Genetic Analysis II

01:447:385
Spring Term, 2018
Syllabus

Lecture Meets: Tuesday & Thursday, 1:40 pm – 3:00 pm, ARC-107, Busch
Recitation Meets:  
Section 1, Wednesday, 10:35 am – 11:30 am, SEC-202, Busch
Section 2, Wednesday, 12:15 pm – 1:10 pm, ARC-206, Busch
Section 3, Wednesday, 1:55 pm – 2:50 pm, SEC-220, Busch
Section H1, Wednesday, 1:55 pm – 2:50 pm, ARC-206, Busch

Prerequisites: 447:384

Professor  
Dr. Kim McKim, Ph.D.  
mckim@waksman.rutgers.edu

Office Hours: by appointment  
Waksman Institute 206  
(848) 445-1164

Teaching Assistant:  
Lisa LaManna,  
lml228@scarletmail.rutgers.edu

Office Hours: By appointment. Room 2014 Waksman

Course Description and Goals  
This course is the second half of the course for majors in Genetics, covering selected topics in greater depth than is possible in the 447:380 Introduction to Genetics course. Our goals are for students to learn the terms, concepts, and theories in the field of genetics, and for students to understand how research approaches from multiple disciplines, in a holistic fashion, can be used to tackle problems in the life sciences. Emphasis will be on experimental methods and concepts in genetics, and their application in contemporary genetic research. The class will be a combination of lecture and discussion. The course places particular emphasis on molecular genetics in multicellular organisms, emphasizing genome structure and dynamics, DNA damage and mutagenesis, cancer genetics, and developmental genetics. It also covers population, quantitative, and statistical genetics.

Course Objectives
• To learn the terms, concepts, and theories in the field of genetics.
• To understand how hypotheses are formulated.
• To understand why particular genetic approaches and techniques are employed.
• To understand why new technologies are crucial for the scientific progress.
• To understand how genetic experiments are performed (both technically and conceptually).
• To understand how genetic data are analyzed and interpreted.
Course Materials

Textbook:
1. Genetics: From Genes To Genomes (5th edition) by Hartwell, Goldberg, Fischer and Hood, Online access to the SmartBook version can be obtained through McGraw-Hill Connect (your purchase in the fall should still provide you access this spring):

Supplemental Readings will be provided via the SAKAI website "GENETIC ANALYSIS II 01 Sp18"

Iclicker required

Attendance Policy

Students are responsible for all materials related to this course, including lecture material, material posted online, and assigned reading. An anticipated absence should be discussed with an instructor prior to the date in question; an excused absence in such a situation is at the discretion of the instructor. Students are expected to attend and participate in recitation; punctuality and participation will be factors in the recitation performance grade. Late assignments will not be accepted, and no makeup will be given for them. Only one makeup exam during the entire course will be permitted for a student who fails to attend an exam; a reasonable explanation for the absence, as assessed by the instructor, will be required (e.g., illness).

Performance Expectations and Evaluation Methods

Grades will be based on student performance on exams and homework assignments. Percent contribution towards the final course grade will be as follows:

20% per exam X 3 = 60%
20% In class quizzes
20% Recitation Performance

The following grading scale will be used:
90% A
85% B+
75% B
70% C+
60% C

I reserve the right to (and probably will) modify the grading scale downward (e.g., making the lowest A an 88%), but the grading scale will not be adjusted upward. Grades below "C" will be determined based on the final score distribution at the end of the course.
## Lecture and Exam Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Lec</th>
<th>Topic</th>
<th>Reading (Hartwell)</th>
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<tbody>
<tr>
<td>Jan. 16</td>
<td>Tue</td>
<td>1</td>
<td>Overview and Review</td>
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<tr>
<td>18</td>
<td>Thur</td>
<td>2</td>
<td>Population Genetics</td>
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<tr>
<td>23</td>
<td>Tue</td>
<td>3</td>
<td>Quantitative Genetics</td>
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<td>25</td>
<td>Thur</td>
<td>4</td>
<td>Evolutionary Genetics</td>
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<tr>
<td>30</td>
<td>Tue</td>
<td>5</td>
<td>Molecular Basis of Mutations</td>
<td>7, online</td>
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<tr>
<td>Feb 1</td>
<td>Thur</td>
<td>6</td>
<td>Spontaneous and Induced Mutations</td>
<td>7</td>
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<tr>
<td>6</td>
<td>Tue</td>
<td>7</td>
<td>Chromosome segregation</td>
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<tr>
<td>8</td>
<td>Thur</td>
<td>8</td>
<td>Chromosome segregation and recombination</td>
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<td>13</td>
<td>Tue</td>
<td>9</td>
<td>Chromosome rearrangements</td>
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<td>15</td>
<td>Thur</td>
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<td>Site-Specific Recombination and Transposition</td>
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<td>20</td>
<td>Tue</td>
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<td><strong>Exam 1 (Lectures 1-8)</strong></td>
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<td>22</td>
<td>Thur</td>
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<td>Transposons and viruses</td>
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<td>27</td>
<td>Tue</td>
<td>12</td>
<td>Gene regulation - prokaryotes</td>
<td>15</td>
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<td>Mar. 1</td>
<td>Thur</td>
<td>13</td>
<td>Gene regulation - prokaryotes</td>
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<td>6</td>
<td>Tue</td>
<td>14</td>
<td>Gene regulation- eukaryotes</td>
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<tr>
<td>8</td>
<td>Thur</td>
<td>15</td>
<td>Gene regulation - eukaryotes</td>
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<tr>
<td>13</td>
<td>Tue</td>
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<td><strong>Spring Break – No Class</strong></td>
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<td>15</td>
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<td><strong>Spring Break – No Class</strong></td>
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<tr>
<td>20</td>
<td>Tue</td>
<td>16</td>
<td>Transgenics and gene therapy</td>
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<td>22</td>
<td>Thur</td>
<td>17</td>
<td>Transgenics and reverse genetics</td>
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<td>27</td>
<td>Tue</td>
<td>18</td>
<td>Reverse genetics</td>
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<td>29</td>
<td>Thur</td>
<td>19</td>
<td>Genetic manipulation of plants and modern technologies</td>
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<td>April 3</td>
<td>Tue</td>
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<td><strong>Exam 2 (Lectures 9-18)</strong></td>
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<td>5</td>
<td>Thur</td>
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<td>Cell cycle</td>
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<td>10</td>
<td>Tue</td>
<td>21</td>
<td>Cell cycle and Cancer Genetics</td>
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<td>12</td>
<td>Thur</td>
<td>22</td>
<td>Plant Genetics/ Organelles</td>
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Quizzes
Students are expected to read materials in advance of the lectures that cover that material so that the students will be prepared to discuss the material in class. To ensure that students read the material in advance, there will be in class “iclicker” quizzes for the reading material in the corresponding lectures. Students are strongly encouraged to use the practice quiz features in SmartBook/LearnSmart to learn the material before class.

Homework (Problem Sets)
Homework will be assigned in the form of weekly problem sets. All problem sets will be assigned from the textbook or downloaded from the SAKAI website. Homework primarily covers the lecture material and focuses on problem solving skills rather than rote memorization. Students can discuss questions on the homework assignments with each other or with the faculty; however, students are expected to submit original written work. Thus, “word for word” copying of even a single answer is unacceptable. Write up your answers in your own words. Individual homework assignments are due in section the week following the lectures that they cover.

Bring two copies of your homework to section: one to turn in and one to keep with you during the section discussion. The students will work in groups to present the answers to most of the recitation questions. Each group will present the answer to 1 or 2 questions. However, there will not be enough time to generate a consensus copy of your group work. Therefore, the recitation work will be graded individually, and the group presentations will be factored into a participation component. After submission, answers will be posted on SAKAI.

Exams
There will be three exams, which will be given in ARC-107 during our normal class lecture period (the third will be given during the final exam period but will not be comprehensive). Exams will cover the material from lectures as well as the reading assigned for those lectures. Students may not use their textbook or notes during the exam. Students are strongly discouraged from missing an exam, as a makeup exam will be different from the exam given in class, and we cannot guarantee that such a makeup would be of the same length and level of difficulty as the original exam assigned in class.
Other Policies

We expect students’ active participation during lectures and section, including comments and questions. A cooperative approach to learning is strongly encouraged with regard to in-class discussion and the assigned reading; students can work together with their classmates on these parts of the class.

Students can discuss questions on the problem set homework assignments with each other or with the instructors; however, students are expected to submit original written work. Thus, “word for word” copying of even a single answer is unacceptable. If students discuss the problem set assignments with others, then they should be sure to write up their answers in their own words.

Students in the Honors section will be given additional assignments (posted in a separate section of the sakai site). The scores for these problem sets will be part of their recitation/participation grade.

Students are required to work independently on the in-class exams. All students who violate academic integrity will be reported to the appropriate dean, academic officer, and/or appropriate hearing board for disciplinary action immediately, regardless of the level of offense. This includes students who are cheating as well as students who are helping to facilitate cheating or other academic dishonesty. We will advocate for the strongest possible sanctions against students who violate academic integrity, including but not limited to assigning the grade of XF (disciplinary F) for the course, suspension for one or more semesters, and permanent expulsion from the University with a permanent notation of disciplinary expulsion on the student’s transcript.

All students are expected to read the Rutgers University Academic Integrity Policy. More information can be obtained at the following website:

http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers
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 Ave, 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.

Scarlet Listeners
(732) 247-5555 / http://www.scarletlisteners.com/
Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.