**BIO 142: ORGANISMAL BIOLOGY**

**Block 6, October-November 2018**

**INSTRUCTORS:** **Isaac Winkler**

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**SCHEDULE:** 9:00-11:00 am, 1:00-3:00 pm, 106 West Science

**OFFICE HOURS:** Isaac: M-Th 3:00-5:00 pm or by appointment other times  
 Becky: by appointment

**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:** **Lecture: 400**

Reading quizzes 100

Participation/attendance 25

Problem worksheets 50

Field trip worksheet 25

Midterm exam 100

Final exam 100

**Lab: 400**

Experiment reports 150

Biodiversity project 170

Notebook/data checks 30

\_\_\_\_\_\_ Biodiversity quiz\_\_\_\_\_\_\_\_\_\_\_50\_\_\_\_\_\_\_\_

**TOTAL 800**

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 > 90%; B > 80%; C > 70%; D > 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 point will be given for each day present and participating (18 pts.). Points will also be given for participation in weekly class surveys (7 pts.).

**Problem worksheets:**

Two problems 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. Problems sets will be due at the beginning of class on Oct. 29 & Oct. 31. [EPO: reasoning]

**Field trip:**

We will take one class field trip, to the Botanical Center and Tallgrass Prairie Center at University of Northern Iowa on Thursday, Nov. 8. We will be leaving at 8:30 am and will be back to campus by 3:00 pm. There will be a worksheet (25 pts.) to complete during the trip.

**Labs:**

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

**Aquatic ecology experiments:** [EPO: inquiry, reasoning]

1. 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.
2. Experiment I: Collaborating as a class, we will test the ecological effects of nutrient runoff for a simple pond ecosystem. You will then write a one page lab report (25 pts.).
3. Experiment II: Working in groups of three, you will decide on a hypothesis about aquatic ecology and biodiversity that you would like to test, then design and carry out an experiment. You will submit a project proposal outlining your hypothesis and methods (25 pts.), a draft report (25 pts.), and a final report (50 pts.).

**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 students will each be assigned a group of organisms to learn about, collect, document, identify, and report on. The elements of your report will be:

1. Written report (100 pts.) summarizing general information about your assigned organisms, methods for collecting and surveying, organisms found, ecological patterns observed, and sources used. The written report will be supplemented by spreadsheet data on collection and identification, photos (including contributions to a Google Photos album) and (as appropriate) voucher specimens. For full credit, groups will document at least 25 different species and identify at least 20 unique taxonomic categories (species or higher category).
2. Two species pages (per group; 30 pts.) for a general public audience with more detailed information about two fully identified species documented in your report, including information about the biology, ecology, habitat, identification, and distribution of the species, along with any interesting facts.
3. A short (<10 min.) presentation (40 pts.) to the class reporting about your assigned group, what taxa were found, and how to recognize major taxonomic categories, in preparation for the lab quiz.

**Notebook/Data checks:**

Keeping good notes about laboratory procedures, observations, and results is vital to doing good science. You will need a notebook (such as a composition book) to take daily notes in during lab and in the field. Each Friday, you will leave your notebook in the lab for Becky to check to ensure you are keeping adequate notes (5 pts. weekly). Specimen and identification information for the biodiversity survey must also be entered into the master spreadsheet shared on google docs. Becky will also check every Friday to make sure you are entering spreadsheet data regularly (also 5 pts. weekly). **NOTE:** it is tempting to wait until later to label specimens & samples, organize and annotate photos and enter data, but **don’t wait!** Something will get mixed up or forgotten, and a specimen without data use useless! Organizing things takes time, so don’t leave it to the end.

**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. This will be an open book (& phone or computer) quiz and will cover organisms from each of the student groups’ reports. (50 pts.)

**Extra Credit:**

A maximum of 40 points (=5% of final grade) of extra credit may be earned in any of three 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.
3. For the biodiversity survey, there will be a list of “wanted” taxa that I think are interesting and unusual. Finding and documenting these in your report will earn your group extra points (5 pts. each, 2 possible per group)

**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 (major events and innovations in the history of life). 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.

**SCHEDULE OVERVIEW:**

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| --- | --- | --- | --- | --- | --- | --- |
| **Week** | **Day** | **AM Lecture Topic** | **PM Lab** | **OpenStax** | **Ancestors’ Tale** | **Assignments due** |
| **1** | Oct. 22 | Biodiversity & tree of life; lab overview | Visit Nature Park |  |  |  |
| Oct. 23 | Phylogeny & character evolution | Visit Nature Park | 20.1, 20.2 | pp. 143-170 |  |
| Oct. 24 | Ecology & struggle for existence | Discuss article | 45.3, 46.1 |  | Article summary (PM) |
| Oct. 25 | Natural & sexual selection | Set up experiment I, discuss experiment II | 18.1 | pp. 309-327 |  |
| Oct. 26 | Genes & meiosis | Review experiment II proposals | 11.1, 12.3 |  | Experiment II proposal (PM) |
| **2** | Oct. 29 | Population genetics | Set up experiment II | 19.1 |  | Problem set I (AM) |
| Oct. 30 | adaptation & speciation | Nature Park/project time | 18.2 | pp. 343-356, 386-394 |  |
| Oct. 31 | MIDTERM EXAM | Nature Park/project time |  |  | Problem set II (AM) |
| Nov. 1 | Prokaryotes, early life & oxygen revolution | experiment I data collection & discussion | 22.2 | pp. 616-621, 636-641, 694-699 |  |
| Nov. 2 | Eukaryotes, symbiosis & sex | project time | 23.1 | pp. 480-490, 609-621 |  |
| **3** | Nov. 5 | Multicellularity | Nature Park/project time | 27.1 | pp. 545-555, 571-573 |  |
| Nov. 6 | Adaptive radiation & animal phyla | Nature Park/project time | 27.4 | pp. 426-444, 494-508 |  |
| Nov. 7 | Land plants & fungi | project time | 25.1, 26.1 | pp. 563-567 |  |
| Nov. 8 | FIELD TRIP | FIELD TRIP |  |  | Field trip worksheet |
| Nov. 9 | Land animals | project time | 29.3 | pp. 364-372 | Experiment II draft (PM) |
| **4** | Nov. 12 | Flowering plants, partners & parasites | Biodiversity presentations | 26.3 |  | Biodiversity survey report (PM) |
| Nov. 13 | Climate change, extinction, mammals | Biodiversity presentations & organism quiz | 29.6 | pp. 203-207, 263-270, 279-282, 295-302 |  |
| Nov. 14 | FINAL EXAM |  |  |  | Experiment II 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.