Genetics - Spring 2024

Evolving Syllabus

Subject to some change during the course of the semester. Under certain circumstances, the instructor may have to alter course requirements, assignment deadlines, and grading procedures; and the university may have to alter the semester calendar.

Prerequisites

- BIOL-201 Cellular or BIOL-202 or BIOG-240

Administrative details

Meetings:	MWF 9-9:50am, location WAL-3420
Recitation	Wednesday 8-8:50am, location WAL-3420
Credits	3
Required text	Essential Genetics, 7th ed, by Hartl and Jones
	iClicker will be required.
Instructor:	Michael Osier
Office:	08-1338
	Schedule
Contact:	mvoscl@rit.edu

Topics

	Mon lecture		Wed recitation	Wed lecture	Fri lecture
Week 1 - Jan 15	No class		Introduction	Why study genetics?; Phenotypic Variation	Mendel and Darwin (Chapter 2.1-2.6; Chapter 15.1-15.2, look over OMIM)
Week 2 - Jan 22	Quiz 1	Genome structures; Organization of the Chromosome; Mitosis and Meiosis (Chapters 3.1-3.5, 6.1-6.5, 12.1-12.6)	CoT in the Act by Dr. Rothman	Mutation and Repair; Eukaryotic gene structure (Chapters 3.1-3.5, 6.1-6.5, 12.1-12.6)	Polymorphism; Model organisms
Week 3 - Jan 29	Quiz 2	Sex-linked inheritance; Sex determination and the Lyons hypothesis (Chapters 3.6, 5.1-5.2)	Activity: sex-linked *Drosophila* phenotypes, Exam review	Trancription, splicing, and translation (Chapter 8)	
Week 4 - Feb	Exam 1: short answer		Online activity this week - NIH	Exam 1: problem solving	Prokaryotic gene expression (Chapter

5			Genetic Testing Registry		9.1-9.3)	
Week 5 - Feb 12	Quiz 3	Mapping prokaryotic genes (Chapter 7.1-7.5)	Exam 1 followup	Mapping prokaryotic genes (Chapter 7.1-7.5); Eukaryotic gene expression (Chapter 9.4-9.7)		
Week 6 - Feb 19	Quiz 4	Independent assortment (Chapter 2.3-2.4, 3.7 [just Chi-square Goodness-of-Fit], Chapter 4.1-4.2)	Parada et al., 2002	Independent assortment (Chapter 2.3-2.4, 3.7 [just Chi-square Goodness-of-Fit], Chapter 4.1-4.2)		
Week 7 - Feb 26	Quiz 5	Tetrad analysis (4.5 [not including section on Gene Conversion])	Exam review	Linkage (Chapter 4.1-4.2, 4.5 [not including section on Gene Conversion])		
Week 8 - Mar 4	Exam 2: short answer		Online activity this week - Prokaryotic mapping practice worksheet	Exam 2: problem solving	Exam 2 followup	
Week 9 - Mar 11	Spring Break					
Week 10 - Mar 18	Segregration analysis (Chapter 2.5, 5.1-5.3, 4.1-4.3)		Mid-semester review	Eukaryotic gene mapping; Karyotype analysis (Chapters 5.1-5.3, 4.1-4.3)		
Week 11 - Mar 25	Quiz 6	Quantitative genetics (Chapters 15.1-15.2, 15.4-15.5)	Activity: finding double-recombinants	Introduction to Population Genetics: Random mating, non-random mating, and HWE (Chapters 14.2-14.3, 14.9)		
Week 12 - Apr 1	Quiz 7	Activity: Forensics and HWE	Patsalis et al. paper; Xu et al. paper	Activity: Random genetic drift (Chapters 14.2-14.3, 14.9); Random Genetic Drift (Chapters 14.2-14.3, 14.9)	Exam review	
Week 13 - Apr 8	Exam 3: short answer		Open review session	Exam 3: problem solving	HWE and selection (Chapters 14.2-14.3, 14.9)	
Week 14 - Apr 15	Quiz 8	Complementation (pp 17-19 for Complementation)	Exam 3 followup	Activity: Epistasis; Pleiotropy and Penetrance and Phenocopies, oh my! (Chapter 2.6-2.7)		
Week 15 - Apr 22	Quiz 9	Catchup, open course review	Lyons, Cox, and Dancis paper	Activity: Doing the pathway shuffle (Genetics board game)	Exam review	
Week 16 - Apr 29	open course review		Exam week			

Grading

Quizzes (2 points each x 9)	18%
Participation	12%
Exam 1	14%
Exam 2	18%
Exam 3	18%
Final Exam	20%
Total	**100%**

If your final exam grade is higher than your average for the first three exams, your final exam grade will replace your lowest grade in Exams 1 through 3. So if you earn 90% on your final, and your exam average was 83%, and your lowest grade was a 70%, the 90% will replace the 70%, plus you get a 90% on the final.

