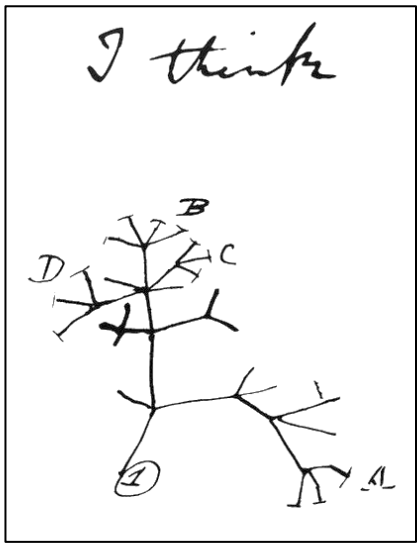
Biology 2200—Summer session III, 2019

Dr. Priscilla Erickson (she/her/hers)

10:00AM-12:15 PM Monday through Friday; Gilmer 166
1:00PM-3:30PM Monday through Friday; in your assigned lab section or TBA



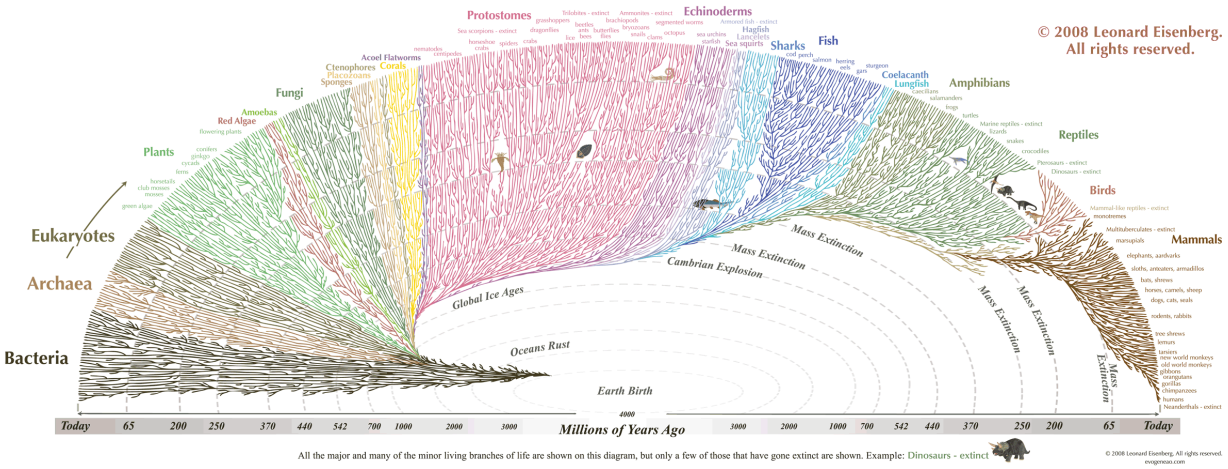
There is grandeur in this view of life…from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.

Charles Darwin, On the Origin of Species, 1859

Nothing in biology make sense except in the light of evolution…without that light it becomes a pile of sundry facts, some of them interesting or curious, but making no meaningful picture as a whole.

Theodosius Dobzhansky, 1973

Welcome! Our world is full of "endless forms most beautiful"—different organisms with crazy, awesome, and stunning features that make them exquisitely adapted to nearly every environment imaginable. Where did life come from and how did it get so diverse? What *was* Darwin thinking in the sketch above, and how did it change the world? And how did our understanding go from that little sketch to the sprawling, ever-changing tree of life depicted on the next page? On our journey, we will tackle timely questions such as: why are bacterial infections so good at evading antibiotics? and how might organisms evolve in the face of climate change? Over the next four weeks, you will learn how to approach the biological world through the lens of an evolutionary biologist. You will discover the tremendous diversity of life on earth that has arisen via evolutionary processes and appreciate how humans interact with these diverse organisms. Lastly, you will contemplate your own body, thinking about how billions of years of evolution have shaped how your organs work to maintain internal stability in an ever-changing environment. In the long run, this evolutionary lens will provide insight for your future studies in biology, and the scientific thinking and collaboration skills you learn in this course will be applicable to problem solving in many realms of your life.



By the end of this summer, your own thinking about biology will evolve in the following ways:

- You will be able to **explain** how populations evolve via the process of natural selection and **extrapolate** how small changes over time drive major innovations and produce diversity
- You will be able to **compare and contrast** the main features of different groups of life (e.g. energy acquisition, reproduction, interacting with environment)
- You will **be aware of** the ways in which humans interact with different groups of organisms, both positively *and* negatively, and **recognize the value** of biodiversity
- You will **describe** how your own organs work together to maintain homeostasis
- You will **connect** evolutionary principles to important topics in human medicine and global issues such as climate change
- You will perform like a scientist by: **formulating** hypotheses to explain observations, **designing** experiments to test your hypothesis, **interpreting** data from actual scientific research and **drawing conclusions** based on your knowledge of living systems
- You will **take responsibility for** your own learning and see how you can use your knowledge to **engage** and **collaborate** with your peers to solve problems
- **Reflect on** what you have learned and identify areas that still need work

The forces of evolution (in this class):

There are four main forces of evolution in nature, but there are five main tools that we will use in our explorations to help you gain a new understanding and apply it to the real world. Remember, these are *your* tools to help *you* learn!

