

Foundations: Cellular Biology

Biology 141, Block 2, 2019

9-11 am and 1-3 pm, Russell Science Center

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Office hours by appointment:
<https://cbvolle.youcanbook.me/>
Availability: 8:00 am to 10:00 pm

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Course Description

The course introduces students to the principles of cell structure, cell function and information transfer by emphasizing the investigative approach to biological questions. Students design, execute, and interpret research. Research topics will vary with each instructor. This course is a prerequisite for most upper-level Biology courses.

In this course, we will investigate cellular biology through the lens of DNA damage and repair. We will explore two scenarios where DNA repair leads to unexpected negative outcomes for human health: Huntington's Disease and antibiotic resistant bacteria. Both of these topics are ones that I, my students, and my collaborators currently explore. We will learn about these topics through active learning activities and discussions, so completing all the assigned work is important. We will also conduct laboratory research related to the topics, and you will be asked to design and carry out your own experiments. My hope is that this course will not only help you build a foundational knowledge in cellular biology, but allow you to develop an interest in scientific inquiry.

Course Goals

Students who complete this course successfully will be able to:

- Apply knowledge of basic cellular processes to complex biological problems (Knowledge)
- Critically interpret and evaluate scientific literature (Reasoning)
- Design experiments using the scientific method (Inquiry)
- Communicate scientific concepts in a clear and concise manner (Communication)

Course Support of Educational Priorities and Outcomes of the College

This course supports the following Educational Priorities and Outcomes of Cornell College in the following ways:

- Knowledge: We will integrate knowledge from a variety of scientific fields, including chemistry, biochemistry, molecular biology, and microbiology. Students will be given test questions to evaluate their mastery of different subjects.
- Reasoning: We will learn how to read technical scientific literature using the CREATE

method, then apply those skills to journal articles relevant to the course topics. Students will be assessed on their ability to interpret and explain those papers in their “News and Views” project.

- Inquiry: Using structured experiments as a template, we will develop original research questions related to the class topics. We will then perform experiments designed to answer those questions. Students will be evaluated on their ability to construct an experiment that answers their experimental question.
- Communication: We will present scientific information in a variety of forms, both written and oral, including a blog post, haiku, lab notebook, and research report. Students will be evaluated on the content and clarity of their presentations.

Required Texts, Materials, or Equipment

- There is no required textbook for this class. Readings will come from a variety of open access textbooks and from the scientific literature. You will occasionally be asked to watch a video as well. All the course materials are available on the course Moodle page.
- Please make sure you have a lab notebook by day 2. I do not care what kind of notebook you use, but you must have a notebook specifically for lab and you must bring it to class every day, except for exam days.

Daily Work/Homework

My previous students will tell you that it is a mistake to think my courses are easy. My courses are fair, and there is a big difference between the two. My general philosophy is that if you do all the work required of you, you will get a good grade. There is assigned reading and an accompanying quiz for almost every class period. The best way to succeed in this class is to work at it every day, rather than trying to cram everything in before an exam. Please remember that I am a resource, but one that has autonomy. Do not wait to come see me, because I might not be available, and then where will you be?

Major Assignments

Exams: There are three exams in this course (see schedule). For exam 1, I will provide you with 25-30 questions on the first day of class. Fifteen of those questions will be on exam 1. I will provide questions in a similar manner for exams 2 and 3. The questions will ask you to apply what we are learning in class to new situations, not regurgitate some fact. You must work on exam questions individually; I want to know what you think, not what you and your friends think. You will not be allowed to bring your prepared answers to the exam with you. I do not offer review sessions, but I will be in my office from 7-8 pm the night before each exam.

Haiku: When students start writing about science, there is a tendency to use big, complicated words. Because no one ever bothered to correct those students, reading journal articles is often a painful experience. In this project, you will clearly define your topic in the form of an illustrated haiku. Please see the haiku handout for more information.

News and Views: News and Views are short summaries of highly impactful research published in the journal Nature. They not only summarize the research, but often explain why it is important and how it might relate to other topics. We will be reading several journal articles in the class. After we've discussed them in class, you will write a News and Views style summary. Please see the News and Views handout for more information

Research Presentations: At the end of each independent research section, we will present our findings, whatever they might be. The point of this exercise is not to get the right answer, but to analyze whatever data you do get and gain familiarity with presenting. Please see the research presentation handout for more information.

Class Participation

There are several ways in which class participation will be evaluated. The first is simply showing up to class. Second is completing the reading quizzes as assigned. You will have as many chances as you need to get a perfect score. Your lab notebook will be graded for completion rather than content, though it must follow the specifications provided in the "keeping a lab notebook" handout. Lab notebooks that do not follow the specifications will not receive credit.

