

Syllabus as of 7/26/2020. Dates and policies are subject to change

Genetic Analysis I: 384. Sections 01-03, H1, Fall 2020

Welcome to the Genetics Major!

Course for Genetics Majors Only

The Course Canvas website is located at:

pending

You should have received an e-mail with this link.

Meeting Days/Places

Tuesday and Friday, 12-1:20 Classes held through Canvas and Big Blue Button
Recitation – each student is assigned one recitation section held Thursdays according to your assigned timeslot. Again, we will meet on Canvas/Big Blue Button.

01- Thursday 5:15 PM - 6:10 PM

02- Thursday 6:55 PM - 7:50 PM

03- Thursday 1:55 PM - 2:50 PM

H1- Thursday 3:35 PM - 4:30 PM

Class environment: Since you are training to be scientists, we will model the class in the spirit of working as scientific colleagues (with the instructors and each other), practice evidence-based thinking and learning, and value collaboration and diversity. I encourage you to strive towards learning, not grades!

In an effort to work as scientists in class (with team-based problem solving) we can't afford as much time for content transfer. Therefore pre-class reading assignments are essential for you to come prepared to class with an understanding of the content. Pre-reading assignments will be assessed on-line.

Materials:

- 1) **Text:** We will be using a digital text with an on-line resource for this course. Get access at the following site. I'd recommend getting the lifetime eBook, as you'll need it for the second semester: <https://www.mheducation.com/highered/product/genetics-genes-genomes-hartwell-goldberg/M9781259700903.html#textbookCollapse>
ISBN10: 1259700909
ISBN13: 9781259700903

Additional, OPTIONAL paper-based resources are available. Details from the publisher at the same site.

Disability – If you have a documented disability and require special accommodations, please let us know as soon as possible. Students with disabilities requesting accommodations must follow the procedures outlined at <https://ods.rutgers.edu/letter-accommodation>.

Full disability policies and procedures are at <https://ods.rutgers.edu/>

Assessment: Ideally, you will acquire skills necessary to assess your own learning. You will be able to integrate ideas and concepts, form your own questions, decide which questions are the most important, and then seek evidence to answer them.

Below is the breakdown for class assessment:

10% for pre-class reading – quizzes

20% for recitation work – problem sets

5% for pre- and post- course essays

10% for in-class group work and participation on the class form, asking questions and answering other students' questions

12.5% for transmission genetics exam I

12.5% for transmission genetics exam II

12.5% for molecular genetics exam I

12.5% for molecular genetics exam II

5% for final exam

(Assessment on current events will be interwoven into all of the above; current events relevant to the class material will begin each class period)

Attendance: Attendance is mandatory. Unexcused absences are not tolerated, as per Rutgers policy. This is particularly important in a class aimed at developing collaborative problem solving. You can't collaborate if you are not in class. Unexcused absences from class will be graded as zero for class participation and group work for that day. One unexcused absence from recitation will be scored as zero for the missed week and two unexcused absences from recitation will result in failing the class. Part of class participation will include use of iClickers and 3x5 notecards. Failure to bring these to class will impact your in-class grade. If you expect to miss one or two classes, please use the University absence reporting website <https://sims.rutgers.edu/ssra/> to indicate the date and reason for your absence.

Office Hours:

Dr. Verzi: Mondays, 12pm – 1:30pm, BigBlueButton, scheduled on Canvas

Dr. Srujana (Sam) Yadavalli , TBD

Mr. Jung: TBD and announced on Canvas

Current Events: Each class will contain a current event that relates to the day's lesson, typically to start the class. The content of these discussions will be interwoven into the assessments. It's advisable to be on time to class. Students are encouraged to suggest current events for discussion on the class forum page.

Genetics Department Goals Covered in this course:

- 1) Know the terms, concepts and theories in genetics.
- 2) Integrate the material from multiple courses and research. That is, to think holistically and to see the whole as well as the parts.

