

01:146:473 Genetic Regulation in Cell Biology

Fall Semester 2024

<https://canvas.rutgers.edu>

Meeting schedule: Classes are scheduled to meet twice per week *in person* on Tuesdays and Fridays, 10:20 – 11:40 AM) in [room 118 of the SEC building on the Busch Campus](#).

Section Coordinator: Prof. Ronald Hart (rhart@rutgers.edu)

Additional Teaching Faculty: Prof. Natasha O’Brown (natasha.obrown@rutgers.edu) and Prof. Megerditch Kiledjian (kiledjian@dls.rutgers.edu)

Office Hours: By arrangement with individual instructors. Please email and set an appointment for an in-person meeting or a videoconference. There will be scheduled review sessions throughout the semester and prior to exams—these will be announced in class and on Canvas.

Learning Goals:

1. Master factual and conceptual knowledge in cell biology that will provide a solid 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 to our society.

These goals are consistent with those set by the Department of Cell Biology and Neuroscience, as well as the Division of Life Sciences at Rutgers University.

Course Description: This course, taught by three professors, addresses advanced concepts of cell biology, focusing on genetic animal models, genomics, chromatin function, gene expression, and RNA biology. The course is organized into 3 modules. Classes meet in person twice per week (2x80 min). Attendance and participation are encouraged.

Course Organization and Requirements

- The course will meet in the scheduled classroom.
- Each student will need a high-speed Internet connection and a web browser to access the Canvas site, lecture materials, and for some exams.
- The course is open to juniors and seniors.
- The course pre-requisite is:
 - Fundamentals of Cell Biology (146:270).

Course Materials

- Required Text (2021): MOLECULAR CELL BIOLOGY, by Lodish, Berk, Kaiser, Krieger, Bretscher, Ploegh, Martin, Yaffe and Amon 9th Edition, WH Freeman. ISBN-13:978-1-319-20852-3 (or electronic equivalent).
- You may choose to participate in the First Day Course Materials program to obtain an electronic copy of the text at reduced cost. **If you do not wish to use this program you must opt out by Sept 19.**
- Each student is expected to review assigned textbook reading prior to each class.
- All materials 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.

Exams and Grading Policy:

- All exams will be given during class periods. Exams will be taken on paper handed out in class.
- There will be three module exams scheduled during the semester. These will be primarily multiple choice but may include short-answer questions.
- Quizzes will be given using the online Canvas portal. These are assigned occasionally by individual instructors. These can be taken asynchronously anytime after assignment but before the announced due date and time.
- Three 80-minute module exams will count for 58.5% of the undergraduate grade (19.5% each exam). Quizzes will count for 41.5% of the final grade.
- Scaling or curving of exam grades will only be applied if class performance on individual exams varies substantially. Otherwise, the standard Rutgers grading scheme will apply, with no rounding of the class

averages: A is 90 or above, B+ is 85 to less than 90, B is 80 to less than 85, C+ is 75 to less than 80, C is 70 to less than 75, D is 60 to less than 70, and F is below 60.

Technology Challenges

Please visit the Rutgers Student Tech Guide page for resources available to all students. If you do not have the appropriate technology for financial reasons, please email Dean of Students deanofstudents@echo.rutgers.edu or complete the contact form for assistance. If you are facing other financial hardships, please visit the Office of Financial Aid at <https://financialaid.rutgers.edu/>.

Self-Reporting Absence Application

Students are expected to attend all classes; if you expect to miss one or more classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence. An email is automatically sent to the course director.

Academic Integrity Policy:

The following website has resources for faculty on maintaining academic integrity in the online environment as well as information on the new University Academic Integrity Policy and Procedures:

<https://nbprovost.rutgers.edu/academic-integrity>. Students should visit this site for more information:
<https://nbprovost.rutgers.edu/academic-integrity-students>.

