

**COURSE TITLE: INTRODUCTION TO MOLECULAR BIOLOGY RESEARCH/
INTRODUCTION TO GENETICS RESEARCH**

**COURSE CATALOG CODE AND SECTION NUMBER: 01:694:214 SECTIONS 01 AND
02. THIS COURSE IS CROSS-LISTED WITH 447:315 AND 694:315. REGISTRATION IS BY
SP# ONLY. CONTACT DR. VERTSON FOR A SP#.**

SEMESTER: SPRING 2024, IN-PERSON

COURSE INSTRUCTOR AND CONTACT INFORMATION

Instructor	Email	Office Location & Hours
Dr. Nickels	bnickels@waksman.rutgers.edu	Waksman Rm 031, Tues 2-5 PM
Dr. Villegas	villegas@dls.rutgers.edu	
Dr. Vertson (Coordinator)	vertson@waksman.rutgers.edu	
Dr. Mead	mead@waksman.rutgers.edu	

COURSE MEETING DAYS, TIMES, LOCATION, MODALITY:

- ☐ Lecture Times (Waksman Institute Auditorium, Busch Campus)
 - o Tuesdays 10:20-11:40 AM
 - o Fridays 10:20-11:15 AM
- ☐ Lab Times (Waksman Institute 019 Teaching Laboratory, Busch Campus)
 - o Section 01: Officially 12:10 -3:10 PM, (starts 10 min after lecture on Tuesday).
 - o Section 02: Officially 12:10 -3:10 PM, (starts 10 min after lecture on Friday).

OFFICE HOURS / STUDENT SUPPORT HOURS:

Office hours will be held on-line at the times listed above. If you can't attend office hours or want to schedule a one-on-one session in person or on-line, feel free to send an email and we can work it out.

A professor will be in the laboratory while it is running. Therefore, the best time to ask questions and get help is during the lab sections of the class.

COURSE DESCRIPTION:

The purpose of this course is for students to learn many of the techniques used in modern molecular biology and biochemistry research so that they will be able to carry out independent projects as undergraduates in research labs on campus. Students will carry out a research project.

The Research Project: After some initial training in techniques commonly used in molecular biology, students will start to work on their main research project. The project involves sequencing random clones from a cDNA library. The sequences derived from these experiments will be used to query a database for sequence similarity using the appropriate computer software. When matches are found, students will then search the scientific literature for information on the genes that they have identified.

REQUIRED TEXTS AND COURSE MATERIALS

There is no textbook to buy. We'll be using Canvas as our Learning Management System, and all lecture and laboratory notes, figures, videos, assignments, and grades will be posted there. You will be required to print out the laboratory protocols for each laboratory session and bring them to the lab. Students failing to bring a printed copy of the protocols will be docked ten (10) points on their laboratory scores. NOTE: Using your phone, computer or tablet for the lab laboratory protocols is not accepted.

TECHNICAL / TECHNOLOGY REQUIREMENTS

A \$125 laboratory fee is required.

LEARNING GOALS

Course Learning Goals

This course fulfills the laboratory course requirements for 01:694:315 for Molecular Biology and Biochemistry majors or 01:447:315 for Genetics majors. This course may also be used to fulfill the elective or laboratory requirements of the Biological Sciences and Cell & Neuro Biology majors.

Department Learning Goals

This course satisfies learning goals 1, 2, 3, and 4 of the MBB and Genetics Departments.

Core Learning Goals

NS e. Understand and apply basic principles and concepts in the physical or biological sciences.

NS f. Explain and be able to assess the relationship among assumptions, method, evidence, arguments, and theory in scientific analysis.

GRADING POLICY:

We will not, under any circumstances answer questions regarding grade cutoffs. We will not be calculating grade cutoffs until **after the final exam**. Assume there will be no curve, but if necessary, grades will be adjusted at the end of the semester.

If you have a question regarding an exam after it's been graded, you'll have 1 week to ask them. After the 1 week those grades will be "locked".

Final grades will be rounded to the nearest whole number. 89.50 will round up to a 90. 89.49 will round down to an 89. We will not entertain end of the semester grade bump requests.

Scores or grades will not be given over the phone or by email for any reason. Students can use the course gradebook for grade information. Gradebook is accessible through your Canvas site. Please note that Gradebook is NOT used for all assignments in this course. In no case will students be allowed to take a retest for any exam/practical or rewrite any assignment. In no case will any examination, quiz, or assignment grades will be dropped.

