Biodiversity in a Changing World
UF Quest 2, Spring 2023
General Education: Biological Sciences, International
[Note: A minimum grade of a C is required for General Education credit]

Modality: In person
Location: Entomology Building (Steinmetz) 1031
Time: Tuesday period 5&6 (11:45-1:30) and Thursday period 5 (11:45pm- 12:35)
Please note: Class resources, announcements, and assignments will be made available through the class Canvas site.
Instructor: Jennifer Weeks, Department of Entomology and Nematology
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273-3955
Office hours: Steinmetz (Entomology) Building, Room 3103 Thursdays 12:45-2:45 or by appointment

Course Description

This course addresses one of the most complex, pressing issues of our time- how humans are altering the number, relative abundance, and distribution of species on Earth via changing land use, urbanization, globalization, and climate change and how this is impacting biodiversity. We will explore the patterns and the processes that have historically governed the global distribution of life on Earth as well as investigate methodologies and analyses used to study biodiversity from the level of genes to ecosystems. Through selected readings, we will explore how the changes in biodiversity around the world impact critical ecosystem services including nutrient cycling, food production, disease transmission and distribution, and culture. Finally, we will interact with both local and international practitioners to discuss ways scientists and community partners are addressing these issues on both local and global scales. This class is recommended for students interested in understanding more clearly how we approach answering questions with science, how science is evaluated, and the complexity of using science to create and implement policy when the challenges are global in nature. Students taking this course will be prepared to explore higher level courses in entomology, agronomy, horticulture, plant pathology, soil and water sciences, biology, geography, and wildlife ecology and conservation to further their depth of knowledge and develop their skill set in understanding and thinking critically about biodiversity in a changing world.

Quest 2 and Gen Ed Descriptions and Student Learning Outcomes

Quest 2 Description: Quest 2 courses are grounded in the modes of inquiry and analysis characteristic of the social and/or biophysical sciences, Quest 2 courses invite students to address pressing questions facing human society and the planet—questions that outstrip the boundaries of any one discipline and that represent the kind of open-ended, complex issues they will face as critical, creative, and thoughtful adults navigating a complex and interconnected world.

- Quest 2 Student Learning Outcomes:
  - Identify, describe, and explain the cross-disciplinary dimensions of a pressing societal issue or challenge as represented by the social sciences and/or biophysical sciences incorporated into the course. (Content)
  - Critically analyze quantitative or qualitative data appropriate for informing an approach, policy, or praxis that addresses some dimension of an important societal issue or challenge. (Critical Thinking)
  - Develop and present, in terms accessible to an educated public, clear and effective responses to proposed approaches, policies, or practices that address important societal issues or challenges (Communication)
  - Connect course content with critical reflection on their intellectual, personal, and professional development at UF and beyond. (Connection)

Biological Sciences (B) Description: Biological science courses provide instruction in the basic concepts, theories and terms of the scientific method in the context of the life sciences. Courses focuson major

scientific developments and their impacts on society, science and the environment, and the relevant processes that govern biological systems. Students will formulate empirically-testable hypotheses derived from the study of living things, apply logical reasoning skills through scientific criticism and argument, and apply techniques of discovery and critical thinking to evaluate outcomes of experiments.

Biological Sciences Student Learning Outcomes:

Identify, describe, and explain the basic concepts, theories and terminology of natural science and the scientific method; the major scientific discoveries and the impacts on society and the environment; and the relevant processes that govern biological and physical systems. (Content)

- Formulate empirically-testable hypotheses derived from the study of physical processes or living things; apply logical reasoning skills effectively through scientific criticism and argument; and apply techniques of discovery and criticalthinking effectively to solve scientific problems and to evaluate outcomes. (Critical thinking)
- Communicate scientific knowledge, thoughts, and reasoning clearly and effectively.(Communication)

International (N) Description: This designation is always in conjunction with another program area: International courses promote the development of students' global and intercultural awareness. Students examine the cultural, economic, geographic, historical, political, and/or social experiences and processes that characterize the contemporary world, and thereby comprehend the trends, challenges, and opportunities that affect communities around the world. Students analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate their own and other people's understanding of an increasingly connected world.

