

Biology 143 General Genetics
Spring Semester 2002

Professor: Bruce Ostrow, Ph.D.

Office: Pierce 104

Phone: (770) 784-8346

Email: bostrow@learnlink.emory.edu

Office Hours: Tuesdays and Thursdays 10 a.m. - 12 noon *and* by appointment

Lecture Hours: Monday, Wednesday, Friday 9:35 - 10:25 a.m.

Room: Pierce 102

Lab Hours: Wednesdays 2:00 - 5:00 p.m.

Room: Pierce 123

Required Texts: (available at bookstore)

Principles of Genetics, 2nd ed. Snustad, D. P., and M. J. Simmons. 2000. Wiley & Sons, Inc.

The Double Helix: A Personal Account of the Discovery of the Structure of DNA.
James D. Watson. 1968. Mentor, New York.

Subscription to Virtual Flylab.

Investigating Biology, 3rd ed. Morgan and Carter. 1999. (*For one lab exercise*).

Additional Required Materials:

A good calculator that can do exponential numbers.

Access to a modem and printer to print laboratory instructions using PDF format.

Additional Recommended Materials:

Study Guide and Problem Workbook for Principles of Genetics
(available at bookstore and on reserve at the library)

Course Plan:

1. The object of this class is to learn advanced concepts in genetics and to address issues relevant to this field including human genetic diseases. Biology 141 and Chemistry 141 are prerequisites.
2. You are expected to have a strong background in basic biology, cell biology, basic genetics, and mathematics. For example you should know Mendel's laws, the functions and processes of mitosis, meiosis, replication, transcription, and translation, also probability theory and the Chi-square statistical test. Review chapters 1 and 2 of the textbook. I will provide you with practice test questions on these subjects.

3. Attendance at all lectures and labs is required. The Biology Department Absence Policy is reproduced at the end of the syllabus.
4. We have a Class Conference entitled “143 Ostrow” in the Oxford College/Class Conferences/Biology folder. Place the icon on your desktop and check the conference daily for assignments and announcements. Feel free to post messages related to the class.
5. Supplemental Instruction is provided for this course. The S.I. leader will hold regular meetings to review course material. Also you are encouraged to form study groups and to work with your peers. You can certainly approach alumnae of this course with questions. At certain times throughout the semester we will arrange to meet for a review session.
6. Your success in learning the material is dependent on reading the material beforehand, attending class, taking good notes, rereading the material, reviewing your notes, doing the problem sets, attending SI, and participating in discussion. All lectures are structured to encourage time for questions and discussion. Open discussions that are informative and thought provoking will happen only if you come to class prepared. Review and recopy your notes daily. Start studying 7 days before each test (instead of 3). You must work to understand the ideas, not just memorize the material. You are invited to come to my office for additional discussion.
7. At the end of each chapter in the textbook are sets of practice problems, some of which may appear on the exams. In order to hone your genetics skills, I will assign weekly problem sets that you should complete. The SI leader will be able to check over your answers. Problem sets are optional and beneficial; the better you understand the problems, the better you will do on the exams.
8. In the lab, we will be working with potentially infectious microbes, flames, flammable materials, gas under pressure, carcinogens, and caustic chemicals. Contact lenses and dressy clothes are not recommended. **Food and drinks are absolutely prohibited!** It is imperative that you read the lab before attempting the experiment. Although we will be performing routine experiments, they might not work. Do not be disappointed, but consider failure as a lesson in setbacks typically encountered during research. We will discuss methods of troubleshooting.
9. Instructions for each week’s lab exercises will be available on electronic reserve. It will be your responsibility to access the web page, print out the instructions, and bring them to lab. Go to the Oxford College home page/Academic Life/Spring 2002 Electronic Reserves/ Biology 143/ Lab reserves folder. The lab TA will post reminders on the Learnlink Conference.
10. I do not provide back-tests for this class. If you know of any back-tests for this class, please let me know and then I will make them available for the whole class.

11. Cheating is not acceptable. You must abide by the Honor Code. All worked turned in for credit is to be of your own thoughts and construction. Your signature on items turned in for credit (examinations, homework, lab work) attests to your upholding the Honor Code.

12. Late material is accepted but I deduct 10% per day late.

13. Evaluations of the course will be made during the week before the final exam. These are collected by students, given to the department, and are not seen by the instructor until the summertime.

Grading

Your grade in the course will be based on a point system with an approximate total of 660 points. The scale is:

90-100% = A

80-89% = B

70-79% = C

60-69% = D

<60% = F

Plus and minus grades are given.

5 lecture exams	55%	360 points
1 final exam	15%	100 points
3 lab exams	23%	150 points
4 lab reports	3%	20 points
<u>2 lab investigations</u>	<u>5%</u>	<u>30 points</u>
Total	100%	660 points

Lecture Tests

There will be five exams and a final. Tests will include multiple choice, short answers, word problems, and essays. Bring your calculator to all tests. Tests will be taken at the scheduled time. If you are too sick to take a test **you must let me know prior to the test;** otherwise you will receive a 0 for that test! The Final exam will be comprehensive.

Lab grade

Your lab grade will account for 30% of your total grade in class. Thus lab is a very important component of your work in this class.

Lab Tests

The three lab tests are based on lab exercises and objectives. They will be mostly written short answer-type questions but also will have a small practical component. Bring your calculator to all tests. Tests will be taken at the scheduled time.

Lab Reports

For four of the labs there is a written lab report. The format for these reports will be discussed in lab. Each report is due the following lab meeting.

