120:538 Topics in Molecular Genetics

INSTRUCTORS: Dr. Susan Seipel

EMAIL: saseipel@andromeda.rutgers.edu

Office/Office Hours: 308 Boyden Hall

COURSE LOCATION(S): 224 Boyden Hall

COURSE WEBSITE: Blackboard

MEETING TIME(S): MONDAYS, 10:00 AM – 11:20 AM;
WEDNESDAYS 10:00 AM – 2:20 PM

COURSE DESCRIPTION:
Lecture and laboratory course on the principles and techniques of molecular biology. The laboratory portion of the course will immerse students in a semester-long laboratory project in which the students will perform molecular methods (isolation of RNA and plasmid DNA, PCR, restriction digests, cloning into GFP vectors, sequencing), learn the safest use of molecular biology lab equipment and reagents, and rigorously interpret and analyze results.

PREREQUISITES:
21:120:201, 202, 356 or a similar undergraduate course in Molecular or Cell Biology.

REQUIRED TEXT:
A bound notebook, safety glasses, and a lab coat are required.
Though there is no required text, a general molecular or cellular biology textbook would be useful for background information.

LEARNING OBJECTIVES/GOALS:
Upon successful completion of this course, participants will be able to:
1. Extract gene sequence data from public databases, apply principles of gene structure and expression to identify features within gene sequence, and analyze gene sequence manually and using online software tools.
2. Interpret and discuss the outcome of experiments formally through oral presentations and written reports.
3. Read and adapt protocols to maximize results, understanding the purpose of each step.
4. Maintain a thorough, detailed notebook containing experimental objectives, protocols, and the expected and actual results.
5. Critically read and discuss original published research.
6. Use equipment and reagents properly, maintaining a safe laboratory environment.
Course Syllabus/Fall 2012

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**SCHEDULE AND COURSE OUTLINE:** Dates listed by week; lectures and laboratory sections will meet every week unless otherwise noted. Weekly dates of quizzes and due dates for written projects are listed, but please note there will be additional smaller assignments throughout the semester. Due dates for these assignments will be regularly updated on the course [Blackboard](http://blackboard.rutgers.edu) site.

<table>
<thead>
<tr>
<th>WEEK</th>
<th>MEETING TOPIC</th>
<th>NOTES/READING</th>
<th>ASSIGNMENTS/EXAMS</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Introduction, laboratory safety</td>
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</table>
| Week 2 | Project background  
Lab: Reagent preparation (1) | | |
| Week 3 | DNA and RNA: What, where, how (to work with nucleic acids) and why (work with DNA vs. RNA)  
Lab: DNA isolation, quantitation, and characterization (2) | | |
| Week 4 | Reverse transcription and the power of controls;  
Designing primers for PCR  
Lab: Reverse transcription (3) | | |
| Week 5 | PCR: History, process, application  
Lab: PCR (4) | QUIZ | |
| Week 6 | Journal Club  
Lab: Analysis of PCR results, TA cloning (5) | Lab Report #1 (2-4) | |
| Week 7 | Introduction of DNA into cells, Putting bacteria to work  
Lab: Plasmid isolation, quantification, and characterization (6) | | |
| Week 8 | Lab meeting  
Lab: PCR for directional cloning (7) | | |
| Week 9 | Restriction enzymes  
Lab: Restriction digests, characterization (8.1) | Quiz | |
| Week 10 | Ligation  
Lab: Restriction digests, characterization (8.2) | Lab Report #2 (5-7) | |
| Week 11 | Sequencing and sequence analysis  
Lab: Ligation, transformation (9) | | |
| Week 12 | Journal Club  
Lab: Plasmid isolation and characterization (10) | | |
| Week 13 | Future directions: Protein expression, transfection | | |
| Week 14 | Lab: Sequence analysis (11) | | |
| Week 15 | Lab meeting and presentations  
Review, distribute take-home exam | Lab Report #3 (8-11) | |

**FINAL DUE WEDNESDAY, DECEMBER 19TH AT 12 PM.**
GRADING POLICY:
Your grade for this course will be determined based on the categories listed in the table below.

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Notebook</td>
<td>15%</td>
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<tr>
<td>Quizzes (2)</td>
<td>10%</td>
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<tr>
<td>Participation in lab meeting/journal club/presentations</td>
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<tr>
<td>• Presenting data</td>
<td>30%</td>
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<tr>
<td>• Interpretation and analysis</td>
<td></td>
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<tr>
<td>Lab reports (3)</td>
<td>15%</td>
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<tr>
<td>Take-home exam, Final report</td>
<td>30%</td>
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<tr>
<td>TOTAL</td>
<td>100%</td>
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ATTENDANCE, MAKE-UP, AND LATENESS POLICY:
Due to the nature and size of the course, it is imperative to attend all scheduled lecture and laboratory sessions. Should you have to miss a lab for a University-approved reason, please contact the instructor immediately.

Academic Dishonesty: The course has a zero tolerance policy for academic dishonesty, including plagiarism and cheating. Instances of dishonesty will be punished by a zero on the assignment and consultation with the Academic Integrity Officers to determine if further action is required. If you have any questions about what constitutes plagiarism or cheating, please ask your instructors or refer to the academic integrity websites for Rutgers and NJIT:

- [http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers](http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers)
- [http://studentconduct.rutgers.edu/](http://studentconduct.rutgers.edu/)