Core curriculum Goals Covered in this course: In this course you will analyze the relationship that science and technology have to contemporary social issues in each class meeting and in written assignments. Therefore, the course meets the **Contemporary Challenges [CC] goal c** requirement in the SAS core curriculum.

Course Goals: We will attempt to accomplish the following goals, roughly in chronological order; each learning goal will be approximately 1 class length. However, it's important to be able to relate each goal to the others. I will attempt to design assessments around your ability to demonstrate you've accomplished these learning objectives.

Note: see Canvas website for updated due dates on reading assignments. Dates are approximate, and the syllabus may be updated, but the following topics will be covered roughly in chronological order:

Introduction to Genetic Analysis – Class 1

Learning Goal 1: Understand common patterns of inheritance

Class 1 [book chapters 1-2.2]

Specific learning objectives:

- Be able to predict the outcome of a genetic cross
- Relate common genetic terms to one another (gene, allele, genotype, phenotype, trait, heterozygous, homozygous, allele segregation, dominant, recessive, independent assortment)
- predict the outcome of genetic crosses that track dominant and recessive genes

Learning Goal 2: Appreciate how inheritance patterns can be predicted using statistics and the laws of inheritance

Class 1-3 [book chapters 2.2-2.3]

Specific learning objectives:

- Discern between and apply the sum and product rules to predict the probability of genetic cross outcomes
- Appreciate the importance of statistics in research, know how to choose an appropriate statistical test, and plan for an adequate sample size in your experiments
- Explain Mendel's law of independent assortment and how the 9:3:3:1 phenotypic ratio - among the F₂ of a dihybrid cross provides evidence for this law.
- Interpret phenotypic ratios of progeny to infer how particular traits are inherited.
- Predict the genotypic and phenotypic ratios among progeny of complex multihybrid crosses using simple rules of probability.
- Create pedigrees showing inheritance of a dominant or recessive trait

Learning Goal 3: Understand Chromosome Structure and the process by which chromosomes are duplicated and segregated in mitosis and meiosis

Class 4 [book chapter 4.3, 4.4]

- Explain how to create and interpret a karyotype, and what you'd use it for
- Diagram the order of steps in mitosis and the importance of restriction points (aka checkpoints)
- Discuss the advantages of sexual reproduction and how meiosis contributes to these advantages
- Relate differences in mammalian male and female meiosis to chromosomal disorders

Learning Goal 4: Chromosome theory and Sexual dimorphism.

Class 5 [book chapter 4.6, 4.7]

- Be able to explain sex-linked inheritance pattern and be able to create a pedigree exhibiting sex-linked inheritance
- Explain what dosage compensation is and what problem it solves.
- Distinguish between sex-influenced, sex-limited, and sex-linked
- What is the evidence that the *SRY* gene confers male phenotype in mammals?
- Discuss why dosage compensation is important and how it is achieved in mammals

Learning Goal 5: Understand inheritance patterns that don't fit the simple dominant/recessive relationship observed by Mendel.

Class 6-7 [book chapters 3.1]

- Explain the relationship between an inheritance pattern and the likely underlying molecular mechanism
- Define and contrast different types of single-gene inheritance patterns
- Discuss the influence of environment on traits
- Explain how multiple alleles contribute to the inheritance pattern of blood type

Class 7: Transmission Genetics Exam I 9/25

Learning Goal 6: Understand how gene-gene interactions can impact phenotypes

Class 7-9 [book chapter 3.2]

- Be able to apply epistasis, complementation, modifying genes, gene redundancy, and suppressor mutations to experiments involving research model systems and/or human genetic disease
- Define and contrast expressivity and penetrance
- Explain how Mendel's laws could apply to continuous traits that are controlled by multiple alleles of multiple genes, such as height.