Collab:

- The course Collab site is your one-stop-shop for a full schedule, all assignments, and grade information

Piazza:

- Please use Piazza rather than email for *all* questions about course content
- You are encouraged to respond to your peers' questions!
- Enroll at: piazza.com/virginia/summer2019/biol2200

Textbook: Please bring to class every day!

- Campbell Biology, 11th Edition. Your textbook is your primary resource to gather information for each of our focal topics
- Mastering biology account (must purchased along with textbook). Please see details about registration on Collab.
- Optional online supplemental lecture videos to help you summarize and synthesize the text will be posted on Collab

Laboratory materials:

- Lab manual ISBN 978-1-323-72016-5, available only through the UVA bookstore
- Simbio account (separate account; registration information will on Collab and sent via email). Needs to be set up by 10am on Tuesday, July 9th ! (that's tomorrow if you are reading this on the first day of class!)
- Dissecting kit (purchase from UVA bookstore by the end of week 2)
- Please review the detailed description of laboratory policies on Collab

In-lecture activities:

- Some activities will require the use of a computer to watch videos or interact with data. Please bring an internet-enabled device (tablet or laptop) to each class. If you do not have regular or reliable access to such a device, please see me as soon as possible to discuss possibilities.
- Handouts and/or web links will be distributed in class, posted on Collab, or announced in lecture as appropriate.
- Any supplies necessary for activities will be provided by the instructor

How will your knowledge evolve?

A huge body of research shows that you will learn more if you actively practice working with the material *in class with your peers*. That means you need to come to class having a baseline familiarity in order to be successful! You will read approximately one chapter

per night and complete homework assignments to help check your understanding. At times it will seem overwhelming, but stick with it! When you come to class, we will review some key points, and then you will collaborate in teams (just like scientists do!) to apply your knowledge, think critically, and solve problems. Preparing ahead of time will give you the tools you need to collaborate with your team. **The full schedule is available on Collab, but a brief outline of some key questions and dates appears below:**

Unit 1: How does evolution work? (Lectures 1-5)

Unit 2: What has evolution made? (Lectures 6-12)

Unit 3: How does our anatomy and physiology reflect adaptation? (Lectures 13-18)

How will we track your own evolution?

Homework (Mastering biology online questions):

One important aspect of any introductory class is teaching you *how to learn* about the subject. In this course, the responsibility to learn basic material lies primarily on you. Doing so will help you distill the most important ideas from a complex set of information and synthesize multiple examples into common themes. Our textbook has a thorough set of online resources to help guide and focus your independent learning. After completing the assigned reading and optional videos, you will answer a series of questions designed to gauge your understanding. Don't worry—you'll get multiple chances to get each question right with a small penalty for wrong ansers, and you can use your book or other resources to answer the questions. These questions will keep you on track with the reading, help you see where you are and also help me see how the class is doing as a whole.

In-class activities:

Scientists don't usually listen to lectures all day—they work in teams to ask questions and solve problems. Did you know that actively engaging with material (rather than just listening to a lecture) has been shown to increase exam scores by 6% and reduce course failure rates by nearly half? Active learning also helps students with less prior experience with the material perform more strongly. For some activities in class, your team will report back to the class as a whole so that you can share ideas and learn from each other. For other activities, you may be asked to turn in a group or individual worksheet. These assignments, though ungraded, provide me the opportunity to read and respond to your thinking process so that you can improve before exams.

Exams:

Exams are part of the learning process, too! The first section of each exam will consist of a mixture of questions that assess your basic comprehension of the material (multiple choice, fill in the blank, true/false, short answer). This content-based section will not be cumulative—it will only focus on the lectures covered in that exam. The rest of the exam will consist of problems that ask you to apply what you've learned to various forms of scientific thinking. In this part of each exam, I will expect you to build on concepts you have learned throughout the course. These questions will be thematically connected across exams so that the exams build their own scientific story as they go. Remember, the group activity work that we do in class will give you many opportunities to practice these critical thinking exercises. That's why one of the best ways to study for exams is to show up to class ready to participate! Exams will occur on **Monday July 15th, Monday July 22nd, Monday July 29th and Friday August 2nd.**

Pre-labs and post-labs (one of each for 12 labs):

Scientists don't start just doing experiments without carefully thinking about their purpose and their plan. You will complete pre-labs is to ensure that you have read and understand the laboratory materials and instructions ahead of time. Doing so will allow you to work safely and efficiently. But more importantly, pre-labs ensure that you know *why* you are doing what you are doing. In the labs you will explore important concepts and interact hands-on with some of the fascinating organisms we are studying in lecture. The lab is an opportunity to apply what you have learned to the real world. Scientists also don't just do an experiment and stop there. They analyze, interpret, and apply their results to the current knowledge of the field. Post labs are designed to assess what you learned from completing each laboratory activity. They will ask you to tie your laboratory observations and outcomes back to material that you learned in class and apply the material to new situations.

