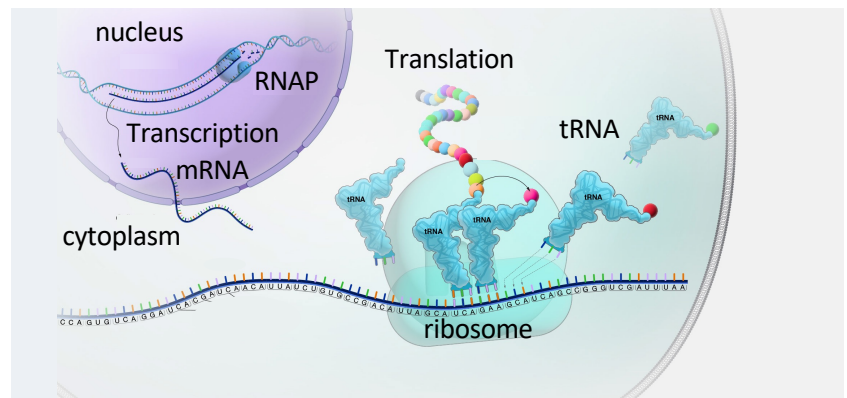


Foundations of Biology Spring 2023

BIOL UN1004
MW 4:10-5:25pm
601 Fairchild

Mary Ann Price



Course Description and Objectives

In this course, we will introduce basic terminology, important concepts, and basic problem-solving skills in order to prepare biology and pre-health students for the challenging Biology courses they will take at Columbia. We will do a deep dive into a small number of topics and use these as access points to teaching skills that will aid students in future STEM courses. Classes will include time for problem solving. Recitations will involve problem solving and student presentations of solutions to problems.

Learning goals:

At the end of this course, students should be able:

- To identify key words in a subject area and find resources to aid in understanding them.
- To break down complex problems into component manageable parts.
- To develop and to appropriately apply multiple approaches to solving complex problems.

Learning objectives:

At the end of this course, students should be able:

- To describe the structure and properties of biological macromolecules such as lipids, proteins and nucleic acids.
- To analyze the function of biological macromolecules and explain the relationship between structure and function.
- To compare and contrast how biological macromolecules are synthesized.
- To describe information flow from DNA → RNA → protein, and to predict the outcome if there are mistakes.
- To understand the structure of biological membranes in biology and their consequences.

Instructor Information

Mary Ann Price

Office: 744A Mudd

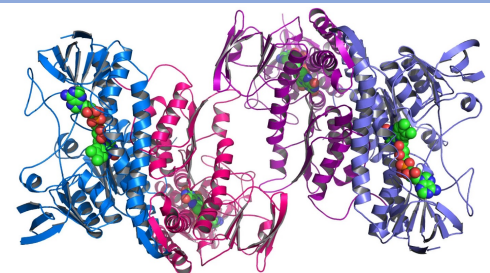
e-mail: map2293@columbia.edu

Office hours: Friday 9:30-11am

TAs: Yi Qu (yi.qu@columbia.edu) and
Xinze Tan (xt2248@columbia.edu)

Inside the Syllabus

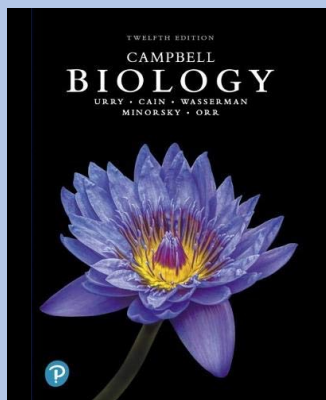
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CourseWorks2/Canvas

Since a lot of course materials will be posted on the course Canvas site throughout the semester, it is necessary to consult this site at least weekly. All the materials needed for a particular lecture will be posted in a folder for that lecture (in Files (left menu) > Lecture Materials). Keys to the group problems will be posted in the lecture folder of the lecture in which they were completed. Extra (ungraded) problem sets for practice will be in a folder in Files. Video recordings of lectures will be in Course Video Recordings (left menu). Practice exams and exam keys will be posted at the appropriate times (in Files > Exams).

Textbook and Videos:



Textbook: Campbell's "Biology", 12th edition, Pearson. You do not need to buy the textbook for this course; relevant chapters will be provided via CourseWorks2/Canvas.

