

Instructor: Dr. Jennifer Fox
Regents 373
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Lecture: MTRF 8:15-10:15
Regents 239
Laboratory: MTRF 10:30-1:10
Regents 361

Office Hours: TR 1:15-2:15
or by appointment

Course Goals and Objectives

In the course, you will become acquainted with the process of evolution, the astonishing diversity of living organisms that has evolved through this process, and the complex ecological interactions that occur among species. In addition to introducing basic concepts of evolution and ecology, this course promotes an understanding of science as a process and provides opportunities to practice writing clearly and concisely about biology.

Course Expectations

I expect you to come to each class prepared, to treat all members of the class with respect, and to turn assignments in on time. You can expect the same from me in return.

Lectures

Attendance at all lectures is important and expected. You are responsible for all information presented in lectures, including any announcements and course content not found in your textbook. Your active participation is expected. Participation entails coming to class prepared, listening actively, and speaking up when required. You may be asked to take a specific stance in a class debate, work in small groups, answer “clicker” questions, or make a brief presentation to the class. Of course participation is not possible if you are not here, so you must come to every class on time.

Readings

Our text is Morris et al.'s *Biology: How Life Works* and Pechenik's *A Short Guide to Writing about Biology*, any edition. Please take advantage of the additional materials included with the text and online (see link on course Canvas site). Additional readings will be distributed in class or available on the course web site. Assigned readings should be *completed* by the date listed on the syllabus.

The lectures and readings for this course are designed to supplement, not repeat, each other. We will talk about topics in class that are not covered explicitly in the readings, and you will read about things that we will not discuss in much detail. I often use different examples than the text in order to give you an additional perspective or to highlight different aspects of a subject. Therefore, to do well in this course you must attend all lectures *and* keep up with the readings.

Quizzes

In order for you to assess how well you are keeping up with the material, we will have several quizzes. These quizzes are non-cumulative and cover material from previous lectures, readings, and assignments as well as readings assigned for the current day. All quizzes will be given at the start of class. Your lowest quiz score will be dropped. It is not possible to make up a missed quiz; be sure to account for traffic or Metro delays when planning your trip to campus each day.

Laboratory

Your attendance and active involvement in all labs is required. To get the most out of your laboratory experience, preparation is essential. Come to lab prepared and you will perform efficiently, minimize mistakes, work effectively with your lab partners, and finish the exercise within the time period. Most importantly, you will understand what you are doing and why. It is not possible to make up a missed lab. You will receive more detailed information about the expectations for this portion of the class in your lab section. Please note that two or more unexcused absences from lab will result in failing the entire course.

Learning Goals

The Department of Biology at Georgetown has developed a set of learning goals for all Biology majors. These goals both guide the organization of the curriculum in our department and also serve to explicitly communicate to students the knowledge and intellectual skills that we value as a foundation to your education as biologists. We will address all of these goals in both the lecture and laboratory portions of Foundations in Biology II, with special emphasis on the goals below in bold. You can access a more detailed description of the learning goals at <http://biology.georgetown.edu>.

Insight into the Process and Product of Science

These learning goals emphasize our belief that a biology education should enable students to make creative and careful use of their knowledge. Only then will they be scientists.

1. Integration of new knowledge into existing intellectual frameworks
- 2. Engagement with scientific inquiry**
- 3. Representing and interpreting data in quantitative and statistically meaningful forms**
4. Communicating scientific understanding in oral and written forms
- 5. Appreciating the epistemology of science**

Fundamental Biological Concepts

A major theme that rises above the categories of fundamental biological concepts that we describe below is that all of biology operates under the constraints of the mechanisms of evolution. It is therefore **essential that Biology students have a strong foundational understanding of the theories, evidence, and mechanism of evolution.**

6. Organization of molecular, cellular, organismal and ecological systems
- 7. Evolution as a framework for understanding biological systems**
8. The flow of biological information
- 9. Flow of energy and matter in biological systems**
- 10. Interdependence and interactions within biological systems and their emergent properties**

Evaluation and Grading (Tentative)

Your performance in these courses will be evaluated based on the following percentages.

Biol 106 (lecture, 3 credits):

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|------------------------------------|-------------|
| Unit 1, Unit 2, Unit 3 exams | 26, 28, 30% |
| Quizzes | 10 |
| In-class work | 6 |

Biol 116 (lab, 2 credits):

| | |
|--------------------------------------|-----|
| Pre-lab and in-lab assignments | 15% |
| Lab reports (3) | 60 |
| Lab exams (3) | 25 |

Final grades will be assigned based on the following percentages: A = 93.3-100%; A- = 90.0-93.3%, B+ = 86.6-90.0%; B = 83.3-86.6%; etc.

There will be a lecture exam and a lab exam at the end of each unit. All exams are innately cumulative. While the questions on each exam will focus on the most recent material and lectures and labs from that Unit, the concepts build on each other and you will be expected to be able to integrate ideas throughout the term. The final exam (Unit 3) will also include synthetic questions that cover material presented throughout the term; we will discuss more details in class.

