

# BIO 142: ORGANISMAL BIOLOGY

Block 5, January-February 2019

## INSTRUCTORS:

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## SCHEDULE:

9:00-11:00 am, 1:00-3:00 pm, 123 Russel Science Center

## OFFICE HOURS:

Isaac: M-Th 3:00-5:00 pm or by appointment other times

Becky: by appointment, during lunch hours

## TEXTS:

*Biology*, 2e. OpenStax, Rice University (free online text).

<https://openstax.org/details/books/biology-2e>

*The Ancestor's Tale: A Pilgrimage to the Dawn of Evolution*. Revised & Expanded Edition (2016) by Richard Dawkins & Yan Wong.

## GRADING:

<b>Lecture:</b>		<b>450</b>
Reading quizzes	100	
Participation/attendance	50	
Worksheets	100	
Midterm exam	100	
Final exam	100	
<b>Lab:</b>		<b>350</b>
Experiment reports	125	
Biodiversity project	125	
Note checks	25	
Biodiversity quiz	50	
<b>TOTAL</b>		<b>800</b>

Scores for assignments submitted late will be reduced by 25% the first day and for every subsequent day late. Grades will be based on your % of total points in class ( $A \geq 90\%$ ;  $B \geq 80\%$ ;  $C \geq 70\%$ ;  $D \geq 60\%$ ;  $F < 60\%$ ), with + or – scores near the cutoff. Final grade cutoffs may be lowered if appropriate.

## EDUCATIONAL OUTCOMES AND PRIORITIES:

This course supports the Educational Priorities and Outcomes (EPO) of Cornell College with emphases on knowledge, inquiry, reasoning, communication, citizenship and well-being, as noted below.

### GOALS:

During this course, I hope you will:

- 1) Learn to see and appreciate natural life around you, and recognize the value in preserving natural habitats [EPO: citizenship, well-being]
- 2) Become familiar with organismal diversity and its organizing principles (ecology, evolution and phylogeny) [EPO: knowledge]
- 3) Understand how natural selection acts in an ecological context to result in adaptation [EPO: knowledge]
- 4) Gain experience in designing, carrying out, and interpreting experiments to test hypotheses [EPO: inquiry, reasoning]

## ASSIGNMENTS AND ACTIVITIES:

### Reading:

Daily reading assignments from *Ancestors' Tale* and/or OpenStax *Biology 2e* are designed to introduce or to supplement lectures, not to duplicate them. A short (3-8 questions) Moodle quiz about each day's assigned reading will be due by 9:00 am (100 pts. total). Main ideas and examples covered in the reading may also show up on a test, even if we do not discuss them in class. [EPO: knowledge]

### Attendance/Participation:

One or two points will be given for each class period (AM & PM) present on time and participating (50 pts. total).

### Worksheets:

- 1) Ecology article: You will read an article about an ecological experiment from a scientific journal and identify the elements of the study (25 pts.), after which we will discuss the experiment and the experimental method in general, including statistical analysis.
- 2) Two problem sets (25 pts. each) covering Mendelian genetics and Hardy-Weinberg equilibrium will be assigned. Students will be responsible for working on problems outside of class, though we will go through some problems in class, as well.
- 3) A worksheet on basic statistical analysis and experimental design (25 pts.) will be due in week 3. [EPO: reasoning]
- 4) Field trip worksheet to complete during the trip (see below)

### **Field trip:**

We will take one class field trip, to the Botanical Center at University of Northern Iowa on Thursday, Jan. 31. We will be leaving at 9:00 am and will be back to campus by 3:00 pm.

### **Labs:**

Afternoon labs will focus on two related projects, each with several components:

#### **Aquatic ecology experiment:** [EPO: inquiry, reasoning]

Each student will construct an aquatic microcosm including various organisms from a local pond. In groups of five, you will decide on a hypothesis about aquatic ecology and biodiversity that you would like to test, then use your microcosms to conduct a controlled experiment. As a group, you will submit:

- 1) An informal project proposal outlining your hypothesis and methods (25 pts.) for discussion with the instructors.
- 2) A final report (1-2 pages, 75 pts.) in brief, bulleted format (see given example).
- 3) Detailed, dated notes (25 pts.) in a shared google doc including exactly what you put in your microcosm, what your experimental treatment was, the identity and numbers of organisms in your microcosm at the beginning and end of the experiment, and the details of your statistical analysis. You should include some detail about the organisms present, such as how you identified them, and photos, drawings or descriptions.

#### **Biodiversity survey:** [EPO: knowledge, communication, citizenship]

As a class, we will collaborate to survey the biodiversity of the Mount Vernon Nature Park, Hahn Creek, and its bordering greenway. Groups of two or three students will each be assigned a group of organisms to learn about, collect, identify, and report on. Because of the season, we will focus on two habitats where a variety of small organisms can be found even in winter: the pond edge and forest floor. The elements of your group's report will be:

- 1) Species guide page (1-2 pages, 50 pts.) for a general public audience showing 5-10 main kinds (species, genera, or families) present, and how to tell them apart. You should also include information about the biology of the organisms, how and where they are found, and any interesting facts. As an example, see [Common Plant Families of the Chicago Region](#).
- 2) A short (10 min.) group presentation (50 pts.) to the class giving an introduction to your assigned organisms, what taxa were found, and how to recognize major kinds.
- 3) Detailed notes (25 pts.) in a shared google doc including when, where, & how you collected organisms, how you identified them, and photos, drawings or descriptions.