- International Student Learning Outcomes:
  - Identify, describe, and explain the historical, cultural, economic, political, and/or social experiences and processes that characterize the contemporary world. (Content)
  - Analyze and reflect on the ways in which cultural, economic, political, and/or social systems and beliefs mediate understandings of an increasingly connected contemporary world. (Critical Thinking)
  - The international designation is always in conjunction with another category. Communication outcomes are listed in those subject areas.

Course Objectives and Goals

Student Learning Outcomes

Reflecting the curricular structures of Quest 2 and these Gen Ed designations, after taking Biodiversity in a Changing World, students will be able to:

1. Describe global patterns of biodiversity and analyze processes that create and maintain biodiversity.(**Content SLOs for Q2, Gen Ed Bio , and International)**
2. Utilize different methodologies to sample and calculate diversity (**Critical Thinking SLOs for Q2 and Gen Ed Bio)**
3. Summarize and evaluate research-based articles for evidence of anthropogenic activities altering biodiversity and, subsequently, ecosystem services. (**Critical Thinking SLOs for Q2, Gen Ed Bio, and International)**
4. Analyze and reflect on the ways in which approaches to measuring and making policy decisions about biodiversity are influenced by cultural, economic, political, and social systems and beliefs on local, regional, and global scales. (**Critical Thinking SLOs for Q2, Gen Ed Bio, and International)**
5. Critically reflect on course content in the context of their intellectual, personal, and professional development at UF and beyond. **(Connection SLO for Q2)**
6. Research a biodiversity hotspot and create a presentation to educate others about that region including detailed analysis of biodiversity threats as well as current or proposed mitigations and solutions. **(Communication SLO for Gen Ed Bio and Q2)**

To see how assigned work advances each SLO, go to page 4-5

Required Texts and Reading Materials

Assigned readings will be made available as the Canvas course page. Students may be asked to bring a printed or digital copy of the day's assigned reading to class every day;failure to do so may result in loss of participation points.

Readings (posted in Canvas as PDFs):

1. Excerpts from: Wood, Stedman-Edwards, and Mang. 2000.The Root Causes of Biodiversity Loss. Taylor &Francis, NY, USA.
2. Scheffers, B.R., L. De Meester, T.C.L. Bridge, A.A. Hoffmann, J.M. Pandolfi, R.T Corlett, S.H.M. Butchart, P. Pearce-Kelly, K.M. Kovacs, D. Dudgeon, M. Pacifici, C. Rondinini, W.B. Foden, T.G. Martin, C. Mora, D. Bickford, J.E.M. Watson. 2016. The broad footprint of climate change from genes to biomes to people. Science 354:aaf7671
3. Fletcher, R. J., et. al. 2018. Is habitat fragmentation good for biodiversity? Biological Conservation 226: 9-15.
4. Flory, S. L., et. al. 2018. Emerging pathogens can suppress invaders and promote native species recovery. Biological Invasions 20 (1), 5-8.
5. Magurran, A. E., & Dornelas, M. 2010. Biological diversity in a changing world. Philosophical transactions of the Royal Society of London. Series B, Biological sciences, 365(1558), 3593-7.
6. Keesing, F. et al. 2010. Impacts of biodiversity on the emergence and transmission of infectious diseases. Nature468: 647–652.
7. Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4 — Summary and Conclusions. Montréal, 20 pages.
8. Turner, R. et al. 2007. Global Conservation of Biodiversity and Ecosystem Services. BioScience. 57. 868- 873.9.1641/B571009.
https://www.conservation.org/publications/Pages/Will-Turner_Global-Biodiversity-

Conservation-Alleviation-of-Poverty.aspx
9. Turner, W.R., et al. 2012. Global Biodiversity Conservation and the Alleviation of Poverty. BioScience 62: 85–92.ISSN 0006-3568, electronic ISSN 1525-3244.