Course Grading

Statement of Grading Process and Criteria:

Grades will be determined using answer keys and rubrics. Rubrics are included for each project and answer keys will be distributed once grading is complete. I do not grade on a curve, nor do I give extra credit. However, I do give partial credit on tests, so please never leave a question blank. If you are worried about your grade, please come speak with me, so we can figure out what's going on. Also, don't trust the overall grade you have on Moodle. Moodle is a convenient place to see your scores, but it thinks you have a zero on any assignment that isn't due yet.

Explanation of Grading System:

- Exam 1: **125 points**
- Exam 2: **125 points**
- Exam 3: **125 points**
- Haiku: **100 points**
- News and Views 1: **200 points**
- Research Presentation: **125 points**
- Quizzes: **60 points**
- Lab Notebook: **65 points**
- Attendance: **75 points**

Letter grades:

A 92% Excellent

A-	88%	Mostly excellent
B+	84%	Better than good
B	80%	Good
B-	76%	Mostly good
C+	72%	Better than OK
C	68%	OK
C-	64%	Mostly OK
D+	60%	Partially unacceptable
D	56%	Mostly unacceptable
D-	52%	Completely unacceptable
F	<52%	Did not complete the work

Course Policies and Information for Students

1. ATTENDANCE POLICY

Students are expected to attend all lectures and labs. If you have a legitimate reason for missing class or a deadline, please send an e-mail to me before class begins. For each unexcused absence (no notification before morning or afternoon class begins), 10 points will be deducted from your final point total.

2. PENALTIES FOR LATE WORK and REQUESTS FOR EXTENSIONS

Because you know about every assignment from the start of class, I do not accept late work. However, I do understand that we all have lives outside of class and sometimes extensions are necessary. If you need an extension, please come see me before the work is due so we can do our best to make alternative arrangements.

3. POLICIES ON MISSED EXAMS, MAKE-UP EXAMS

If you know ahead of time that you will miss an exam, you must make every effort to take the exam early. If you unexpectedly miss an exam, you must make it up within three days of the exam date. This is in fairness to your classmates, as they can't receive their exams back until everyone has completed the exam.

4. TECHNOLOGY POLICIES:

You are welcome to use your laptop/phones in the classroom as long as they are being used for class work only. If there is an issue, you will be asked to leave your laptop/phone outside the classroom. Please do not wear headphones in class, and make sure all technology is set to silent.

5. DROP POLICY

You may drop the course at any time in the first three days. In order to drop the class on the fifteenth day you must have attended all classes, completed all assignments, and, based on my analysis of your work, put the appropriate effort into learning the material.

6. **DISABILITIES AND ACCOMODATIONS POLICY:** Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Office 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>.
7. **ACADEMIC HONESTY 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 acknowledgment 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."

The instructor reserves the right to change the policies, topics, or topic order at her discretion after informing the class.

Day:	Date:	Due:	Class Topic:	Lab:
1	Monday Sept 23		Introduction to the class and lab	Using micropipettes
2	Tuesday Sept 24	Reading quiz	DNA as a biomolecule	Which dog chewed the shoes, part 1
3	Wednesday Sept 25	Reading quiz	DNA as a biomolecule	Which dog chewed the shoes, part 2
4	Thursday Sept 26	Reading quiz	Proteins as a biomolecule	Human DNA fingerprint, part 1
5	Friday Sept 27	Reading quiz	DNA damage and repair	Human DNA fingerprint, part 2
6	Monday Sept 30		Exam 1	Human DNA fingerprint, part 3
7	Tuesday Oct 1	Reading quiz	Antibiotic resistant bacteria	MIC
8	Wednesday Oct 2	Reading quiz	The central dogma of molecular biology	Research design
9	Thursday Oct 3	Reading quiz	The cell cycle	MIC project
10	Friday Oct 4		Journal Day	MIC project
11	Monday Oct 7	Reading quiz News and Views RD	Novel ways of killing bacteria	Research design
12	Tuesday Oct 8		Exam 2	Resistant bacteria
13	Wednesday Oct 9	Reading quiz	Huntington's disease	Resistant bacteria
14	Thursday Oct 10	Reading quiz	DNA as genetic material	Resistant bacteria
15	Friday Oct 11	Reading quiz Haiku	Cell respiration as a source of ROS	Resistant bacteria
16	Monday Oct 14	News and Views FD	Journal Day	Resistant bacteria
17	Tuesday Oct 15	Reading quiz	Hairpins as regulatory mechanisms	Research presentations
18	Wednesday Oct 16		Exam 3	