Climate Change Paper Discussion	Harrison, S. P., Gornish, E. S., & Copeland, S. (2015). Climate-driven diversity loss in a grassland community. *Proceedings of the National Academy of Sciences*, *112*(28), 8672-8677.		Discussion Quiz due prior to lecture
Tuesday 3/11 – Thursday 3/13 Week 8	Spring Break			
Tuesday 3/18 Week 9	Review (optional)			
Thursday 3/20 Week 9	Midterm Exam			
Part 4: Approaches to Conservation				
Tuesday 3/25 Week 10	Legal foundation of conservation			

Thursday 3/27 Week 10	Conservation of genetic diversity Paper Discussion	DeWoody, J. A., Harder, A. M., Mathur, S., & Willoughby, J. R. (2021). The long-standing significance of genetic diversity in conservation. *Molecular ecology*, *30*(17), 4147-4154.		Discussion Quiz due prior to lecture
Tuesday 4/1 Week 11	Conservation of species populations			
Thursday 4/3 Week 11	Conservation of communities and ecosystems Paper Discussion	Rodríguez, J. P., Rodriguez-Clark, K. M., Baillie, J. E., Ash, N., Benson, J., Boucher, T., ... & Zamin, T. (2011). Establishing IUCN red list criteria for threatened ecosystems. *Conservation Biology*, *25*(1), 21-29. Bland, L. M., Nicholson, E., Miller, R. M., Andrade, A., Carré, A., Etter, A., ... & Keith, D. A. (2019). Impacts of the IUCN Red List of Ecosystems on conservation policy and practice. *Conservation letters*, *12*(5), e12666.		Discussion Quiz due prior to lecture
Tuesday 4/8 Week 12	Managing landscapes and networks			
Thursday 4/10 Week 12	In situ vs. Ex situ conservation Paper Discussion	Mestanza-Ramón, C., Henkanaththegedara, S. M., Vásconez Duchicela, P., Vargas Tierras, Y., Sánchez Capa, M., Constante Mejía, D., ... & Mestanza Ramón, P. (2020). In-situ and ex-situ biodiversity conservation in Ecuador: A review of policies, actions and challenges. *Diversity* , *12* (8), 315.		Discussion Quiz due prior to lecture Rough Draft of Case Study Paper due prior to lecture
Tuesday 4/15	Conservation reserves			

Week 13				
Thursday 4/17 Week 13	Conservation in urban environments Paper Discussion	Lepczyk, C. A., Aronson, M. F., Evans, K. L., Goddard, M. A., Lerman, S. B., & MacIvor, J. S. (2017). Biodiversity in the city: fundamental questions for understanding the ecology of urban green spaces for biodiversity conservation. *BioScience*, *67*(9), 799-807.		Discussion Quiz due prior to lecture Peer Review of Case Study Paper due prior to lecture
Tuesday 4/22 Week 14	Restoration			
Thursday 4/24 Week 14	Herbaria as tools for conservation Paper Discussion	Nualart, N., Ibáñez, N., Soriano, I., & López-Pujol, J. (2017). Assessing the relevance of herbarium collections as tools for conservation biology. *The Botanical Review*, *83*, 303-325.		Discussion Quiz due prior to lecture
Tuesday 4/29 Week 15	International Conservation			
Thursday 5/1 Week 15	Review (optional)			Case Study Assignments due by end of class
Tuesday 5/6	Reading Day			
	Final Exam			

Additional GMU Policies:

Academic Standards

Academic Standards exist to promote authentic scholarship, support the institution's goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values

integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

- **Honesty:** Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
- **Acknowledgement:** Giving proper credit for all contributions to one's work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
- **Uniqueness of Work:** Ensuring that all submitted work is the result of one's own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is outlined in the university's procedures. Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University's academic community.

Student responsibility: Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.

Accommodations for Students with Disabilities

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit https://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Student responsibility: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor *in advance* of any relevant class meeting, assignment, or exam.

FERPA and Use of GMU Email Addresses for Course Communication

The Family Educational Rights and Privacy Act (FERPA) governs the disclosure of education records for eligible students and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

Student responsibility: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

Title IX Resources and Required Reporting

As a part of George Mason University's commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault,

gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the individual the report is about (the "Complainant") will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see University Policy 1202: Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

*** Please note, as a faculty member I am a mandatory reporter and must report all disclosures ***

Student opportunity: If you prefer to speak to someone ***confidentially***, please contact one of Mason's confidential employees in Student Support and Advocacy (SSAC), Counseling and Psychological Services (CAPS), Student Health Services (SHS), and/or the Office of the University Ombudsperson.