ASSESSMENT / GRADING COMPONENTS

The Course Grade will be based on the following distribution:

Exams: 40%

Quizzes 40% (10% Chapter Quizzes, 10% Lab Quizzes; 20% Analysis Quizzes)

Assignments (Questions & Homework) 5%

Lab Reports & Sequence Analysis 15%

Exams: Exams will be either in class or on-line and will account for 40% of the grade. The exams will focus on the material covered in the lectures, labs, and assigned reading. There will be two exams. A mid-term and a final. These exams may be on-line or in-person. Both will be cumulative of all material covered up to that point.

Quizzes: There will be three forms of quizzes.

1. **Chapter Review Quizzes:** After watching the video or reading the lecture notes on a chapter, students will take on-line quizzes posted on Canvas on the material. These will be used for the students to gauge their basic understanding of the material. Students will be allowed to take the quizzes twice and the grade will be averaged. These will represent 10% of the grade.
2. **Lab Quizzes:** After watching the video and reading the protocol notes on a lab students will take on-line quizzes posted on Canvas on the material. These are mainly used to ensure that students are prepared to conduct the lab procedures. The purpose is to avoid mistakes and to allow students to complete the lab more efficiently. These will be due before the lab. These will represent 10% of the grade. If it is apparent that students are not coming to lab properly prepared, we will give unannounced in-class lab quizzes.
3. **Analysis Quizzes:** These are on-line quizzes will be given over a 12 hr period to gauge the understanding of the material that was presented in the lecture notes and videos and then covered in the discussion **sections** in the previous week. These quizzes will account for 20% of your grade.

Assignments: Assignments will be given out through the semester. These include submitting weekly questions on material that was covered in class and homework assignments. They may also cover activities that were performed in class or recitation. These are 5% of your grade.

Lab Reports: You will turn in Lab Reports as .pdf files to your Canvas Assignments page. Your lab reports will contain the data (plate and gel figures, sequence alignments and a picture of the structure) that you generated during the course and your interpretation of the results. The timely analysis of the practice and your unknown DNA sequences on DSAP is also part of this grade. The Lab Reports will count for 15% of the grade.

Students are responsible for all material covered in Intro. to Research lectures and labs, including announcements made at the beginning and end, as well as course content, including Canvas postings.

Some of your assignments will need to be uploaded to the assignments section of Canvas. These assignments must be uploaded BEFORE the assigned due date and time. Late assignments will be marked down or not accepted. Computer and printing problems are never accepted as excuses for lack of or late submissions.

The **BEST** way to do well in this class is to:

- 1) read the chapter notes BEFORE coming to lecture,
- 2) taking notes on the material IN lecture, and

3) rereading the chapter notes again AFTER lecture

You must check for Intro to Research announcements on Canvas or by email daily. Be alert for e-mails from Canvas. You are responsible for all information in the announcements, including changes in assignments.

SCHEDULE OF TOPICS

LECTURE SCHEDULE

Lec #	Date	Topic	Chapters
1	1/16	Intro, central dogma	0, 1
2	1/19	Buffers, Serial Dilutions,	2
3	1/23	Cloning Vectors, Libraries	3
4	1/26	Cloning Vectors, DNA Concentration	3, 2
5	1/30	Restriction Enzymes	3
6	2/2	Restriction enzymes, PCR	3
7	2/6	Analyzing DNA using RE & PCR	3
8	2/9	Gel Electrophoresis	3
9	2/13	Sequencing DNA, Crop & edit DNA sequences	4, 5, 6
10	2/16	Setting up Restriction Digest & PCR Reactions	3
11	2/20	Bioinformatics Analysis Part I: BLASTN	7
12	2/23	Plasmid DNA minipreps	3
13	2/27	Bioinformatics Analysis Part I: BLASTN	7
14	3/1	Bioinformatics Analysis Part I: BLASTX	8
15	3/5	MIDTERM EXAM	
16	3/8	Gel electrophoresis & Analysis of a restriction digest	3
17	3/19	Lecture: Bioinformatics Analysis Part III: ORF, BLASTP	9
18	3/22	Lecture: Bioinformatics Analysis Part III: ORF, BLASTP	9
19	3/26	Literature searches, Human Homology, structural analysis	10, 11, 12
20	3/29	Next generation sequencing & TSA search	13
21	4/2	TAIR, Protein Interactions	14
22	4/7	Gene expression and localization analysis	15
23	4/9	Next Experiments	16

Lec #	Date	Topic	Chapters
24	4/12	Next experiments	16
25	4/16	Subcloning into an expression vector	17
26	4/19	Primer design	17
27	4/23	Primer design	17
28	4/26	Protein expression & purification	18

