Course Syllabus

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BioSci 1500, Cell Biology, Fall 2021

Mon/Wed, 3:00 to 4:15 pm, A224 Langley Hall

Exams will be synchronous, during the class as described below. The exams will be delivered using Canvas.

Office hours: Fri 9:00 to 10:00 am

Instructor: Dr. Kirill Kiselyov

519 Langley Hall

412-624-4317

kiselyov@pitt.edu (mailto:kiselyov@pitt.edu)

Course philosophy, scope and objectives. In this course, we will define cell biology as a science of cellular management, the main question of which extends beyond “how do biological molecules interact?” to “why do they interact?” We will use this approach to understand how cells talk to each other, and how they build functioning tissues and sensory systems. We will use cell biology as a tool for a better understanding of current concepts of disease pathogenesis and modern approaches to treatment. We will read primary publications and make in-class and online presentations.

Upon completion of this course, we will develop the following competencies:

(use this publication (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3671645/) for reference)

- Read, understand and discuss modern cell biological publications.
- Use modern cell biological concepts to explain the pathology of major and rare diseases.

Course schedule:

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(reading assignments for “Essential cell biology” are in brown, for “The molecular biology of the cell” 6th edition are in blue, 5th edition are in red)

Session#	Week #	Date	Topic
1	1	M Aug. 30	**Introduction and overview of the course.** **Principles of cell biology. Cell management.** Why do we have cells? What is cel organelles and networks. What is a functional subunit of a cell? We begin by buildi each with a separate function. Introduction of storytelling groups and the first round of research questions. **Part 1: Cellular components and structure** **Module 1:** Membrane structure and function, membrane organelles.
2	2	W Sep. 1	**Protein insertion into membranes.** **Useful reading (https://drive.google.com/file/d/15DRtkaBiX7jBPmcithV0e6ULKEYH0 reading 2 (https://drive.google.com/open?id=1IAiT-0BkVM-m6UmvsdMZzWhHZNUQ-**
3		W Sep. 8	**Protein mass transit.** How do we build a cell that has a top and a bottom? Using t places. Principles of protein targeting and traffic.
4	3	M Sep. 13	We teach cells to give, to take and to do cleanup. **Exocytosis, and endocytosis.** Individual paper assignment 1 will be posted. Individual presentation 1 is due on Se Useful reading: **Paper 1 (https://drive.google.com/file/d/0ByhYTZ4hoa8WamoybU9Q (https://drive.google.com/file/d/0ByhYTZ4hoa8WN2YzbWRSRmFCOUk/view?usp=sha**

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5		W Sep. 15	Quality and quantity control. **Proteasomes, autophagy, and related diseases.** **Paper 1 (https://drive.google.com/file/d/0ByhYTZ4hoa8WbkhER3FTaHBqSHc/view?u** (https://drive.google.com/file/d/0ByhYTZ4hoa8WV2ExeWhwRkxKZXc/view?usp=shari (https://drive.google.com/file/d/0ByhYTZ4hoa8WSlY5Nk5oQTRBUlU/view?usp=sharin (https://drive.google.com/file/d/0ByhYTZ4hoa8WZHNWek9TRkEyQnc/view?usp=shari
6	4	M Sep. 20	**Discovery session 1** (groups talk about their findings/stories; other groups ask qu
7		W Sep. 22	**Module 1 test (20 min test)** **Module 2: Cytoskeleton and cell mechanics**. The mechanical aspects Individual presentation 1 is due
8	5	M Sep. 27	**Molecular motors and their adaptor proteins.**
9		W Sep. 29	Cytoskeleton in **transport, motility, cell division and organellar positioning**
10	6	M Oct. 4	**Cell Adhesion/ECM**
11		W Oct. 6	**Midterm on Modules 1 and 2** Individual paper assignment 2 will be posted. Individual presentation 2 is due on Oct 18

