

UN3041 Cell Biology

Professor Erin Barnhart (she/her) eb3305@columbia.edu

TA Kwass Wass (they/them) kw3023@columbia.edu

TA Katherine Delgado (she/her) kcd2138@columbia.edu

MW 10:10-11:25am

Fairchild 601

Course schedule:

Date	Day	No.	Topic	Assignment Due
6-Sept	W	1	Introduction to Cells	
11-Sept	M	2	Diffusion	<i>Pre-lecture questions are due at 10am before every lecture, unless otherwise noted.</i>
13-Sept	W	3	Microtubules and Motor Proteins	
18-Sept	M	4	Microtubule Dynamics and Mitosis	
20-Sept	W	5	Microscopy and Image Analysis	PS1 (Sun. 24-Sept, 11:59pm)
25-Sept	M	6	Paper Discussion I	<i>No pre-lecture questions.</i>
27-Sept	W	7	Actin Polymerization	
2-Oct	M	8	Cell Migration	
4-Oct	W	9	A Nod to the Nucleus	PS2 (Sun. 8-Oct, 11:59pm)
9-Oct	M	10	Paper Discussion II	<i>No pre-lecture questions.</i>
11-Oct	W	11	Endomembrane System	
16-Oct	M	12	MIDTERM EXAM	<i>No pre-lecture questions.</i>
18-Oct	W	13	Mitochondria	PS3 (Sun. 22-Oct, 11:59pm)
23-Oct	M	14	Paper Discussion III	<i>No pre-lecture questions.</i>
25-Oct	W	15	Phase Separation	
30-Oct	M	16	Degradation	
1-Nov	W	17	Cell Signaling	PS4 (Sun. 5-Nov, 11:59pm)

6-Nov	M	-	NO CLASS	
8-Nov	W	18	Cell Division	
13-Nov	M	19	Cell Growth and Death	
15-Nov	W	20	Bacterial Cell Biology	PS5 (Thurs. 16-Nov, 11:59pm)
20-Nov	M	21	Neuronal Cell Biology	
22-Nov	W	-	NO CLASS	
27-Nov	M	22	Guest Lecturer: Dr. Ishmail Abdus-Saboor	
29-Nov	W	23	Student Presentations	
4-Dec	M	-	NO CLASS	
6-Dec	W	24	Student Presentations	
11-Dec	M	25	Student Presentations (if needed) Oral Exam Practice Session	Final Proposal (Thurs. 14-Dec, 11:59pm)

We will administer final **Oral Exams** Dec 18-20 (M-W), with exact times chosen by students.

Course Structure: Classes will include lectures (~45-60 minutes) and in-class exercises (~15-30 minutes), as well as small group discussions of primary literature and student presentations (see schedule above).

Assignments (% of final grade):

Pre-lecture Questions (5%): Students will submit answers to short questions based on reading assignments (see attached reading list) **prior to each lecture (by 10am)**. These questions are meant to help students focus their reading and prepare them for in-class exercises. We will not grade these questions; students will receive credit for simply submitting answers. We will post these questions at least five days before they are due, and TAs aim to post answers by 5pm following each lecture.

Problem Sets (40%): Students will complete five problem sets (see schedule above). For each problem set, part one will consist of problems meant to solidify basic concepts in cell biology; part two will consist of questions or a short writing assignment based on a primary research article. We will post problem sets at least one week before they are due; TAs will post solutions and return graded problem sets within a week of submission. We encourage students to work on these problem sets together and to begin them well before the due date (do not wait until the night before!).

Midterm Exam (10%): We will administer an hour exam in class on Monday, October 16. The exam will consist of problems similar to problem set questions and in-class exercises.

Research Proposal (15%): Students will work in teams to write an original research proposal, due on Thursday, December 14 by 11:59pm. Each team will include ~3 students, and students may request specific teammates. Each proposal must address an open question about a central theme in cell biology; the theme this year is **The Cell Biology of the Neuron**. We will provide a list of open questions, along with suggested reading lists for each question, to help proposal teams choose a research direction. We will post this material, along with detailed proposal guidelines, by October 15.

Student Presentations (10%): Each proposal team will give a 10 minute presentation about their proposal topic to the class towards the end of the semester (see schedule above). We will post presentation guidelines by October 15.

Oral Exams (10%): Each student will defend their research proposal and answer questions about fundamental concepts in cell biology in a 20 minute oral exam. We will post oral exam guidelines by December 1.

Discussion (10%): Students will receive credit for participating in small group discussions of primary literature and in-class exercises, and for providing written feedback on classmates' presentations.

Office hours:

Prof. Barnhart has open office hours every Tuesday and Friday (9-10am) in Mudd 731, as well as additional office hours by appointment.

TAs will lead optional recitation sections/office hours every Thursday (2-3pm) and Friday (1-2pm) in Fairchild 709. For the first half of the course (through October 25), students

may attend either section. For the second half of the course (after October 25), we encourage students to attend the section led by the TA assigned to their proposal team.

Books:

Cell Biology by the Numbers, Milo and Philips, 2016

<http://book.bionumbers.org/Links to an external site.>

Molecular Biology of the Cell, Alberts et al

Hard copies of the 7th edition (2022) are available on reserve from the Science and Engineering library in the NWC building; see Library reserves link on CourseWorks.

The 4th edition (2002) is available

online: <https://www.ncbi.nlm.nih.gov/books/NBK21054/Links to an external site.>

Late Assignments and Regrading:

If a student submits an assignment late, we will subtract one point per hour past the submission deadline. Students may request extensions in some cases (acute illness, etc); please email Prof. Barnhart to request an extension before the assignment due date.

TAs will grade problem sets and the midterm exam, and students may ask Prof. Barnhart to regrade any assignment. Be aware, however, that Prof. Barnhart will regrade the entire assignment/exam and it is possible that your grade will decrease rather than increasing.