Grading Scale

I record your points on all assignments over the course of the semester in the Canvas gradebook, which translates total points into a letter grade using a standard grading scale:

A 93-100% of points possible	C 74-76.99%
A- 90-92.99%	C- 70-73.99%
B+ 87-89.99%	D+ 67-69.99%
B 84-86.99%	D 64-66.99%
B- 80-83.99%	D- 60-63.99%
C+ 77-79.99%	E <60

More information on UF grading policy is available at:
https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/.

Point Breakdown (1030 points)	**Points [% of total grade]**
Attendance [28 meetings (2 discretionary absences) @ 5 pts.]	130 points [13%]
15 Exit Slips (Questions/reflections turned in at the end of class)	300 points (20 pts/ea) [29%]
10 Weekly Assignments (summaries, reports, or case studies)	400 points (40 pts/ea) [39%]
Biodiversity Hot Spot Group Project	200 points [19%]

Details on graded elements (You must complete all assigned work to pass the class.)

- Attendance

On-time for all-class periods, and consistent attendance at 26 class meetings (28 class days allowing for 2 discretionary absences). Each class day is worth 5 points for a total of 130 points.

- Exit Slips

Students will be asked to turn in individual or group work from active learning exercises, answer questions, or provide a reflection at the end of certain class periods. There are 15 exit slips worth 20 points each for a total of 300 points.
Advances SLOs: 1, 2, 3, 4

- Assignments: Paper Summaries

For each paper assigned for class discussion, students will provide written synopsis answers to questions provided for selected reading(s). Guidelines will be provided in the Canvas course site. Four paper summaries are worth 40 points each.
Advances SLOs: 1, 3, 5

- Assignment: Sampling Lab Report

Students will complete this report as a culminating activity for the virtual forest sampling lab. The report guidelines and rubric will be posted to the Canvas site. This lab report is worth 40 points.
Advances SLOs: 1, 2, 3, 4

- Assignment: Chilly Flies/Rapid Evolution Report

Global climate change will likely have substantial impacts on living organisms and it is critical to examine how genetic variation may either facilitate or limit the ability for organisms to adapt to global climate change through natural selection. In an inquiry-based classroom activity, students

will use a chill-coma recovery assay to compare thermal tolerance among six different lines (3 fast recovering lines and 3 slow recovering lines) of the fly *Drosophila melanogaster*. The objective of the activity is to provide students the opportunity to assess natural genetic variation in cold tolerance in Drosophila melanogaster and to discuss the implications for this variation to allow adaptation by natural selection to occur, thus facilitating persistence of the species despite a changing climate. This activity will allow students to identify questions and concepts that guide scientific investigations, learn how to conduct a scientific investigation (including use of appropriate tools and techniques for data collection), how to use scientific technology and mathematics including a basic understanding of statistical testing and analysis, and to develop their critical thinking and communication skills. The report guidelines and rubric will be posted to the Canvas site. This lab report is worth 40 points.
Advances SLOs: 1, 2, 3

- Assignments: Case Studies

The purpose of a case study is to walk the audience through a situation where a problem is presented, background information provided, and a description of the solution (or potential solution) given. Students will work through several case studies involving biodiversity, climate change, epidemiology, and conservation provided by the National Center Case Study Teaching in science (https://sciencecases.lib.buffalo.edu/). The 4 case study assignments are worth 40 points each.
Advances SLOs: 1, 2, 4, 5

- Group Project Presentation

Students will research a biodiversity hotspot area and create a presentation to present in class on the region. Detailed instructions and rubric are available in the Canvas course site. This presentation is worth 200 points.
Advances SLOs: 1, 3, 4, 5, 6

Tentative Course Schedule

Please note the course schedule at the end of the document is tentative and may change (including readings and due dates). The most up-to-date information will be on the Canvas course page. Any changes will be announced via Canvas Announcements as well as in class.

