

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

## Fall 2023

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

**Additional Instructors:** Prof. Ron Hart (rhart@dls.rutgers.edu); Prof. Max Tischfield (max.tischfield@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:**

- Required Text (2013): ESSENTIAL CELL BIOLOGY, by Alberts, Hopkin, Johnson, Morgan, Raff, Roberts, and Walter, 5th Edition; WW Norton & Company. ISBN-13: 978-0393679533
- Lecture slides, audio lecture recordings (as available), and primary research literature assigned by the instructors will be posted in Canvas
- All course materials are copyrighted by the university and the individual instructors. Unauthorized distribution of these materials could violate the University Academic Integrity Policy and may subject you to disciplinary action

**Grading Policy:** Three 80-minute exams (Hart, Tischfield, Cai) will count for 90% of the student grade. Each module will have 1-2 online quizzes, which in total will account for 10% of the final grade. Letter grades will be assigned according to normal University guidelines.

**Schedule:** Classes meet twice per week in BUSCH SEC-111 on Tuesday and Thursday during period 5 (3:50 pm - 5:10 pm).

Regular office hours will be posted or by arrangement with individual instructors. There will generally be a review session offered prior to exams--these will be announced in class and on Canvas.

Tuesday (3:50 pm to 5:10 pm)/Thursday (3:50 pm to 5:10 PM) BUSCH SEC-111

<b>Class</b>	<b>Date</b>	<b>Day</b>	<b>Lecturer</b>	<b>Topic</b>	<b>Assignment</b>
1	9/5/23	Tue	<b>Hart</b>	Cells: The Fundamental Units of Life	Chapter 1
2	9/7/23	Thu	<b>Hart</b>	Chemical Components of Cells	Chapter 2
3	9/12/23	Tue	<b>Hart</b>	DNA and Chromosomes	Chapter 5
4	9/14/23	Thu	<b>Hart</b>	DNA Replication and Repair	Chapter 6
5	9/19/23	Tue	<b>Hart</b>	From DNA to Protein: How Cells Read the Genome	Chapter 7
6	9/21/23	Thu	<b>Hart</b>	Control of Gene Expression	Chapter 8
7	9/26/23	Tue	<b>Hart</b>	Analyzing the Structure and Function of Genes	Chapter 10
8	9/28/23	Thu	<b>Hart</b>	Exam Review	
9	10/3/23	Tue	<b>Hart</b>	Exam I	
10	10/5/23	Thu	<b>Tis</b>	Sexual Reproduction and Genetics I	Chaper 19
11	10/10/23	Tue	<b>Tis</b>	Sexual Reproduction and Genetics II/Exploring Gene Function	Chapter 19, 10
12	10/12/23	Thu	<b>Tis</b>	Cell Signaling I	Chap 16
13	10/17/23	Tue	<b>Tis</b>	Cell Signaling II	Chap 16
14	10/19/23	Thu	<b>Tis</b>	Cytoskeleton I	Chap 17
15	10/24/23	Tue	<b>Tis</b>	Cytoskeleton II/Extracellular Matrix	Chap 17, Chap 20
16	10/26/23	Thu	<b>Tis</b>	The Cell Division Cycle I	Chap 19
17	10/31/23	Tue	<b>Tis</b>	The Cell Division Cycle II/Exam Review	Chap 19
18	11/2/23	Thu	<b>Tis</b>	Exam 2	
19	11/7/23	Tue	<b>Cai</b>	Protein structure and function I	Chapter 4
20	11/9/23	Thu	<b>Cai</b>	Protein structure and function II	Chapter 4
21	11/14/23	Tue	<b>Cai</b>	Membrane proteins and membrane transport I	Chapter 11 & 12
22	11/16/23	Thu	<b>Cai</b>	Membrane proteins and membrane transport II	Chapter 11 & 12
23	11/21/23	Tue	<b>Cai</b>	Energy generation in mitochondria I	Chapter 3 & 14
	11/23/23	Thu		No Class--Thanksgiving	
24	11/28/23	Tue	<b>Cai</b>	Energy generation in mitochondria II	Chapter 3 & 14
25	11/30/23	Thu	<b>Cai</b>	Membrane sorting and vesicle trafficking I	Chapter 15
26	12/5/23	Tue	<b>Cai</b>	Membrane sorting and vesicle trafficking II	Chapter 15
27	12/12/23	Thu	<b>Cai</b>	Review Session	
28	TBD			Final Exam	

## 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.