Self-assessments:

I want to make sure that you learn how to be a successful student in biology. Each day, you will be given the opportunity to turn in a reflection of what you learned that day and what you still have questions about. Doing so will help guide your study and preparation methods and help me see how the class is doing. Some questions you might reflect on include:

What are you still confused about after today's class?
What is something interesting you learned that you might tell a friend about?
What activity today was the most helpful for your learning?

How prepared were you for today, and what will you do differently tomorrow? What do you think you contributed to your team today?

How will we quantify your evolution?

Grade breakdown:

Mastering biology reading quiz homework: **10%.**
Exams: **70%** (17.5% each x 4 exams)
Pre-labs and post-labs: **20%**
Self-assessments and other extra credit opportunities: up to **1.5% bonus** on final grade (based on thoughtful completion)

Grading scale:

The grading scale for this class is based on rounded, whole-number grades. Adjustments to these brackets may be made at the discretion of the professor and in the students' favor to account for the unique nature of this summer course.

97-100 A+, 94-96 A, 90-93 A-
87-89 B+, 84-86 B, 80-83 B-
77-79 C+, 74-76 C, 70-73 C-
67-69 D+, 64-66 D, 60-63 D-
<60 F

How can you maximize your fitness in this course?

- This is NOT a class you can memorize your way through. You will need to think critically to succeed.
- If you think you are struggling, get help from me or one of the TAs ASAP-- *before* you are completely overwhelmed. There is not a lot of time to catch up in a summer course like this.
- Take care of yourself despite the jam-packed schedule! Sleep (7-9 hours!). Eat healthy. Stay hydrated. Talk to your friends/family. Exercise if that's your thing.
- Do the reading *every.single.night*, and take notes
- Use the online videos to pull out key concepts from the reading
- Treat the Mastering homework is a quiz and do your best to answer the questions without looking up the answers

- Come to class energetic and prepared for activities
- Participate! Think! Share! Active participation in class is the single most effective way you can help yourself in this class.
- Ask questions in class when you don't understand. Don't wait until your completely lost—get clarification sooner rather than later!
- Follow all laboratory rules and procedures
- Take the self-assessment at the end of each class and the post-exam assessments as a chance to seriously and honestly evaluate your own progress

How did your instructor evolve?

I grew up in a family of biologists and have always loved animals. When I went to college I wanted to be a veterinarian, but then I got interested in biomedical research and thought I would cure cancer. However, a semester studying abroad in Ecuador, where I visited the Amazon rainforest and Galapagos Islands (the inspiration of Charles Darwin's revolutionary theory of evolution by natural selection), made me absolutely fascinated with evolution. I decided to apply my interest in molecular biology and genetics to an evolutionary framework. I studied the evolution of stickleback fish (one of the examples we will study in this class) for my graduate work, and now I study how fruit flies evolve in the rapidly changing seasonal conditions of central Virginia.

Due to the accelerated nature of this class, I will not hold office hours. I will be available for 30 minutes immediately after class (in the break before the laboratory section) if you have additional questions or want to discuss something that piqued your interest. You can also reach me via email at pae3g@virginia.edu. I am eager to help you, but please recognize that the schedule of this course makes individual meetings and extensive email conversations difficult unless there are extenuating circumstances.

Lab coordinator: Joanne Chaplin: jkj3e@virginia.edu

Your TAs have both taught this course before and are excellent resources for additional questions.

Erin Fegley: eef2cs@virginia.edu. Office hours: 3:30-4:30 Wednesdays in Gilmer 056B*
Piper Shifflett: pes3rb@virginia.edu Office hours: 3:30-4:30 Tuesday in Gilmer 056*.

*If no one shows up for office hours by 3:45 PM, they will be canceled.

Additional information:

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. Furthermore, please notify me if you are comfortable in doing so.

I am committed to creating a course that is inclusive in its design. If you encounter barriers, please let me know immediately so we can determine if there is a design adjustment that can be made. I am happy to consider creative solutions as long as they do not compromise the intent of the assessment or learning activity. If you are a student with a disability, or think you may have a disability, you are also welcome to initiate this conversation with the Student Disability Access Center (SDAC). SDAC works with students with disabilities and faculty members/TAs to identify reasonable accommodations. Please visit their website for information and start the application process online: sdac.studenthealth.virginia.edu. If you have already been approved for accommodations through SDAC, please send me your accommodation letter and meet with me so we can develop an implementation plan together.

Honor code:

I trust every student in this course to fully comply with all of the provisions of the University's Honor Code. By enrolling in this course, you have agreed to abide by and uphold the Honor System of the University of Virginia. While work will be done in groups in this course, any work turned in with your name on it must be your own thoughts in your own writing.