Policies

Class Attendance

Class attendance is required. Students are allowed two discretionary absences (see "Attendance" under "Graded Work" above) to cover unexcused absences. Additional absences that meet the standard of "excused" per UF's policies [https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/] may be allowed, otherwise each absence beyond two will result in two points off the final grade.

Making Up Work

Work is due as specified in the syllabus. Late work is subject to a 10% point penalty for each 24 hour period it is late. To be excused from submitting work at the assigned time, you must confer with the instructor **in advance** and/or meet the UF standards for an excused absence.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352- 392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing UF's standard online evaluations (https://evaluations.ufl.edu) as well as a course-specific evaluation that focuses on course content and the experience of the Quest curriculum. Class time will be allocated for the completion of both evaluations.

Class Demeanor
Students are expected to arrive to class on time, stay the full class period, and behave in a manner that is respectful to the instructor and to fellow students. Electronic devices should be turned off and placed in closed bags. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be kept to a minimum.

Materials and Supplies Fees
There are no additional fees for this course.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Counseling and Wellness Center
Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/Default.aspx, 392- 1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Writing Studio
The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 302 Tigert Hall for one-on-one consultations and workshops.

Week	Date	Topics (tentative schedule- subject to change)	Due at the end of class
1	Tues Jan 10 Thurs Jan 12	Course Introduction Discussion – Losey & Vaughan 2006	
2	Tues Jan 17 Thur Jan 19	Distribution of biodiversity: patterns and processes Discussion:	Exit Slip 1: Patterns Assignment 1: Paper Summary
3	Tues Jan 24 Thur Jan 26	Cataloging biodiversity Florida Museum of Natural History Field Trip Case Study	Exit Slip 2: Field Trip Assignment 2: Hidden in Plain Sight
4	Tues Jan 31 Thur Feb 2	Biodiversity metrics – sampling and calculatingdiversity from samples Virtual Forest Lab Discussion	Exit Slip 3: Biodiversity Metrics Assignment 3: Virtual Forest Lab
5	Tues Feb 7 Thur Feb 9	Interdependence – Biodiversity and ecological networks Case: Who Set the Moose Loose	Exit Slip 4: Networks Assignment 4: Moose Loose Case
6	Tues Feb 14 Thur Feb 16	Guest Lecture: Dr. Andrea Lucky The role of taxonomy in conservation Climate Change and biodiversity	Exit Slip 5: Lucky Exit Slip 6: Climate Change
7	Tues Feb 21 Thur Feb 23	Discussion: Scheffers, et. al. 2016. The broad footprint of climate change from genes to biomes to people. Science 354: aaf7671 Guest Lecture: Dr. Brett Scheffers	Assignment 5: Paper Summary Exit Slip 7: Scheffers
8	Tues Feb 28	Habitat Fragmentation: Lecture and Discussion	Assignment 6: Paper Summary

	Thur Mar 2	Guest Lecture: Dr. Rob Fletcher	Exit Slip 8: Fletcher
9	Tues Mar 7 Thur Mar 9	Biodiversity and Public Health Discussion: Keesing	Exit Slip 9: Public Health Assignment 7: Paper Summary
10	Tues Mar 14 Thur Mar 16	SPRING BREAK	None
11	Tues Mar 21 Thur Mar 23	Case: Dilution Effect Case: Dilution Effect	 Assignment 8: Dilution Case

12	Tues Mar 28 Thur Mar 30	Chill Coma Lab Chill Coma Lab, Group Project Planning	 Assignment 9: Chill Coma Lab
13	Tues Apr 4 Thur Mar 6	Group Project Planning & Case Study Biodiversity conservation and the global community Guest Lecturer: Dr. Laure Katz, Conservation International	Assignment 10: Patagonia Land Grab Exit Slip 10: Katz
14	Tues Apr 11 Thur Apr 13	Presentations Presentations	Exit Slip 11 Exit Slip 12
15	Tues Apr 18 Thur Apr 20	Presentations Presentations	Exit Slip 13 Exit Slip 14
16	Tues Apr 25	Presentations and Course Evaluations	Exit Slip 15