All exams, assignments, or other assessments will include this statement: **On my honor, I have neither received nor given any unauthorized assistance on this examination (assignment, paper, quiz, etc.).**

Student-Wellness Services:

- Student Success Essentials: <https://success.rutgers.edu>
- Student Support Services: <https://www.rutgers.edu/academics/student-support>
- The Learning Centers: <https://rlc.rutgers.edu/>
- Rutgers Libraries: <https://www.libraries.rutgers.edu/>
- Bias Incident Reporting: <https://studentaffairs.rutgers.edu/bias-incident-reporting>
- Dean of Students – Student Support Office: <https://success.rutgers.edu/resource/dean-students-student-support-office>
- Office of Veteran and Military Programs and Services: <https://veterans.rutgers.edu>
- Student Health Services: <http://health.rutgers.edu/>
- Counseling, Alcohol and Other Drug Assistance Program & Psychiatric Services (CAPS): <http://health.rutgers.edu/medical-counseling-services/counseling/>
- UWill: free immediate access to teletherapy; you can choose a therapist based on your preferences including issue, gender, language, ethnicity. <http://health.rutgers.edu/uwill/>
- Office for Violence Prevention and Victim Assistance: www.vpva.rutgers.edu/
- Office of Disability Services: <https://ods.rutgers.edu/>
- Basic Needs Assistance (food, housing, and other essentials): <https://ruoffcampus.rutgers.edu/basic-needs>
- Rutgers Student Food Pantry: <https://ruoffcampus.rutgers.edu/food-pantry>

Genetic Regulation in Cell Biology – Fall 2024 - Class Schedule

Class	Date	Day	Lecturer	Topic	Readings
1	9/3/2024	Tue	Hart/ Team	INTRODUCTION TO THE COURSE	
2	9/6/2024	Fri	O'Brown	Identifying Human Disease Genes	Ch 6.4, Altshuler et al, 2008
3	9/10/2024	Tue	O'Brown	Model Organisms for Studying Human Development	Ch 1.6, Irion and Nüsslein-Volhard (2022)
4	9/13/2024	Fri	O'Brown	Disease Modeling with Animals	Wangler et al (2017), Ch 1.5, 6.4-6.6
5	9/17/2024	Tue	O'Brown	Stem Cell Derived Organoids	Ch 4
6	9/20/2024	Fri	O'Brown	Induced Pluripotent Stem Cells for Regenerative Medicine	Ch 22.1-22.2
7	9/24/2024	Tue	O'Brown	Cell Fate Decisions in Development	Ch 22.3-22.4
8	9/27/2024	Fri	O'Brown	Cancer	Ch 25.1-25.4
9	10/1/2024	Tue	O'Brown	Module 1 Review	
10	10/4/2024	Fri	O'Brown	Exam 1	
11	10/8/2024	Tue	Hart	DNA Polymerase and quantitative PCR: Detection of SARS-CoV-2 RNA	Ch 5.1,5.2,6.2; Corman et al. (2020), Heijnen et al. (2021)
12	10/11/2024	Fri	Hart	DNA Sequencing & Single-cell RNAseq	Ch 6.2; Albers et al, (2011), Synder et al. (2011), Porreco et al. (2014)
13	10/15/2024	Tue	Hart	Disease modeling in human subjects	Beecham et al. (2009), Young et al. (2021)
14	10/18/2024	Fri	Hart	Chromosome Structure & Epigenetics	Ch 7.1-7.2, 7.4-7.5, 8.6
15	10/22/2024	Tue	Hart	Epigenetics in Drug and Alcohol Abuse	Walker et al. (2015), Renthall et al. (2009), Vassoler et al. (2013)
16	10/25/2024	Fri	Hart	DNA Repair & CRISPR Genome Editing	Ch 5.3,6.6
17	10/29/2024	Tue	Hart	Genome Editing & Gene Therapy	Ch 6.6,22.2;Xie et al. (2014), Frangoul et al. (2020)
18	11/1/2024	Fri	Hart	Module 2 Review	
19	11/5/2024	Tue	Hart	Exam 2	
20	11/8/2024	Fri	Kiledjian	Post-Transcriptional RNA Processing - An Overview	Ch 9.1
21	11/12/2024	Tue	Kiledjian	Regulation of Pre-mRNA Splicing	Ch 9.2-9.3, 13.6 & Notes
22	11/15/2024	Fri	Kiledjian	Regulation of mRNA decay and Transport	Ch 9.4 & Notes
23	11/19/2024	Tue	Kiledjian	Small regulatory RNAs	Ch 9.5 & Notes
	11/22/2024	Fri	Kiledjian	RNA Therapeutics in Genetic Disorders	Notes
24	11/27/2024	Wed	Kiledjian	RNA Vaccines (SARS-CoV-2)	Notes
25	11/29/2024	Fri	No Class		
26	12/3/2024	Tue	Kiledjian	Bench to Bedside; Development of Therapeutics	Notes
27	12/6/2024	Fri	Kiledjian	Module 3 review	
28	12/10/2024	Tue	Kiledjian	EXAM 3	