LAB SCHEDULE

Lab #	Date	Topic
	1/16(19)	NO LAB
	1/23(26)	NO LAB
1	1/30(2/2)	Pipetting exercises
2	2/6(9)	DNA Spots
3	2/13(16)	DNA UV
4	2/20(23)	Start O/N cultures
5	2/27(3/1)	DNA plasmid purification
6	3/5(8)	Restriction digests & PCR
7	3/19(22)	Gel electrophoresis
8	3/26(29)	Start O/N cultures II
9	4/2(5)	Plasmid miniprep, RD & PCR II
10	4/9(12)	DNA Gel electrophoresis II
	4/16(19)	NO LAB
	4/23(26)	NO LAB

POLICIES

Attendance and Participation

- ☐ Attendance is **required** at all lectures and laboratory sessions.
- ☐ At the beginning of each laboratory session there will be a demonstration of the techniques. Students who show up late for the lab session and miss the demonstration will have ten (10) points deducted from their laboratory reports.
- ☐ Students must arrive at the lab in the proper attire. That means long pants or skirt covering the legs and closed toe shoes. Shorts and sandals are not permitted in the lab.
- ☐ University Policy states that "Students are advised to provide timely notification to instructors about necessary absences for religious observances." Check your calendar to determine if there are any

times during the semester when you will be refraining from participating in secular activities in observance of one or more religious holidays. If any of these will interfere with your attendance at lab or at an exam, you must inform Dr. Vershon by 1/21/23 by completing and submitting the Notice of Expected Absence Due to Religious Observance. You are responsible for contacting Dr. Vershon at least one week in advance to make arrangements for makeups. If you fail to do so, we are not responsible for any points you may lose because of your absence.

- ❑ Acceptable reasons for missing a laboratory, lecture, or examination are: (1) athletic participation - official teams only, not intramurals (provide the Coach's Letter); (2) religious observance; (3) serious illness (provide supporting letter from your Dean of Student's Office); (4) death in your immediate family (provide supporting letter from your Dean of Student's Office). In no case will a submission to the Student Absence Report System be sufficient cause for a student to be granted an excused absence. The SARS system has no utility for the course; there is no need for students to submit a report through this system and reports received will be ignored.
- ❑ If an exam is missed, a grade of zero will be assigned unless a valid written excuse is presented to Dr. Vershon. If a student misses an exam because of illness, they must email the Dr. Vershon within 24 hours of the scheduled exam time. A grade of zero will be given to any student who misses the exam and fails to provide notification within 24 hours.
- ❑ IF you have a **documentable** reason why you cannot take the exam during this window please let Dr. Vershon know as soon as possible **before the exam** to make arrangements. If your inability to take the exam is legitimate no penalty will be taken.
- ❑ If you simply miss the exam, you will have 24 hours after the exam due date to contact the coordinator to arrange a makeup. If no previous arrangement has been made, a fifteen (15) point penalty will be applied to your exam score and the makeup must take place no more than 72 hours after the exam due date. **No makeups will be given for the final exam.**

Disability Accommodations

Any student who has a documented physical or learning disability is urged to provide Dr. Vershon their Letter of Accommodation from the Office of Disability Services (<https://ods.rutgers.edu>) **at the beginning of the semester** or as soon thereafter as possible. Dr. Vershon will work to provide the requested accommodations. Only students presenting documentation from the Office of Disability Services will be provided accommodations.

ACADEMIC INTEGRITY POLICY

No agency or person (student or non-student) has been or will be granted permission to sell or post to other online sites (Course Hero Chegg etc) Honors Introduction to Research class notes, lecture outlines, exams, or syllabi or to provide them online. This policy does not preclude informal sharing of notes among students (which is encouraged) and does not apply to note takers hired to provide University sanctioned tutoring or to assist disabled students.

Students are expected to be familiar with and comply with Rutgers' Code of Academic Integrity Found at <https://newbrunswick.rutgers.edu/chancellor/academic-integrity-students>. We generally have a zero-tolerance policy for cheating, and all violations will result in substantial penalties. If you have any doubts or questions about what constitutes academic misconduct, please do not hesitate to contact Dr. Vershon.

<http://nbacademicintegrity.rutgers.edu/>

⇒ Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- ☐ Cheating
- ☐ Plagiarism
- ☐ Aiding others in committing a violation or allowing others to use your work
- ☐ Failure to cite sources correctly
- ☐ Fabrication
- ☐ Using another person's ideas or words without attribution, including re-using a previous assignment
- ☐ Unauthorized collaboration
- ☐ Sabotaging another student's work

STUDENT SUPPORT AND MENTAL WELLNESS

- ☐ 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>