BIOL 2310/2311: Problems Based Ecology

Spring Semester 2022, 4 credits

Lesson T/Th 2-3:15, Van Leer C240

Lab T/Th 3:30-6:15, Kendada 180

Instructors

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Overview

This is a problem-based learning class designed to provide you with a working, applied knowledge of the fundamental concepts and practices of ecology. The course is built around a series of five problems that introduce you to

techniques such as formulating questions and hypotheses, effective literature searching, experimental design, problem-solving, and effective communication. The activities in this class are designed to support your understanding of processes that structure communities and ecosystems in mechanistic, predictive ways. You will also develop and understanding of patterns of species interactions, human alteration of the biosphere, and the importance of environmental variation in both space and time.

Learning Objectives

By the end of the course, you will develop several skills that will serve you as a scientist and responsible citizen, no matter what profession you choose. These skills include:

1. Understanding essential ecological concepts and the history of their development.
2. Qualitative and quantitative representation of hypotheses.
3. Graphically and verbally specifying vague problems.
4. Performing effective literature searches and experimental methods.
5. Communicating results targeted to your audience, in the most economic and efficient ways possible.

Instructional format

Six hours each week are scheduled for the class. Although lecture and lab are nominally separate, in practice, there will be little difference in activities between these two periods. Very little of the class will be taught in traditional lecture, nor will there be canned labs. Instead, the course consists of five three week modules designed around formulating and solving problems that require ecological knowledge, skills, and approaches. You will work in small cooperative groups, using both lecture and lab periods to work on your problems. You will design and execute experimental or empirical tests of these problems. Group membership will shuffle during the course of the semester.

The following rules apply to all group work:

1. Everyone is responsible for making sure that all group members understand the problem and contribute to its solution.
2. Everyone must assist one another in understanding the material and in developing skills such as focusing questions, formulating testable hypotheses, performing effective literature searches, and writing.
3. Each group will prepare a joint (single) report. Each member of the group endorses the report by this submission, thereby indicating agreement with the group's conclusions, contribution to the report, and understanding of its contents. Since you will identify all the sources for your information, you must cite your sources. Violation of this policy is a violation of the GT Honor Code.

The instructors are here to facilitate your self- and group-directed learning as you search for, articulate, and present your solutions. Modules will typically begin with an instructor-led introduction to the problem. You will work with other group participants to define the problem, determine what you need to know to solve the problem, act on the problem, and present your findings. Lectures are not preplanned. Instead, the instructors will develop mini-lectures in response to student-identified needs for your learning process.

Course policies

Because of the heavy emphasis on group work accomplished during class, it is **required** **that you attend each and every class**, **that you be on time, and that you stay for the entire class period**. You are allowed 1 unexcused absence during the course. Unexcused absences are those other than health related issues or official university functions (*e.g*. sports). Please note that scheduling an interview, travel arrangements etc. are voluntary on your part and thus are unexcused, although we reserve the right to relax this condition under the right circumstances. Written verification of excused absences is required. Each unexcused absence beyond the first will decrease your final grade by at least

10%.

While much of your work will be in collaborative groups, there will be an individual midterm examination; you may not collaborate with anyone inside or outside of the class on this. Any violations of the GT Honor Code will result in referral to the Office of Student Integrity and penalty ranging from no credit for the assignment in question, to a grade of “F” for the class. We don’t want to see you fail, and we will be glad to answer questions about class activities and the Honor Code.

Grading

Each student in a group will earn the same grade for the group’s work. This will be based on the quality of your written and/or oral presentation. Part of your project grade will be determined by evaluations from both the instructors and your peers that will be completed after each assignment. Instructors will “debrief” you after each assignment to share with you their observations on your performance, obtain additional insights into your contributions and assess your knowledge of concepts directly. They also will address any to help you in acting as a more effective problem solver and group participant. You also will receive anonymous peer evaluations based on your group interactions.

Group project grades will count for 70% of your course grade (5 equally weighted assignments). All grading disputes must be settled within one week of the assignment’s or exam’s return date.

Evaluation

1. Group projects (Five equally-weighted module reports) 70%
2. Midterm examination 20%
3. Learning journal 10%

Text

There are no assigned readings for this course. We suggest the following two references. Information for the assignments will come from a variety of sources, including primary scientific literature, reference texts, and other materials you identify.

Gotelli, N. 2001. A Primer of Ecology (5th ed.) New York: Sinauer. ISBN 0878932739

Dodson, S. I. et al. 1999. Readings in Ecology. New York: Oxford University Press. ISBN 0195133099

Life in the time of COVID:

As you all know, the policy of the Georgia Board of Regents is that instruction has returned to normal in person mode. In addition, the team-based nature of this course, as well as our method of instruction requires class presence. Therefore, there is effectively no alternative to the attendance requirement either pedagogically or wrt to BoR policy. As per the previous attendance policy statement, class attendance is mandatory without a valid medical reason. I **strongly** recommend dropping this course if, for some reason or another, you are uncomfortable with in person instruction.

Here are steps you can take to keep yourself and the others around you safe:

1. Wear a mask. This is recommended although not required in GT buildings. Mask wearing reduces your risk of contracting COVID and more importantly, helps reduce transmission rates according to authoritative and comprehensive studies. NOTE: Masking is required on state owned property and therefore is required when we use state owned vans to go to our field sites in Modules 4 and 5.
2. Try to social distance when in groups.
3. Be fully vaccinated and boosted. You’ll have roughly a 10 fold lower chance of contracting COVID and a 10 fold lower risk of severe illness, according to most recent findings.
4. Minimize your risk by limiting participation in other gatherings or events, particularly those where individuals can not be assured to have followed 1-3 above.
5. Get tested regularly to make sure you are infection free.

*You should not come to class If you believe you have been exposed to COVID*. However, you will need to present evidence you were tested no more than 48 hours prior to, or no more than 24 hours later than, the missed class.

Schedule of Topics and Assignments (subject to modification)

Dates given should be considered guidelines only. In general, you can count on a final paper and oral presentation, or both, being due on the last day of each of the five problem modules.

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| Week  Dates | Topics | Assignments |
| 1  1/10-1/14 | Introduction to problem based learning  Effective group dynamics  Literature searches |  |
| 2-3  1/17-1/28 | Module 1: Single species population dynamics  Presentations due 1/27; Paper due 11:55 PM 1/28\* | Problem 1: Black-footed ferret conservation |
| 4-6  1/31-2/18 | Module 2: Multi-species interactions  Presentations 2/17; Paper 2/18 | Problem 2: Building a predator-prey system for introductory ecology classes |
| 7-9  2/21-3/11 | Module 3: Communities and human impacts  Midterm-2/24  Presentations 3/10; Paper 3/11 | Problem 3: Fisheries, invasive species and community disruption |
| 10-12  3/14-3/18  3/28-4/8 | Module 4: Communities-change through space and time  Presentations 4/7 Paper 4/8  Break 3/21-3/25 | Problem 4: Community composition and change in granite outcrops |
| 13-15  4/11-4/26 | Module 5: Ecosystems and human impacts  Presentations and Paper SUBJECT TO DISCUSSION | Problem 5: Ecosystem health of local Atlanta watersheds |

\* unless otherwise noted, all papers will be due 11:55 PM