Before each lab, you will prepare a short, pre-lab assignment intended to get you ready for that day's activity. During each lab period you and your lab partner(s) will work toward completing an in-lab assignment. Collaboration is encouraged on these in-lab assignments. But you must not free-ride on your partner's work. Studies show that working collaboratively enhances learning; common sense says that free-riding does not have the same effect. At the culmination of each of the three units of lab a Report is due. This Report must be entirely your own work.

Dates and Deadlines

As Ben Franklin almost said, nothing is certain but death, taxes, and deadlines. In this course deadlines are imposed not only to prevent you from falling behind, but also to ensure that your work can be returned to you in a timely manner. Exceptions will be made in cases of serious illness or family emergency and reasonable allowances will be made to accommodate other conflicts if they are brought to my attention *before* the deadline. A late assignment will lose 5% of its value every 24 hours and will not be accepted after a week (counting days that class does not meet, including weekends). Because pre-lab assignments are designed to get you ready for the lab, pre-lab assignments cannot be turned in late. **An assignment is not considered complete until you have uploaded the electronic copy to Canvas or given the hard copy to your instructor.**

There will no make-up exams or quizzes, regardless of circumstances. To be excused from an exam due to a *documented* family emergency or illness, you must notify me *before* the exam and provide appropriate documentation. If you miss an exam for any other reason or fail to notify me in advance, you will receive a zero.

Academic Integrity

Science is by its nature a collaborative enterprise and you will work closely with your lab partners and other students throughout this course. We encourage you to discuss the concepts from lab, the outcome of your experiments, and how to best interpret or present your results. **All written work, however, must be produced independently unless it is specified that you can work together on the assignment.** As a general rule, any time you share a document or file other than raw data, you are sharing too much.

Copying from published or online sources (including this lab manual) or from classmates, failing to give full credit for quotations or ideas, 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. Moreover, it is simply wrong, and undermines the mutual trust on which an academic community must be based. Plagiarism will not be tolerated. If you are ever unsure about whether you should credit a source, err on the side of over-citing and ask for guidance. Please refer to <http://honorcouncil.georgetown.edu/system/policies>

Better Living Through Silicon

It is easy to take computers and all they do for us for granted – until they fail. It is your responsibility to keep your computer in good working order and to back up your files regularly. Don't learn the hard way how valuable the cloud – e.g., Google Drive, Dropbox, Box, etc. – can be for you. If your own computer is not working, there are public computers in most buildings on campus. I do not accept excuses for late or missing work resulting from lost files, computer crashes, printers without ink, or inability to access Canvas or other Internet resources.

The Canvas site for this course can be accessed at <http://georgetown.instructure.com> using your NetID and password. You will find a copy of this syllabus, announcements pertaining to the course, lecture outlines and slides, lab handouts, and any additional readings, handouts or slide shows used in lecture or lab.

I will use your @georgetown.edu account to contact you via e-mail. Please remember to check your e-mail frequently. If you use another e-mail account, please set up your @georgetown.edu account to automatically forward mail to that account.

Cell phones and other mobile devices should be turned off and put away and no text messages sent or received during class.

A Special Note About Summer School

Our summer course will be an intense experience as we cover the same material and concepts as a semester-long course in about a third of the time. During the summer session you have the opportunity to immerse yourself in the topic at hand and to focus on this one course in a way that is not possible during a typical semester, and this can provide a rewarding and productive experience.

However, you must recognize that there is no time to procrastinate. Something important (an exam, a laboratory assignment, a quiz) occurs every day. Because of the cumulative nature of the material, you must get your questions answered as soon as possible, before we move on to new topics that build on the old. The best strategy is to establish a routine that includes time set aside for biology every single day. Work hard and keep up, and get help as soon as you need it, and you'll do well.

Absences

Attendance and participation at all classes is expected, and multiple unexcused absences will negatively impact your grade. Absences due to approved events, such as religious holidays or University-sanctioned activities, should be discussed with me beforehand so that we can make suitable arrangements. Routine or excessive tardiness will be treated as absences. *Regardless of your reason for missing a class, YOU are responsible for finding out what you missed, getting copies of anything distributed in class, and turning in any work collected.*

Extra Help

The best way to learn is to teach others. I strongly encourage you to take advantage of the collective wisdom of your classmates – let your discussions spill over into time outside of formal class meetings, work together to discuss readings and prepare for class, form informal study groups. *The production of all assignments, however, should be your own work.*

Requests for academic accommodations must be formally filed with the Academic Resource Center (ARC). It is your responsibility to self-identify with the ARC. To schedule an appointment, stop by Leavey Center Suite 335 or call (202) 687-8354. Note that there are no retroactive accommodations.

I strive to create a learning environment that supports a diversity of thoughts, perspectives, and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this, please contact me (in person or electronically) with any suggestions.