Learning Goal 7: Understand Genetic Linkage and recombination

Class 10 [book chapters 5.1-5.2]

- Explain how crossing over can yield new combinations of alleles (nonparental)
- Discuss why independent assortment isn't observed with linked traits and explain the relationship between linked genes and the distance between them

Learning Goal 8: Understand how Genetic Linkage is used to map genes

Class 11-12 [book chapters 5.3-5.4, 5.6]

- Be able to design crosses that will allow you to: determine if genes are linked, and if so, determine the distance between the genes
- Apply Chi square analysis to predict whether traits are linked or sorting independently
- Apply the Chi square test as a mechanism to relate the concepts of hypothesis testing, proof, *P* value and probability.

Class 13 Overflow, review, and ethics discussions.

Class 14: Transmission Genetics Exam II 10/20 – in class

Recitation problem sets and directions will typically be distributed the Wednesday prior to collection (1 week). They will be done individually and submitted before recitation, then a revised copy worked on and submitted as groups during the first 25 minutes of recitation in breakout groups. The group copy will be graded, but clear effort should be seen on individual copies. The remaining 30 minutes of recitation will be to review the problems that were just submitted with the TA. Note, for the Honors recitation section, there will not be a groupwork period during recitation. Instead, time will be devoted to additional problem solving, literature review, current events, policy discussion, etc...

Due dates as of 8/29/19. We may adjust the schedule as necessary for school closings, class progress, etc. In that case an updated syllabus will be posted on Canvas.

<u>Assignment</u>	<u>Details</u>	<u>Due Date</u>
<i>Recitation 1</i>	<i>Pre-test</i>	<i>9/3</i>
Pre-reading assignment 1	Text Chapter 2.2 – 2.3	9/4 reading quiz
Reflective Writing Assignment #1		9/5/18 at 10am Submit on Canvas
<i>Recitation 2</i>	<i>Crosses and Probability</i>	<i>9/10</i>
Pre-reading assignment 2	Text Chapter 4.1- 4.4	9/11 reading quiz
<i>Recitation 3</i>	<i>Meiosis Diagram</i>	<i>9/17</i>
Pre-reading assignment 3	Text Chapter 4.6, 4.7	9/15 reading quiz
Pre-reading assignment 4	Text Chapter 3.1	9/18 reading quiz
<i>Recitation 4</i>	<i>Complex Mendel</i>	<i>9/24</i>
EXAM I		9/25
Pre-reading assignment 5	Text Chapter 3.2-3.3	9/29 reading quiz
<i>Recitation 5</i>	<i>Gene-Gene Interactions</i>	<i>10/1</i>
Pre-reading assignment 6	Text Chapter 5.1, 5.2, 5.4,	10/6 clicker quiz
<i>Recitation 6</i>	<i>Linkage and Chi-Square</i>	<i>10/8</i>
Pre-reading assignment 7	Text Chapter 5.3, 5.6	10/13 clicker quiz
<i>Recitation 7</i>	<i>Linkage and mapping</i>	<i>10/15</i>
EXAM II		10/20/18

Study Schedule Example:

First week of September, Practice Chapter 2 book problems 1-47

Second week of September Continue Ch. 2 problems plus Chapter 4, 1-22

Third week of September, Chapter 4, 27-51, Chapter 3, 1-19, and Exam 1 from 2016 and 2017

First week of October: Book problems from Chapter 3.2-3.3

Second week of October: Book problems from Chapter 5.1-5.4, 5.6

Practice the two old Exams II's in the resources folder

Student-Wellness Services:

By Phone

848-932-7884

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-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

Scarlet Listeners – 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

Current Academic Integrity Policy:

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

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.

ACADEMIC INTEGRITY AT RUTGERS: In accordance with departmental and University Policy, violations of academic integrity will immediately be referred to the dean. See the attached statement from our departmental Vice Chair below:

Attendance Policy

Students are responsible for all materials related to this course, including lecture material, material posted online, and assigned reading. Students are expected to attend all meetings of the course; a failure in attendance will be grounds for failure of the course. 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 major 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.

If you have a documented disability and require special accommodations, please let us know as soon as possible.

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 recitation 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 are expected to complete the online quizzes independently. They may not share answers with other students or even discuss the questions with other students prior to the quiz deadline.

Finally, 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/>