12	7	M Oct. 11	**Part 2 (Module 3): Ion transport and ion permeability.** Charging and discharging the cellular batteries. Ion gradients and membrane perm
13		W Oct. 13	**Ion channels.** Excitable membrane and signal propagation in neurons. Basic sens
14	8	M Oct. 18	Ion channels and transporters in **healthy tissues and in disease.** • **Review 1 (https://drive.google.com/open?id=1uAXMEnMqB76O69DJI0RWs6pXto** • **Review 2 (https://docs.google.com/document/d/1YRY6j7m4KL9iCXaqZtn4hyBKQ usp=sharing)** Individual presentation 2 is due
15		W Oct. 20	Mitochondria: structure, function and dynamics. Mitochondrial diseases and neurodegenerative diseases. **Paper (https://drive.google.com/file/d/0ByhYTZ4hoa8WY092ZGExLVZ1NDg/view?usp** Individual paper assignment 3 will be posted. Individual presentation 3 is due Nov
16	9	M Oct. 25	**Discovery session 2** (groups talk about their findings/stories; other groups ask qu
17		W Oct. 27	**Module 3 test (20 min test)** **Part 3: Molecular and cellular basis of communication.** **Module 4. Signaling.** We teach organelles and cells to talk to each other, and to interpret information. Principles of cell communication. Here we teach cells to react. Short- and long-tern

18	10	M Nov. 1	G protein-coupled receptor signaling. Individual presentation 3 is due
19		W Nov. 3	Tyrosine kinase receptor signaling.
20	11	M Nov 8.	Apoptosis. Cell death as a signaling process. The relation between autophagy and Individual presentation 3 is due
21		W Nov. 10	**Module 4 test (20 min test)** Transcription factors. Responding to starvation and oxidative stress. Useful reading: **Paper 1 (http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3427256/pdf/** **(https://drive.google.com/open?id=0ByhYTZ4hoa8WMDc1Z2RmU1RSdFU)**
22			Cell cycle, growth and signaling. Cell differentiation. Individual paper assignment 4 will be posted. Individual presentation 4 is due Dece
23	12	M Nov. 15	**Midterm on Modules 3 and 4**

24		W Nov. 17	**Discovery session 3** (groups talk about their findings/stories; other groups ask qu
25	13	M Nov. 29	**Part 4. Special chapters** 1. Organellar interaction Reading: ***Nature* collection (https://www.nature.com/collections/lwgyctjhsr)** ; ***Front*** **(https://www.frontiersin.org/articles/10.3389/fcell.2015.00056/full#h3) CDD review (ht** **017-0025-4)** ; **CDD review 2 (https://www.nature.com/articles/s41419-017-0179-0)** ; **E** **(http://emboj.embopress.org/content/early/2015/06/03/embj.201591481.figures-only)** ; **(https://www.researchgate.net/publication/260129613_Peroxisomes_A_Nexus_for_Lip** ;
26		W Dec. 1	Special chapters 1. Autophagy and apoptosis axis 2. Epigenetics and microRNA in the signaling context Individual presentation 4 is due
27	14	M Dec. 6	**Discovery session 4** (groups talk about their findings/stories; other groups ask qu
28		W Dec. 8	**Review (https://docs.google.com/presentation/d/1aYuia747YVMgbUZtPC5A2SexPnEj** **Review 4 (https://drive.google.com/file/d/0ByhYTZ4hoa8WRFNFT3Zhcm5SNGc/view**

Final Exam DEC 7 10:00 AM - 11:50 AM

Grading policies. Grades will be based upon the 2 midterms at 40% of the total (20% each), 3 short tests for 20% of the total (15% each), in- and out-of-class work at 10% of the total, and the final exam at 30% of the total. In- and out-of-class work will comprise submitted presentations, reviewed presentations and peer assessments. Two-thirds of the final will cover the new material while the other third of the final will be on the first part of the course. We will have an open-book exam format. Please do not use your phones during the exam. No communication between students is allowed during the test.

