

COURSE NAME; COURSE NUMBER; SEMESTER; MEETING DAYS, TIMES, AND PLACE:

Molecular Genetics 11:126:481

Fall 2023, Course Index No: 12635

Tuesday and Thursday 5:40 PM to 7:00 PM, in FS-AUD

CONTACT INFORMATION:

Instructor: Thomas Leustek

Office Location: ZOOM

Phone (text): 908-451-3266 Email: Leustek@sebs.rutgers.edu

Office Hours: By Arrangement, for individuals or groups, please email for an appointment.

COURSE WEBSITE, RESOURCES AND MATERIALS:

- See CANVAS for all course information and resources. If you are registered for MolGen you should have access to the MolGen CANVAS site.

COURSE DESCRIPTION:

Molecular Genetics is a challenging course that covers a range of basic topics in molecular genetics and molecular biology including the concept of the gene, transcription, translation, regulation of gene expression and replication. The course takes a genomics-centered approach and covers many of the latest methodologies used in genomics analysis. The course delves into both prokaryotic and eukaryotic systems, taking a historical and methodological approach with the aim of providing insight into how understanding was obtained through experimentation and discovery. The prerequisite for this course is Genetics (01:447:380 OR 11:776:305) with a minimum grade of C. Although, Molecular Genetics is open to all Rutgers students, it is part of the major in Biotechnology and fulfills the first Biotechnology program learning goal: "Biotechnology Majors will be able to describe the basic molecular concepts essential for understanding the field of biotechnology and the applications of biotechnology."

COURSE LEARNING GOALS:

After completing Molecular Genetics students will be able to:

1. Explain the significance of genomics and the –omics revolution to biomedical research and applications
2. Explain the methodology and principles behind genomic sequencing, interpretation, and analysis
3. Compare and contrast the anatomies of genomes from the taxonomic domains of life
4. Describe how genomes function (expression and heredity) using specific examples to illustrate general themes including:
 - a. how DNA is accessed by molecular complexes
 - b. how molecular complexes act on genomes

- c. how RNA is produced from the genome and how it is acted upon by molecular complexes
- d. how molecular complexes act to regulate genome activity
- e. how molecular complexes mediate communication between cells
- f. how molecular complexes mediate genome replication
- g. the types of mutation and how molecular complexes repair mutations

ASSIGNMENTS, RESPONSIBILITIES & ASSESSMENT:

EQUIPMENT- Equipment for CANVAS access in class.

GRADING- Three common hourly exams and one comprehensive final exam (4 exams total). Only the highest two hourly exam grades plus the final exam will be used to calculate class grade. Each counted exam is valued at 25% of the course grade (total exams=75% of course grade). Five out-of-class reading assignments with an online open-book quiz, each valued at 5% of the class grade (total=25% of course grade). Extra credit is offered for class participation and completion of SIRS 9 (<https://otear.rutgers.edu/sirs/>) for this course.

Grading Scheme out of a total 100 points

A= >89.5 points

B+= 84.5 to 89.4 points

B= 79.5 to 84.4 points

C+= 74.5 to 79.4 points

C= 69.5 to 74.4 points

D= 59.5 to 69.4 points

F= <59.4 points

T-Grade- for incomplete work

EXAM GRADING AND GRIEVANCE POLICY- If you have a concern about grading please write to leustek@sebs.rutgers.edu and explain your concern. Write MolGen Exam Concern in the subject line of the email. Concerns about exam grading will be handled only through email, or through office hours. Please do not ask for time before or after class to address grading issues.

RESCHEDULED EXAM POLICY- Taking an exam at an alternate time is possible only if prearranged with the instructor. In the absence of a pre-arranged exam time for a missed exam, the lowest grade policy will apply.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/getting-registered>. Policies and procedures can be found at <https://ods.rutgers.edu/>.

RESPONSIBILITY TO BE INFORMED- Students are responsible for keeping informed about all course matters including changes to the syllabus, course policies, exams and due dates. Check email and the CANVAS course site regularly.

