

Biology 245 Ecology - Fall 2020 Course Syllabus

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Organizations of species and individuals...exist in a state of interdependence (Möbius).
A struggle for existence inevitably follows (Darwin).

All science is involved with discovering the rules of the game of nature. Regardless of the level on which the game is played (i.e., physics, chemistry, or biology), the goal of science is the same: to interpret the rules well enough to construct predictive models about how nature works. Ecology is a relatively recent, mongrel, scientific discipline with its roots in natural history and evolutionary biology. It is really the science of natural selection, since it involves studying how organisms interact with their environments. When I was an undergraduate there was no course in ecology *per se* at many colleges and universities; thus, I did not discover ecology until graduate school. Today we have professional ecologists with backgrounds in biochemistry, computer science, and astrophysics, all working to discover patterns and processes in nature that contribute to the central question in ecology: what explains the distribution and abundance of organisms on our planet?

The most interesting things about any science are the examples thereof. Development of theory from hypothesis testing is best learned by looking at the results of experiments and descriptive studies. Toward that end we will be looking at examples of ecological studies that are published in the peer-reviewed primary literature.

The topics in this course are chosen to give you a survey of the current "state of the art" in the science of ecology. In addition, we will be examining the relationship between basic biology and environmental concerns such as overpopulation and the preservation of the earth's remaining biological diversity in the era of the sixth mass extinction since the Cambrian Explosion. If you glance through your text (M. C. Molles, *Ecology: Concepts and Applications*, 8th ed.), you will see the subject arranged hierarchically by increasing system complexity. We will follow this approach in class, but the lecture will not be a rehash of the book. If you read the book before coming to class, the lecture material will make more sense to you than if you wait until later to read it.

General goals of this course

- 1. Effective scientific communication.** Quizzes and reports graded for clarity as well as factual content. Classroom discussion evaluated on the basis of lucid, informed participation. Oral and written reports require synthesis of concepts and procedures.
- 2. Use and understanding of the scientific method.** Learn science as a logical progression from generation and testing of hypotheses through development of theory, using examples from the primary (peer-reviewed) literature. Examine how the scientific process applies to ecological systems.

3. **Knowledge of major concepts in biology.** Learn how to think like an ecologist. Examine the levels of organization in ecology, from populations through ecosystems; dynamics of populations and communities; interactions such as competition, predation and parasitism.
4. **Use tools and techniques of science.** Learn aspects of the basic methodology and data analysis used by ecologists.
5. **Scientific literacy.** Reading and critical evaluation of primary literature. Examine relevance of scientific findings to current events.

In addition to the text chapters, there are some relevant publications for you to read, enumerated on the class schedule, with copies on the course Canvas site. This is where you learn how the science is done, not just what the conclusions are (those are in the text and lecture material). You will need to read and be prepared to discuss these by the time you come to class the days they are assigned. I will feel free to call on any of you to contribute to the discussion.

There are 600 course points, 150 of which come from the lab. The laboratory will consist of two field projects, each of which will involve a written and/or oral report. For the lecture points, there will be four quizzes of equal weight (100 each), but no cumulative final exam. The remaining 50 course points will be allotted to my judgement of the quality of your participation and effort.

Our lab meetings involve field work (we will not meet indoors), so dress accordingly (sturdy shoes, long pants, insect repellent, sun block, etc.). Keep a notebook. Your assigned reports should contain information not only on what you did on a given day, but a description of the field(s), weather, general impressions of methodology, and any unexpected things that come up. **Attendance in lab is mandatory; face masks (mouth and nose covered) and “social distancing” are required.**