A	[95-100]
A-	[90-95)
B+	[86.7-90)
B	[83.4-86.7)
B-	[80-83.4)
C+	[76.7-80)
C	[73.4-76.7)
C-	[70-73.4)
D	[60-70)
F	<60

Participation

Participation will be determined based upon a combination of factors, including but not limited to, attending sessions on time, participating in all iClicker questions for the day, and properly following any relevant RIT policies.

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iClicker

I will be using iClicker to make our class time more engaging. This will help me understand what you know, give everyone a chance to participate, and increase how much you learn in class. This will also provide you with feedback on how well you are comprehending course concepts, and help you master challenging concepts.

You are required to participate with the iClicker student app on a smartphone, tablet or laptop in a timely fashion. It is also your responsibility to regularly check your iClicker records for any discrepancies.

You can use an existing iClicker account if you have one...please do not create a new account if you already have one. If you do not have an account yet, you can create a new iClicker account using the instructions here. There is a fee for using the iClicker service. Subscriptions can be purchased within the app.

Next, you can add our course per the instructions here. The course will be under "Biology" and named "BIOL-321 Genetics 2024" for the Spring 2024 semester.

Optional homework assignments

The below homework questions are not required, but may be reflective of some questions on quizzes and exams. With the exception of dates without assigned problems, for every completed homework assignment submitted on paper in handwriting before the start of the following week (e.g. Homework for Week 1 due before class on Monday of Week 2), students will earn 1/2 bonus point toward their final grade. No late submissions will be accepted for bonus points. Feedback will be given as quickly as possible.

All numbers below are Concepts in Action problems from the end of the corresponding chapter. "2.1" corresponds to Chapter 2, first Concept in Action problem. All even numbered problems have answers in the back of the text. Problems from outside the textbook may also be indicated.

Week Assigned	Week Due	Assignment
1	2	2.1, 2.2, 2.5, 2.16, 2.20; Search OMIM for a disease of interest to you...in no more than one-half page, describe what is known about the genetics of this human trait.
2	3	3.2, 3.8, 6.4, 6.6, 6.8, 6.10
3	4	2.18, 3.10, 3.12, 5.4, 5.6, 5.8, 8.2, 8.6, 8.8, 8.14, 8.20, 12.2, 12.6, 12.8, 12.12, 12.16
4	5	9.2, 9.16, 9.18
5	6	9.6, 7.10, 7.11, 7.14, 7.18, 7.20
6	7	3.16, 3.18
7	8	Exam review packet
8	10	4.2, 4.6, 4.8, 4.10
9	N/A	None
10	11	2.8, 2.9, 2.10, 2.21, 4.20 a & b, 5.12
11	12	14.2, 14.4, 14.6, 14.8, 14.10, 14.12
12	13	Exam review packet
13	14	Worksheet in myCourses - Submit to myCourses Assignment box by Week 14 Wednesday
14	15	2.12, 2.14, 2.17, 4.13, 4.16, 4.20 (a and b), 15.2, 15.4, 15.10, 15.12, 15.20
15*	16*	2.3, 2.11, 2.15, 4.17, 9.13, 9.20, 12.9, 12.11, 14.9, 14.17, 2.13, 4.11, 4.14, 4.19, 9.15, 12.17, 14.11, 14.13, 14.15, 15.5

* Week 15 problems due before the final exam.

Quiz and Exam policy

No electronics except for a calculator. The calculator must *not* be a graphing or programmable calculator. No caps or hats.

Quizzes will take place during the first ten minutes of class time. Exams will take the full assigned session and you may leave when finished.

There will be one makeup for any exam or quiz, on a date and time to be determined by the instructor. Please email the instructor as soon as possible if you are unable to make an exam or quiz.

Recording policy

Unless written permission is granted by the faculty member, or a specific accommodation has been approved by the Disability Services Office, students are prohibited from recording lectures or presentations.

Links

Spreadsheets to practice with

- Chi-square worksheet (xlsx)
- Selection worksheet (ods)

Supporting information

- 200+ terms that genetics students should learn
- Term list broken down by exam period for 2023
- Game cards
- Punnett Square calculator
- Gene expression control by deacylation in flowering
- Online color hue test
- Alternative genetic codes
- Snake sex chromosome evolution article
- Genetics Testing Registry - over 10K tests registered!
- Mendel's paper
- A review of trisomy X (47,XXX)
- NCBI
- Detecting non-approved Genetically Modified Organisms
- Moris et al., 2008. (Identification of Candida species in HIV patients)
- Lai and Sun, 2003. (Microsatellite mutation)
- Kelly et al., 2006. (example of a missense mutation)
- Nakamura et al., 1995. (mt heteroplasmy in human disease)
- MERRF
- MELAS
- example of ragged-red fibers
- Profile of Barbara McClintock
- Labrador color genetics
- Male infertility related to 47,XYY
- Case of fully functional polydactyly (found by Shandra Iannucci)

Contents last updated 1/14/24

- Any changes after the start of class will be noted here.