

# 01:146:270 Fundamentals of Cell and Developmental Biology

## Spring 2021

**Course Director:** Qian Cai, PhD (cai@dls.rutgers.edu)

**Additional Instructors:** Alice Liu, PhD (liu@dls.rutgers.edu); Peng Jiang, PhD (peng.jiang@rutgers.edu)

**Topics:** This course will address fundamental concepts of cell biology, with a touch of human genetics. After completing this course, students should have a strong fundamental grasp of the following concepts:

1. The structure and function of DNA and chromosomes, the regulation of gene expression, and hoproteins are produced from gene sequences
2. Sexual reproduction, including mechanisms for gene variation and the contribution towards development and disease
3. The structure and function of proteins and how they are sorted within cells and transported across cell membranes
4. How cells regulate energy production and consumption
5. The control of signal transduction and its effects on the cytoskeleton and cell migration
6. How cells regulate and accomplish cell division

**Learning Goals:** The learning goals for this course are consistent with general goals set by the Department of Cell Biology and Neuroscience, as well as the Division of Life Sciences.

1. Obtain factual and conceptual knowledge in fundamentals of cell biology and development (with a hint of neuroscience) that will provide a strong foundation for success in advanced training and professional careers.
2. Develop an ability to summarize, integrate and organize information.
3. Use scientific reasoning to evaluate the potential for current research and new discoveries to improve our understanding of cell biology and its relevance to human health and out society.

**Required Materials:** Each student will need a high-speed internet connection, and a webcam and microphone are highly recommended for class participation. The course material will closely follow the text book (Essential Cell Biology, Alberts et al., ISBN 9780393679533) so it is required reading for the course. Supplemental videos illustrating key concepts will be included.

**Grading Policy:** Following the completion of each module, an exam will be administered during the normal class hours covering material from the eight lectures. Exams will be multiple choice and Proctortrack will not be used. We will take certain measures to ensure the integrity of the exam process and minimize cheating. This will include strict time limits on exams, randomized question and answer orders, and a one-at-a-time question format. In addition, each module will have two short quizzes that will be announced ahead of time. The combined scores from these quizzes will count for 10% of the total grade, and the three exams will count for the remaining 90%. No cumulative final exam will be given, and the exam for module three will be scheduled during final exam week at the specified date and time.

**Schedule:** This course will be conducted synchronously online on Tuesday and Thursday afternoons (Period 5). The lectures will be delivered live during that time (3:20 pm - 4:40 pm) using the live conference function in Canvas, and students will be expected to attend in order to ask questions and interface with faculty and peers. In case students must miss class due to illness or other excused reasons, the lectures will be recorded and posted online. Office hours will be available for each module at a scheduled time, and these will be held online through the Canvas conference portal. The course is divided into three modules that will be taught by Drs. Alice Liu, Peng Jiang, and Qian Cai. Each module consists of eight 80-minute lectures and will have a review session.

Tue/Thu 3:20 to 4:40 PM

Class	Date	Day	Lecturer	Topic	Assignment
1	1/19/20	Tue	Liu	Cells: The Fundamental Units of Life	Chapter 1
2	1/21/20	Thu	Liu	Chemical Components of Cells	Chapter 2
3	1/26/20	Tue	Liu	No Class--Monday schedule	
4	1/28/20	Thu	Liu	DNA and Chromosomes	Chapter 5
5	2/2/20	Tue	Liu	DNA Replication and Repair	Chapter 6
6	2/4/20	Thu	Liu	From DNA to Protein: How Cells Read the Genome	Chapter 7
7	2/9/20	Tue	Liu	Control of Gene Expression	Chapter 8
8	2/11/20	Thu	Liu	Analyzing the Structure and Function of Genes	Chapter 10
9	2/16/20	Tue	Liu	Exam Review	
10	2/18/20	Thu	Liu	Exam I	
10	2/23/20	Tue	Jiang	Sexual Reproduction and Genetics I	Chaper 19
11	2/25/20	Thu	Jiang	Sexual Reproduction and Genetics II/Exploring Gene Function	Chapter 19, 10
12	3/2/20	Tue	Jiang	Cell Signaling I	Chap 16
13	3/4/20	Thu	Jiang	Cell Signaling II	Chap 16
14	3/9/20	Tue	Jiang	Cytoskeleton I	Chap 17
15	3/11/20	Thu	Jiang	Cytoskeleton II/Extracellular Matrix	Chap 17, Chap 20
	3/16/20	Tue		Spring Break	
	3/18/20	Thu		Spring Break	
16	3/23/20	Tue	Jiang	The Cell Division Cycle I	Chap 19
17	3/25/20	Thu	Jiang	The Cell Division Cycle II/Exam Review	Chap 19
18	3/30/20	Tue	Jiang	Exam 2	
19	4/1/20	Thu	Cai	Protein structure and function I	Chapter 4
20	4/6/20	Tue	Cai	Protein structure and function II	Chapter 4
21	4/8/20	Thu	Cai	Membrane proteins and membrane transport I	Chapter 11 & 12
22	4/13/20	Tue	Cai	Membrane proteins and membrane transport II	Chapter 11 & 12
23	4/15/20	Thu	Cai	Energy generation in mitochondria I	Chapter 3 & 14
24	4/20/20	Tue	Cai	Energy generation in mitochondria II	Chapter 3 & 14
25	4/22/20	Thu	Cai	Membrane sorting and vesicle trafficking I	Chapter 15
26	4/27/20	Tue	Cai	Membrane sorting and vesicle trafficking II	Chapter 15
	4/29/20	Thu	Cai	Exam Review	
27	5/4/20	Tue		Reading Period	
	TBA		Cai	Exam 3	

## Course Policies and Resources

### Academic Integrity Policy:

<http://academicintegrity.rutgers.edu/academic-integrity-policy>

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.

### Student-Wellness Services:

*Just In Case Web App*

<http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

### *Counseling, ADAP & Psychiatric Services (CAPS)*

(848) 932-7884

17 Senior Street, New Brunswick, NJ 08901

[www.rhscaps.rutgers.edu/](http://www.rhscaps.rutgers.edu/)

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

### *Crisis Intervention:*

<http://health.rutgers.edu/medical-counseling-services/counseling/crisis-intervention>

Report a Concern: <http://health.rutgers.edu/do-something-to-help>

### *Violence Prevention & Victim Assistance (VPVA)*

(848) 932-1181

3 Bartlett Street, New Brunswick, NJ 08901

[www.vpva.rutgers.edu](http://www.vpva.rutgers.edu)

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

### *Disability Services*

(848) 445-6800

Lucy Stone Hall, Suite A145, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation:

<https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

### *Scarlet Listeners*

(732) 247-5555

<http://www.scarletlisteners.com>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.