Presentations. Students will be given an opportunity to supplement up to 5% of their final grade by presenting a research paper at different points during the semester. Contact me with suggested topics. Papers must be relevant to the topic of this class and the instructor has the right to reject the presentation.

Each student will be assigned 4 papers during the semester to create individual narrated presentations using Powerpoint, or similar software. The presentations will be submitted to Peerceptiv by the due date stated in the syllabus and assigned by the peers for review. The reviews will have a deadline and the reviews/comments will be shared with the submitter unanimously. The instructor will curate the comments.

Stories and discovery sessions. Each student will join a group of students based on their interests in a series of topics suggested by the instructor. The students will develop the topics during the semester and present to their peers, during the discovery sessions, as their understanding of the topics develops.

Exam policies. Please note the date and time of the final exam and check the date of your other finals now so that you can adjust for possible conflicts. **If you miss an hour exam due to a condition beyond your control, you must give a written explanation with supporting documents to me within one week of the exam.** Anyone who misses an exam without providing this documentation will be given a grade of zero for the exam. If your reason is medical, you must provide a letter from your physician. A student excused from an exam will be given a grade based upon his/her performance on the other exams. Anyone missing the final will receive, at best, an incomplete.

I will make every effort to help you with your studies, but I can't help you if I do not know that you are struggling. Please do not hesitate to email and schedule a meeting if you need help.

Textbook. Recommended text is "**Essential Cell Biology (http://store.vitalsource.com/show/9781317806271)** ," Alberts et al., 4th edition or "**Molecular Biology of the Cell (http://www.garlandscience.com/product/isbn/9780815344322)** ," Alberts et al., 5th or 6th editions. Additional optional reading material and copies of the two textbooks will be available on reserve at Langley Library.

University policies.

- Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity, from the February 1974 Senate Committee on Tenure and Academic Freedom reported to the Senate Council, will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz or exam will be imposed. View the complete policy at **www.cfo.pitt.edu/policies/policy/02/02-03-02.html (http://www.cfo.pitt.edu/policies/policy/02/02-03-02.html)** .

- If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and the Office of Disability Resources and Services, 140 William Pitt

Union, 412-648-7890/412-624-3346 (Fax), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course. For more information, visit **www.studentaffairs.pitt.edu/drsabout (http://www.studentaffairs.pitt.edu/drsabout)** .

- Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to **http://accounts.pitt.edu (http://accounts.pitt.edu/)** , log into your account, click on Edit Forwarding Addresses, and follow the instructions on the page. Be sure to log out of your account when you have finished.

For the full E-mail Communication Policy, go to **www.bc.pitt.edu/policies/policy/09/09-10-01.html (http://www.bc.pitt.edu/policies/policy/09/09-10-01.html)** .

Course Summary:

Date	Details	Due
Mon Aug 30, 2021	**2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685375&include_contexts=course_104420)**	3pm to 4:15pm
Wed Sep 1, 2021	**2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685376&include_contexts=course_104420)**	3pm to 4:15pm
Fri Sep 3, 2021	**office hours 2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685449&include_contexts=course_104420)**	9am to 10am
Mon Sep 6, 2021	**2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685377&include_contexts=course_104420)**	3pm to 4:15pm

Date	Details	Due
Wed Sep 8, 2021	2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685378&include_contexts=course_104420)	3pm to 4:15pm
Fri Sep 10, 2021	office hours 2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685450&include_contexts=course_104420)	9am to 10am
Fri Sep 17, 2021	office hours 2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685451&include_contexts=course_104420)	9am to 10am
Fri Sep 24, 2021	office hours 2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685452&include_contexts=course_104420)	9am to 10am
Fri Oct 1, 2021	office hours 2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685453&include_contexts=course_104420)	9am to 10am
Fri Oct 8, 2021	office hours 2221 BIOSC 1500 SEC1030 CELL BIOLOGY (https://canvas.pitt.edu/calendar?event_id=685454&include_contexts=course_104420)	9am to 10am