Biol 106/116 – Foundations in Biology II — Summer 2023

Tentative syllabus and schedule

Instructor: Dr. Jennifer Fox
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Lecture: MTRF 8:30-10:35
Laboratory: MTRF 10:50-1:20

Office Hours: TBD

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. 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 work in small groups, answer poll 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* (3rd ed., but older editions are fine) and Pechenik's *A Short Guide to Writing about Biology* (any edition). Additional readings will be distributed in class or available on the course web site. Assigned readings should be read before 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.

Problem Sets

In order for you to assess how well you are keeping up with the material, we will have several problem sets. These are non-cumulative and cover material from previous lectures, readings, and assignments as well as readings assigned for the current day. Your lowest score will be dropped.

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.

How can you best prepare for the lab? The most important thing you can do each for each lab is to **read the lab exercise and associated readings beforehand and come ready to engage.** Make notes in the margins of the lab assignments. Draw up a flow chart or outline. Write down questions about procedures or concepts that are not yet clear to you. Ask your classmates how they are studying and preparing.

Throughout each lab document you will see questions in *italics*. These are intended as thought questions or as a way to check your understanding. If you find yourself struggling to answer them, you should consult the textbook or ask your instructor or SAA for guidance. After you have completed each lab, go back and reread the introduction. You may find new insights by reading the material after you have gotten your hands wet.

Have a separate notebook dedicated to the lab section of this course. Use it to take notes during the recitations and pre-lab lectures, record updates or changes to procedures described in the lab manual, collect data, sketch graphs, work out methods, and make notes to yourself for your write-ups. Always make sure that you have a copy of any data or information in case your lab partner isn't in lab.

Please note that two or more unexcused absences from lab will result in failing the entire course. If you have a legitimate reason for missing a lab, you must discuss it with me **in advance.**

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 assessed based on the following percentages.

Biol 106 (lecture, 3 credits):

Highest, Middle, Lowest exams	26, 23, 21%
Problem sets	20
In-class participation	10

Biol 116 (lab, 2 credits):

Pre-lab and in-lab assignments	24%
Lab reports (3)	60
Lab exams (3)	16

Final grades will be assigned based on the following percentages: A = 93.33-100%; A- = 90.00-93.32%, B+ = 86.67-89.99%; B = 83.33-86.66%; etc.

There are two types of assessments in this course: formative and summative. Formative assessments allow you (and me, but mostly you!) to monitor your learning progress, and help you to identify your strengths and weakness in understanding the material so you know better what to focus on. In-class work, problem sets, pre-lab and in-lab assignments are examples of formative assessments. Summative assessments evaluate your mastery of the material and ability to explain it. The unit reports and exams are summative assignments for this course. Formative assessments will be graded for correctness and completion, summative assessments are evaluated for correctness.

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 pre-lab and in-lab assignments. You can discus back and forth about how to answer something and then mutually agree on what the answer should be—that's collaboration—but you may not copy and paste a worked-out answer from your partner, or divide the questions and each answer a subset while working alone. This is not collaboration and it violates the spirit that we're trying to encourage. Studies show that working collaboratively enhances learning; common sense says that free-riding does not have the same effect. If you do work together on a common document, list names of all contributors when turning it in.

Each unit ends with lecture and lab exam. 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. At the culmination of each of the three units of lab a Report is also 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. 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. If you find yourself struggling to keep up with course assignments and material, please reach out to Prof. Fox as soon as possible.

Absences

Attendance and participation at all classes are 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***.

A note from the pandemic: The above is the standard attendance policy. It is based on solid pedagogical purposes – attending lecture and lab and being part of the group learning that occurs in this course and has been shown to improve learning. Simply put, students who attend class in person do better in all aspects of the course. But public health sometimes trumps pedagogy, and you may need to quarantine due to COVID or another illness. If you do need to miss class, good communication is key. Please contact Prof. Fox as soon as you know that you will miss a lecture or lab so that we can make alternative arrangements.

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 the lab assignments) or from classmates or previous students, failing to give full credit for quotations or ideas, consulting unauthorized sources during an exam, 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 honorcouncil.georgetown.edu/system/policies and look at the "Academic Integrity" document in the lab manual for more details.

Inclusivity and Diversity

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.).

- Let me know if you prefer a name and/or set of pronouns that differ from official records.
- If you feel like your performance in the course is being impacted by your experiences outside of class, please don't hesitate to talk with me. If you prefer to speak with someone outside of the course, your academic dean or the Office of Student Affairs are excellent resources.
- We are all on the continuum of learning about diverse perspectives and identities. As a participant in course discussions, work to honor the diversity of your classmates. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me.

In an ideal world, science would be objective. However, much of science is subjective and is historically built on a small subset of privileged voices. I acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Please contact me with your suggestions to improve the quality of the course materials.

