

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

Molecular Genetics Laboratory (4 credits)

11:126:482 Spring 2024 (Index sec 1: 11697; sec 3: 11699)

Monday 10:20-11:40 (lecture), and 2:00-7:00/10:20-11:40 on designated laboratory section days

Location: Cook Campus, Lecture-Foran 138A; Laboratory-Foran 193

CONTACT INFORMATION:

Instructor: Dr. Faith Belanger

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Instructor: Dr. Donald Kobayashi

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TA: Antonia Kaz (ak1946@cinj.rutgers.edu)

TA: Carmaleen Rodrigopulle (cr992@scarletmail.rutgers.edu)

Lab Preparer: Ralph Dapsis (194 Foran Hall)

COURSE MATERIALS:

- Online (internet) access to course content through Canvas

COURSE DESCRIPTION:

Students are introduced to both chemical and transposon mutagenesis as approaches for gene identification in prokaryotic organisms. Students also investigate heterologous gene expression in bacteria by direct cloning for phenotype. Advantages and disadvantages of the various approaches are discussed. Students are also exposed to yeast as a model system to investigate molecular genetics of eukaryotic organisms. Laboratory experiments illustrate: 1) the use of genetic crosses to create individuals with particular genetic characteristics; 2) cloning a gene by complementation; and 3) deletion of a gene from the yeast chromosome.

LEARNING GOALS:

1. Mastery of basic methods and applications for molecular genetic studies, and comparing and contrasting these methods and applications between prokaryotic and eukaryotic systems
Assessment through exams, quizzes, oral presentations, and evaluation of lab performance
2. Understanding the purpose of appropriate and adequate experimental controls and knowing how to establish these controls when designing experiments
Assessment through exams, quizzes, oral presentations and lab reports
3. Development of interpersonal skills related to effective teamwork
Assessment of lab performance of the entire team and individual members of the team

4. Development of effective scientific communication skills
Assessment of writing skills by short answer/essay questions on exams, lab reports and speaking skills by oral presentations
5. Mastery of the operation of standard equipment used in molecular biology laboratories
Assessment by evaluation of lab performance and lab reports
6. Ability to analyze data and present results effectively
Assessment by specific questions on exams, lab quizzes, lab reports and oral presentations
7. Development of organizational skills
Assessment by weekly review of flow charts written in lab notebooks, data entry in lab notebooks and evaluation of ability to conduct weekly experiments in a timely manner
8. Understanding the use of formulas for quantitative purposes in experimental procedures
Assessment by quizzes, exams and evaluations of lab performance during experimental procedures
9. Understanding hypothesis-driven experimentation
Assessment by exams, quizzes, lab reports, oral presentations, inspection of data recorded in lab notebook, and evaluation of lab performance

ASSIGNMENTS/RESPONSIBILITIES & ASSESSMENT:

Course Grading

25%: Exam 1 (midterm)

25%: Exam 2 (non-comprehensive final)

25%: Written Laboratory Reports

10%: Quizzes

10%: Oral presentations

5%: Lab notebook/attendance/lab participation and performance

Total = 100%

Learning Goal Assessment by evaluation of:

1. Performance on specific quiz and exam questions
2. Performance on oral presentation
3. Observation of in-laboratory performance

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

COURSE SCHEDULE (first 8 weeks of semester):

Week	Topic
Week 1 (Jan 16)	No Class
Week 2 (Jan 22)	Laboratory 1 P. 6 Growth curves of <i>Serratia marcescens</i> Follow-up lab: count colonies on plates for growth curve
Week 3 (Jan 29)	Laboratory 2 P. 9 Chemical mutagenesis: generation of kill curves Follow-up lab: count colonies on plates for kill curves
Week 4 (Feb 5)	Laboratory 3 P. 14 Chemical mutagenesis (cont.): generation of NTG mutants for selection of <i>lipA</i> activity loss dilution plating of mutagenized cells Transposon mutagenesis: mating of donor and recipient cells plating of matings Follow-up lab: Plating of matings 3,4 and 5 of transposon mutagenesis
Week 5 (Feb 12)	Laboratory 4 P. 21 Chemical mutagenesis (cont.): Select bacterial colonies and replica-plate onto LB agar and LB agar supplemented with 1% Tween 80. Transposon mutagenesis (cont.): Selection of mutants and replica plating Follow-up lab: Observation of mutants and restreaking of <i>lipA</i> mutants
Week 6 (Feb 19)	Laboratory 5 P. 23 Direct cloning Isolation of plasmid DNA from lipase expressing clones Follow-up lab: none
Week 7 (Feb 26)	Laboratory 6 P. 25 Direct cloning (cont.): Restriction analysis of isolated plasmid DNA from lab 5 Follow-up lab: none
Week 8 (Mar 4)	MIDTERM EXAM: Monday, Mar 6 First week of yeast labs (Belanger)

Remainder of Weekly Schedule and Final Exam: TBD

ABSENCE POLICY

All course material will be presented in lecture and laboratory classes. Presence in laboratory class meeting times, including follow-up laboratories, is mandatory. The makeup exam for the missed midterm exam will be given during finals week.

FINAL EXAM/PAPER DATE AND TIME

Online Final exam Schedule: <http://finalexams.rutgers.edu/>

ACADEMIC INTEGRITY

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.

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/

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-guide-lines>. 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.