I am committed to supporting survivors of sexual misconduct, including relationship violence, sexual harassment, and sexual assault. However, university policy also requires me to report any disclosures about sexual misconduct to the Title IX Coordinator, whose role is to coordinate the University's response to sexual misconduct. Georgetown has a number of fully confidential professional resources who can provide support and assistance to survivors of sexual assault and other forms of sexual misconduct. More information about campus resources and reporting sexual misconduct can be found at sexualassault.georgetown.edu.

I check my email regularly but not constantly, and infrequently in the evening or on weekends. If you can't wait at least 24 hours to receive a reply, it is better to call my office or come to my office in person. I am available during my office hours and am happy to make appointments in order to discuss biology, course specifics, or other matters. If you are having difficulty with the course, please come and see me – the sooner the better – so that we can address the issues before it is too late. If you are enjoying the course, stop by to discuss topics we're covering or things we aren't getting to. I am interested in your questions, comments, and suggestions about this course.

I look forward to spending the semester exploring the diversity of life with you!

Biol 106/116 – Foundations in Biology II Schedule (Tentative)

Summer 2019

| Date | Lecture Topic | Reading | Lab Exercise | Lab Assignments Due |
|-----------|---|---|---------------------------------------|--|
| M June 3 | Administrivia: Evolution | Ch. 1 (esp. 1.1, 1.4-1.6) | Introductions | Complete survey |
| T June 4 | Darwin and Evidence for Evolution | Ch. 23.3, Fig. 23.20, Freeman 24.2, Origin Ch. 14 | 1. Variation | Pre-lab 1: Variational thinking In-lab 1: Seeing variation |
| R June 6 | Sources of Variation [Q] | Chs. 15 (esp. 15.1), 18 | 2. Darwinian Snails [L] | Pre-lab 2: Darwin's postulates In-lab 2: Snails questions |
| F June 7 | Hardy-Weinberg Model [Q] | Chs. 16, 21.1-21.3, Freeman Ch. 25.1 | 3. Field Trip: Natural History Museum | Pre-lab 3: Natural selection In-lab: 3 NMNH review |
| M June 10 | More H-W and Evolutionary Processes [Q] | Ch. 21 | 4. Evolutionary Forces [L] | Pre-lab 4: Evol. forces predictions In-lab 4: Evol. forces results |
| T June 11 | Natural Selection and Adaptation | Ch. 21.4, Judson, Jacob | 5. Speciation [L] | Unit 1 Report (Darwin Letter) In-lab 5: Speciation questions |
| R June 13 | Unit 1 Lecture Exam Speciation | Ch. 22 | Unit 1 Lab Exam | |
| F June 14 | Phylogenies & Systematics [Q] | Ch. 23.1-23.2 | 6. Phylogenies | Pre-lab 6: Phylogeny questions In-lab 6: Fruit phylogeny |
| M June 17 | Origins of Life; Prokaryotes | Ch. 23.3-23.4, Ch. 26, Case 5 | 7. Molecular Phylogenetics [L] | Pre-lab 7: Mol. phylog. questions In-lab 7: Molecular phylogeny |
| T June 18 | "Protists" [Q] | Ch. 27 | TBA | |
| R June 20 | Multicellularity [Q] | Ch. 28 | Spring break! No lab | |
| F June 21 | Plants and Fungi | Chs. 30.1-30.2, 33.1, 29.2, 34 | 8. Field Trip: Botanic Garden | Unit 2 Report (Mol. Phylogeny) Pre-lab 8: Plants In-lab 8: Botanic Garden questions |
| M June 24 | Animals & Move Onto Land [Q] | Ch. 44, 42.2, 29.1 | 9. Hypothesis testing: Termites | Pre-lab 9: t-test worksheet In-lab 9: Termite data & questions |
| T June 25 | Unit 2 Lecture Exam Intro to Ecology, Populations | Ch. 46 | Unit 2 Lab Exam | |
| R June 27 | Populations, Communities | Ch. 47.1-47.4, Case 7 | 10. Arthropod Diversity | In-lab 10: Arthropod counts |
| F June 28 | Communities, Ecosystems [Q] | Chs. 47.5-47.6, 25 | 11. Field Trip: National Zoo | Pre-lab 11: Animals In-lab 11: Zoo questions |
| M July 1 | Ecosystems [Q] | Chs. 47.5-47.6, 25 | 12. Forest Ecology | Pre-lab 12: Annotated Bibliography In-lab 12: Forest BINGO |
| T July 2 | Photosynthesis and Conclusions | Ch. 8, Ch. 49 | No lab | Unit 3 Report (Arthro. Diversity) |
| R July 4 | Independence Day: No class | | Independence Day: No lab | |
| F July 5 | Final/Unit 3 Lecture Exam | | Unit 3 Lab Exam | |

[Q] = Quiz at start of class

[L] = Bring laptop to lab

Readings from: Morris et al. 2016. *Biology: How Life Works*, 2nd ed. W.H. Freeman and Company, New York, NY. Additional readings posted on Canvas.

This schedule is tentative and subject to change (with notice!)