I am committed to supporting survivors and those impacted by of sexual misconduct, including stalking, 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. The coordinator, in turn, will reach out to you to provide support, resources, and the option to meet. 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 options for reporting sexual misconduct is at sexualassault.georgetown.edu

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.

The Canvas site for this course can be accessed at 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.

Intellectual Property and Copyrights

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More information about intellectual property and copyright and about computer acceptable use policy and intellectual property can be found at the following websites: https://www.library.georgetown.edu/copyright and https://security.georgetown.edu/it-policies-procedures/computer-systems-aup

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, email ARC@georgetown.edu or call (202) 687-0077. Note that there are no retroactive accommodations.

I check my email regularly but not constantly, and infrequently in the evening or on weekends. 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 reach out – 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.

Special Notes 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 quarter 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 experience.

However, you must recognize that there is no time to procrastinate. Something important (an exam, an assignment, a report) occurs almost 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.

Just as with a course during the academic year, you should expect to spend 2-3 hours on your own outside of each scheduled hour of lecture. The best strategy is to establish a routine that includes time set aside for biology every single day in a space with minimal distractions. Work hard and keep up, seek help as soon as you need it, and you'll do well.

We look forward to spending the term exploring the diversity of life with you!!

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Summer 2023 Tentative Schedule

Date	Lecture Topic	Reading	Lab Exercise	Lab Assignments Due
M June 5	Administrivia; Evolution	Ch. 1 (esp. 1.1, 1.4-1.6)	Introductions	Complete survey
T June 6	Darwin and Evidence for Evolution	Ch. 22.3, Fig. 22.22, Freeman 24.2, Origin Ch. 14	1. Variation	Pre-lab 1: Variational thinking In-lab 1: Seeing variation
R June 8	Genetics Sources of Variation [PS]	Chs. 14 (esp. 15.1), 17	2. Darwinian Snails [L]	Pre-lab 2: Darwin's postulates In-lab 2: Snails questions
F June 9	Hardy-Weinberg Model	Chs. 15, 20.1-20.3, Freeman Ch. 25.1	3. Field Trip: Natural History Museum	Pre-lab 3: Natural selection In-lab: 3 NMNH review (due Monday)
M June 12	More H-W and Evolutionary Processes [PS]	Ch. 20	4. Evolutionary Forces [L]	Pre-lab 4: Evol. forces predictions In-lab 4: Evol. forces results
T June 13	Natural Selection and Adaptation	Ch. 20.4, Judson	5. Speciation [L]	**Unit 1 Report (Darwin Letter)** In-lab 5: Speciation questions
R June 15	Speciation	Ch. 21	6. Phylogenies	Pre-lab 6: Phylogeny questions In-lab 6: Building trees
F June 16	Phylogenies & Systematics	Ch. 22.1-22.2	**Unit 1 Lecture and Lab Exams**	
M June 19	Juneteenth: No class		Juneteenth: No lab	
T June 20	Origins of Life; Prokaryotes [PS]	Ch. 22.3-22.4, Ch. 24, Case 5	Spring break! No lab	
R June 22	"Protists" and Multicellularity	Ch. 25, 26	7. Molecular Phylogenetics [L]	Pre-lab 7: Mol. phylog. questions In-lab 7: Molecular phylogeny
F June 23	Plants and Fungi [PS]	Chs. 27.1-27.2, 31, 32	8. Field Trip: Botanic Garden	In-lab 8: Botanic Garden questions
M June 26	Animals & Move onto Land	Ch. 33.1, 33.4, 42 (skim), 40.2, 27.1	9. Hypothesis testing: Termites	**Unit 2 Report (Mol. Phylogeny)** In-lab 9: t-test questions, experiment
T June 27	Intro to Ecology, Populations	Ch. 44	**Unit 2 Lecture and Lab Exams**	
R June 29	Populations, Communities [PS]	Ch. 44, 45	10. Arthropod Diversity	Pre-lab 10: Arthropod samples In-lab 10: Arthropod identifications
F June 30	Communities, Ecosystems [PS]	Chs. 45, 46 (Ch. 25 in 2nd ed.)	11. Regression [L]	Pre-lab 11: Invertebrates In-lab 11: Regression Analyses
M July 3	Ecosystems and Photosynthesis [PS]	Chs. 46, 8	12. Forest Ecology	Pre-lab 12: Annotated Bibliography In-lab 12: Forest BINGO
T July 4	Independence Day: No class		Independence Day: No lab	
R July 6	Conclusions	Ch. 49	No lab	**Unit 3 Report (Ecol. Diversity)**
F July 7	**Final/Unit 3 Lecture Exam**		**Unit 3 Lab Exam**	

This schedule is tentative and subject to change. The most up-to-date version is on Canvas. [PS] = problem set [L] = bring laptop to lab

Readings listed are chapters from Morris et al. *How Life Works*, 3rd edition. See Canvas for other required and suggested readings.