Videos: For each class day, either pages from Campbell or a Khan academy video will be assigned to view before class.



Grading Guidelines

Pre-class quizzes:	10%
Group problems:	20%
Recitation presentations:	20%
Exam 1:	25%
Exam 2:	25%

Videos, readings and pre-class quizzes

Before each class, you will be assigned a video or reading material. Afterward you will take a quiz, via the assignments tab in CourseWorks2/Canvas. The quiz will cover material from the previous class and material from the video or reading. These quizzes count for 10% of your final grade.

Group Problems and Presentations

Every lecture class period, there will be group problems, to be completed in small groups of 3-4 students. These problems are purposefully challenging, to give you and your group members an opportunity to discuss class material and to learn from each other. During recitation class periods, there will be additional problems, and presentations from groups about how to solve the problems. This new element of the course is to help reinforce the concepts and hold each group member accountable for participation and learning. Group problems and presentations will each count for 20% of your final grade.

Accommodations

In order to receive disability-related academic accommodations for this course, students must first be registered with their school Disability Services (DS) office. Detailed information is available online for both the [Columbia](#) and [Barnard](#) registration processes. Refer to the appropriate website for information regarding deadlines and disability documentation requirements.

How to do well in biology

1. Participate

Prepare for class. Read textbook chapters and/or watch videos in advance. Come to class and engage in class. Take notes. Take part in group problems. Attend office hours. Form a study group. Find what works for you!

2. Ask questions

Don't be shy about asking questions in class or at office hours. There are no stupid questions, and most likely some of your classmates will benefit from the additional clarification. Also, don't be intimidated by others' questions.

3. Advice Pages

Advice from former students and TAs has been collected and made into several advice pages (see Advice in the left menu). This is a good first option on getting advice on how to excel in the course, how to approach problem solving, how to explain answers on exams, etc.

4. EdDiscussion

EdDiscussion, which you can link to from Canvas, is an app which allows students to ask and answer each others' questions. I will monitor student answers for correctness and modify as necessary.

Course Policies

Late Assignment Policy. Videos and quizzes will be posted at least 24 hours before each class. The quiz must be completed before class starts. **No quizzes will be accepted after the start of class.** If you have trouble with Courseworks2/Canvas and cannot complete the quiz, notify me before class and alternative arrangements will be made.

Attendance and Group Problems. Missing class means missing group problems. If you have a good excuse for missing, please notify me. If you miss group problems because of an excused absence, alternative arrangements will be made. Class will be available on Zoom, so if you are isolating/quarantining, you can join class and participate.

Technology Policy. I encourage the responsible use of technology in my class. Laptops and tablets are permitted for taking notes and for annotating handouts. Also, some questions during class will be answered via Poll Everywhere, thus every student needs to bring a smart phone, tablet or laptop each day. A few extra computers and/or tablets will be available for emergencies. Be aware that electronic devices can be distracting to other students, so please use them only at appropriate times.

Honor Code/Academic Integrity. Your full observance of the Faculty Statement on Integrity and Columbia College Honor Code is expected. Both can be found [here](#).

Course Schedule (subject to change except exam dates)

Date	Lecture #	Topic
Jan 18	L1	Polarity; types of bonds/interactions
Jan 23	L2	Functional groups; Polymers; amino acids;
Jan 25		Recitation
Jan 30	L3	Peptide bonds; Anfinsen experiment;
Feb 1		Recitation
Feb 6	L4	Techniques for separating peptides
Feb 8		Recitation
Feb 13	L5	Protein structure; alpha helices and beta sheets
Feb 15		Recitation
Feb 20	L6	Tertiary and quaternary structure
Feb 22		Recitation
Feb 27	L7	Techniques for purifying and separating proteins
Mar 1		Recitation
Mar 6		Exam 1
Mar 8		Exam 1 reflection
Mar 13-17		Spring break
Mar 20	L8	DNA is the genetic material; DNA structure
Mar 22		Recitation
Mar 27	L9	Semiconservative replication; mechanism of replication
Mar 29		Recitation
Apr 3	L10	PCR; transcription
Apr 5		Recitation
Apr 10	L11	Translation; mutation
Apr 12		Recitation
Apr 17	L12	What is a cell; what is a membrane
Apr 19		Recitation
Apr 24	L13	Membrane proteins
Apr 26		Recitation
May 1		Exam 2