Lab Investigations

Twice during the semester, you will conduct independent lab investigations. These will be started during the regular lab period and completed during open lab. For each investigation, you will write an investigation report (average 4 pages, typed, double-spaced) detailing your experiment and conclusions. The due date for these investigations will be announced in lab.

Class Participation

The final grade you receive can be influenced by your attendance and class participation.

Lecture ScheduleBiology 143 Genetics
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<u>Week</u>	<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Book Chapters (pages)</u>
1	W	Jan. 16	Introductions; MendelWeb	1, 807-813
	F	Jan. 18	Genetics before 1865, Mendel	52-58
2	Mon.	Jan. 21	No Class (MLK Day Holiday)	
	W	Jan. 23	Mendelian Analysis, Probability	59-64, 67
	F	Jan. 25	Pedigrees	64-68
	Fri.	1/25 (3:00pm)	Exam I (Mendelian genetics)	
3	M	Jan. 28	Extensions of Mendel	4
	W	Jan. 30	Finish Extensions of Mendel	4; 116-128
	F	Feb. 1	Sex determination, dosage compensation	129-134
4	M	Feb. 4	Ploidy, Aneuploidy	138-155
	T	Feb. 5 (8am)	Exam II (through dosage compensation)	
	W	Feb. 6	Chromosomal Mutations	156-162
	F	Feb. 8	Chromosome Nomenclature	Handout
5	M	Feb. 11	Linkage & Recombination I	8
	W	Feb. 13	Linkage & Recombination II	8
	F	Feb. 15	Mapping	194-204
6	M	Feb. 18	Mutation I	78-80, 358-370
	W	Feb. 20	Mutation II	372-387
	F	Feb. 22	The Nature of the Gene	397-414
7	M	Feb. 25	Bacterial Genetics I	17
	T	Feb. 26 (8am)	Exam III (through mutations)	
	W	Feb. 27	Bacterial Genetics II	17
	F	Mar. 1	Viral Genetics I	429-434, 467-472
8	M	Mar. 4	Viral Genetics II	441-450
	W	Mar. 6	Discovery of DNA, <u>The Double Helix</u>	219-224
	F	Mar. 8	DNA structure	225-232

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 Spring Break March 11-15

<u>Week</u>	<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Book Chapters (pages)</u>
9	M	Mar. 18	Chromosome Structure	233-245
	T	Mar. 19 (8am)	Exam IV (through DNA)	
	W	Mar. 20	Genome Structure	246-251
	F	Mar. 22	Replication I	11
10	M	Mar. 25	Replication II	11
	W	Mar. 27	Transcription I	12
	F	Mar. 29	Transcription II	12
11	M	Apr. 1	Translation I	13
	W	Apr. 3	Translation II	13
	F	Apr. 5	Molecular Genetics I	20
12	M	Apr. 8	Molecular Genetics II	21
	T	Apr. 9 (8am)	Exam V (through translation)	
	W	Apr. 10	Molecular Genetics III	22
	F	Apr. 12	Gene Expression in prokaryotes	615-629
13	M	Apr. 15	Expression in eukaryotes	644-657, 740-748
	W	Apr. 17	Developmental Genetics I	675-682, 689-694
	F	Apr. 19	Developmental Genetics II	695-706
14	M	Apr. 22	Population Genetics: Hardy-Weinberg	776-779
	W	Apr. 24	Population Genetics: Non-Hardy-Weinberg	780-786
	F	Apr. 26	Speciation and Evolution	795-801
15	M	April 29	Review Day	
	W	May 1	No Class (Reading Day)	
Wed.	May 8	FINAL EXAM 2:00 – 5:00pm (comprehensive)		

Lab Schedule

Biology 143 Genetics
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Wednesdays 2-5pm

<u>Week</u>	<u>Date</u>	<u>Lab Exercise</u>	<u>Assignment</u>
2	Jan. 23	Maize Genetics The χ^2 Test	Maize Lab report
3	Jan. 30	Genetic Model Systems Fly Husbandry Investigation 1: Mapping a mutation to a chromosome	
4	Feb. 6	Mitosis and Meiosis	Nondisjunction Lab Report
5	Feb. 13	Linkage Analysis using Virtual FlyLab	FlyLab report
6	Feb. 19 (Tuesday 8:15am)	LAB EXAM 1 (over weeks 2-5)	
	Feb. 20	Fragile-X syndrome and FMR1 Isolation of DNA	
7	Feb. 27	Quantification of DNA Polymerase Chain Reaction	
8	March 6	Gel Electrophoresis Investigation 2: Linking a mutation to known markers	Investigation 1 Report due
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Spring Break March 11-15			
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9	March 20	<i>Drosophila</i> Salivary Chromosomes	

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| 10 | March 26 | (Tuesday 8:15am) | LAB EXAM 2 (over weeks 6-9) |
| 10 | March 27 | Restriction Enzyme Mapping
Computer analysis of sequences | Restr. Enz. Lab Report |
| 11 | April 3 | Modeling the Central Dogma | |
| 12 | April 10 | Transformation of <i>E. coli</i> | Investigation 2 Report due |
| 13 | April 17 | Gene expression in <i>E. coli</i>
Gene expression in <i>Drosophila</i> embryos
(Dorsal closure of <i>Pkn</i> embryos) | |
| 14 | April 24 | Population Genetics (The Hardy-Weinberg Principle)
(PTC Tasting & Blood Typing) | |
| 15 | April 30 (Tuesday 8:15am) | LAB EXAM 3 (over weeks 10 - 14) | |