WHAT TO EXPECT THIS SEMESTER:

- Molecular Genetics (11:126:481) is a fully in-person course.
- Class attendance, and participation through asking of questions and seeking clarification of subject matter is strongly encouraged.
- A requirement to wear a mask will be determined by Rutgers University policy.

COURSE SCHEDULE:

Module	Topic(s)	Class Date	Reading Assignment (Quiz Due Date)
Module 1	1.1 Introduction to Molecular Genetics	9/5	
Module 2	2.1 Strategies for sequencing genomes 2.2 Genomic libraries	9/7 9/12	
Module 3	3.1 DNA polymerase and polymerase chain reaction 3.2 Genomic Physical Mapping techniques	9/14 9/19	Reading 1 released 9/13 (9/24, 11:59 PM)
Module 4	4.1 DNA sequencing technologies 4.2 History of shotgun sequencing	9/21 9/26	
Exam 1	Modules 1.1 to 4.2	9/28	
Module 5	5.1 & 5.2 Interpreting a Genome Sequence 5.3 Discovery of Gene Function	10/3 10/5	Reading 2 released 10/2 (10/16, 11:59 PM)
Module 6	6.1 Omics, Systems Biology 6.2 Omics, System-Wide Interactions	10/10 10/12	
Module 7	7.1 & 7.2 Eukaryotic Nuclear Genomes 7.3 Genome Structure of Prokaryotes and Eukaryotic Organelles	10/17 10/19	
Module 8	8.1 Accessing the Genome 8.2 Interaction between DNA and Binding Proteins	10/24 10/26	Reading 3 released 10/24 (11/6, 11:59 PM)
Exam 2	Modules 5.1 to 8.2	10/31	

Module 9	9.1 Transcription Initiation Control Prokaryotic 9.2 Transcription Initiation Control Eukaryotic 9.3 Transcription Termination and Control of Gene Expression	11/2 11/7	
Module 10	10.1 RNA Processing 10.2 RNA Splicing 10.3 RNA Degradation	11/9 11/14	Reading 4 released 11/9 (11/20, 11:59 PM)
Module 11	11.1 Genetic Code, tRNA, Ribosomes 11.2 Translational Initiation, and Elongation 11.2 Termination, Autoregulation, Frameshifting, Termination	11/14 11/16	
Exam 3	Modules 9.1 to 11.2	11/21	
Module 12	12.1 Signal Transduction 12.2 Signal Transduction and Permanent Changes to Genome 12.3 Developmental Control	11/28 11/30	Reading 5 released 11/20, quiz due date 12/4
Module 13	13.1 Genome Replication Initiation and Elongation 13.2 Genome Replication Termination and Regulation	12/5 12/7	
Module 14	14.1 Mutations 14.2 DNA Repair	12/12	
Final Exam	COMPREHENSIVE (covers all topics, but emphasis is on 12.1 to 14.2)	12/19 8:00 PM- 11:00 PM	

ACADEMIC INTEGRITY POLICY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.

- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STATEMENT ON DIVERSITY, EQUITY, AND INCLUSION

It is my intention that students of all backgrounds will be well served by this course. I will work to create an environment of inclusion which respects and affirms the inherent dignity, value, and uniqueness of all individuals, communities and perspectives. We are lucky to be a part of a diverse university. Diverse voices and life experiences enhance the learning process and we welcome students to share their personal experiences. We will not tolerate disrespectful language or behavior against any individual or group. If you feel as though you have been disrespected or treated unfairly by the instructor or any other individual please let the instructor know, or report anonymously to the Office of Academic Programs <https://sebs.rutgers.edu/academics/meet-our-team.php>. In addition, you may also report bias to the Rutgers Diversity and Inclusion initiative using this link: <http://inclusion.rutgers.edu/report-bias-incident/>.

STUDENT WELLNESS SERVICES

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / 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.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / 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, Livingston Campus, 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>.