**Note checks:**

Keeping good notes about laboratory procedures, observations, and results is vital to doing good science. Whenever you work on either of the lab projects, you should write down the details and promptly put them into the shared google doc. Each Friday, Becky will check to ensure you are keeping adequate notes (5 pts. weekly for each project).

**Lab quiz:**

You will be asked to identify (to major taxonomic category) specimens or photographs of organisms found in our biodiversity survey and answer basic questions about their biology and characteristics. You may use the guide pages made by each group, as well as other notes. (50 pts.)

**Exams:**

Exams will focus on material covered in lectures, reading assignments, and problem sets, but will also include other material from lab. The format will include both short answer and multiple choice. The midterm will cover material from the first half of the class (ecology, evolution and genetics), while the final will cover material from the second half of the class only (the tree of life and major events in evolution). If you must miss an exam for an excused reason, please let me know as soon as possible to arrange an alternative time. Cell phones, backpacks, and notes will be left in the back of the room during exams.

**Extra Credit:**

A maximum of 25 points (=3% of final grade) of extra credit may be earned in two different ways:

- 1) During morning lecture time, you can give a brief (1-5 min.) class announcement about a relevant research study or class-related news item (5 pts.). This must be accompanied by a written, half page summary of the article with the original citation (e.g. journal article citation) and any secondary source (e.g. university website announcement or science news article link). Let me know if you want to do a presentation and we can schedule a day.
- 2) You can read extra, unassigned sections of Ancestor's Tale and turn in a brief summary. Points for this will vary depending on length & content, but will be about 5 points for reading a 3-5 page section with a half page written summary.

## SCHEDULE OVERVIEW:

Week	Day	AM Lecture Topic	PM Lab	OpenStax	Ancestors' Tale	Assignments due
<b>1</b>	Jan. 14	Biodiversity & struggle for existence	Assemble microcosms, look at organisms			
	Jan. 15	Community Ecology	Visit Nature Park	45.3, 46.1		
	Jan. 16	Natural & sexual selection	Discuss article	18.1	pp. 309-327	Article worksheet (PM)
	Jan. 17	Genes & meiosis	Review experiment proposals	11.1, 12.3		Aquatic ecology proposal (PM)
	Jan. 18	Population genetics	Set up experiments	19.1, 19.2		Problem set I (AM)
<b>2</b>	Jan. 21	adaptation & speciation	Project time	18.2	pp. 343-356, 386-394	Problem set II (AM)
	Jan. 22	phylogeny & characters	Project time	20.1, 20.2	pp. 143-170	
	Jan. 23	MIDTERM EXAM	Project time			
	Jan. 24	Prokaryotes, early life & oxygen revolution	Project time	22.2	pp. 616-621, 636-641, 694-699	
	Jan. 25	Eukaryotes, symbiosis & sex	Project time	23.1	pp. 480-490, 609-621	
<b>3</b>	Jan. 28	Multicellularity	Statistics discussion	27.1	pp. 545-555, 571-573	
	Jan. 29	Adaptive radiation & animal phyla	Project time	27.4	pp. 426-444, 494-508	
	Jan. 30	Land plants & fungi	Project time	25.1, 26.1	pp. 563-567	Statistics worksheet (PM)
	Jan. 31	FIELD TRIP	FIELD TRIP			Field trip worksheet
	Feb. 1	Land animals	Experiment data collection	29.3	pp. 364-372	
<b>4</b>	Feb. 4	Flowering plants, partners & parasites	Biodiversity presentations	26.3		Biodiversity summary (PM)
	Feb. 5	Climate change, extinction, mammals	Biodiversity presentations & organism quiz	29.6	pp. 203-207, 263-270, 279-282, 295-302	
	Feb. 6	FINAL EXAM				Aquatic ecology lab report (PM)

## **OTHER POLICIES:**

### **Honesty & conduct:**

Penalties for cheating or plagiarizing are severe, and include failure of the course and notification of appropriate administrators. During exams, students must deposit their cell phones, coats, and backpacks at the front of the class. **See the *Compass* for additional information on penalties for academic dishonesty.**

According to Cornell College Policy:

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgement of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading "Academic Honesty."

### **Students with Disabilities:**

Cornell College policies provide the following guidelines designed to promote the success of all students:

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Coordinator of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see <http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml>.

### **Dropping and Adding:**

Any student may drop for any reason during the first three days of class. To drop on the 15th day, you must have "made a determined effort to master the material and to participate in class" (see the Catalog). This involves a minimum of regularly attending class, turning in all assignments, and participating as a member of the group in the lab experiments and biodiversity survey.