Genetic Analysis II

01:447:385
Spring Term, 2020
Syllabus

Lecture Meets: Tuesday & Thursday, 1:40 pm – 3:00 pm, HLL-116, 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-108, 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 **Office Hours:** by appointment

Dr. Kim McKim, Ph.D. Waksman Institute 206 (848) 445-1164
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Teaching Assistant: **Office Hours:**

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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 (6th 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 Sp19*"

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 the instructor and TA 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 homework 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

Date	Day	Lec	Topic	Reading (Hartwell)
Jan. 21	Tue	1	Overview and Review	
23	Thur	2	Population Genetics	21.1-.21.2
28	Tue	3	Quantitative Genetics	22
30	Thur	4	Evolutionary Genetics	21.3, 10.2
Feb 4	Tue	5	Spontaneous and Induced Mutations	7, 8.5
6	Thur	6	Chromosome segregation	12
11	Tue	7	Chromosome rearrangements	12
13	Thur	8	Chromosome rearrangements segregation	13
18	Tue	9	Transposition and Site-Specific Recombination	13
20	Thur	10	Aneuploidy	13
25	Tue		***Exam 1 (Lectures 1-8)***	
27	Thur	11	Transposons and viruses	13
Mar 3	Tue	12	Gene regulation - prokaryotes	16
5	Thur	13	Gene regulation - prokaryotes	16
10	Tue	14	Gene regulation - eukaryotes	17
12	Thur	15	Gene regulation- eukaryotes	17
17	Tue		*Spring Break – No Class*	
19	Thur		*Spring Break – No Class*	
24	Tue	16	Cell cycle	20
26	Thur	17	Cell cycle and Cancer Genetics	20
31	Tue	18	Genetic screens and RNAi	17.4, 19
Apr 2	Thur	19	Developmental Genetics	19
7	Tue		***Exam 2 (Lectures 9-18)***	
9	Thur	20	Epistasis Analysis, genetic pathways	19
14	Tue	21	Plant Genetics/ Organelles	15
16	Thur	22	Genetic manipulation of plants	18

21 Tue	23	Reverse genetics	18
23 Thur	24	Transgenics and reverse genetics	18
28 Tue	25	Transgenics and gene therapy	18
30 Thur	26	Review and catchup	
May TBA		***Exam 3 (Lectures 19-26)***	

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. 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, usually on Friday and due the following Wednesday. All problem sets will be assigned from the textbook or posted on the SAKAI website. Homework primarily covers the lecture material and focuses on problem solving skills rather than memorization of facts. 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 recitation 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, two of which will be given in ARC-107 during our normal class lecture period The third exam 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 assignments 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: peer counseling services
Get things off your chest in a non-judgmental, empathetic space facilitated by trained students. Sessions are held Monday-Thursday evenings during the Fall and Spring semesters.

Sign up for information about times and locations at tinyurl.com/SLGroupSessions or email scarlet.listeners@gmail.com