

Biology 143 General Genetics
Spring Semester 2001

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Office Hours: Mon. through Fri. 11 a.m. -12 noon *and* by appointment

Lecture: M, W, F 9:05 - 9:55 a.m.

Room: Pierce 102

Lab: Mondays 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.

Additional Required Materials:

A good calculator that can do exponential numbers.

Access to a printer to print laboratory instructions.

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. If you feel that you need or would like to review these topics, I will offer "Refresher" sessions on various Tuesday/Thursday mornings.
3. Attendance at all lectures and labs is required. The Biology Department Absence Policy is reproduced at the end of the syllabus.
4. You are encouraged to form study groups and to work with your peers. However all worked turned in for credit is to be of your own thoughts and construction. You are encouraged to come to my office for additional discussion.

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5. 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.
6. Supplemental Instruction is not available this semester for this course. Therefore I will act in the SI capacity. At certain times throughout the semester we will arrange to meet for a review session. You can certainly approach alumnae of this course with questions.
7. 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.
8. Your success in learning the material is dependent on reading the material beforehand, attending class, taking good notes, reviewing the notes, rereading the material, doing the homework, and participating in discussion. Review daily and recopy your notes. Start studying 7 days before each test. You must work to understand the ideas, not just memorize the material. Open discussions that are informative and thought provoking will happen only if you come to class prepared. All lectures are structured to encourage time for questions and discussion.
9. 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.
10. 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 2001 Electronic Reserves/ Biology 143/ Lab reserves folder. The lab TA will post reminders on the Learnlink Conference.
11. Cheating is not acceptable. You must abide by the Honor Code. 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 680 points. The scale is:

90-100% = A

80-89% = B

70-79% = C

60-69% = D

<60% = F

Plus and minus grades are given.

4 lecture exams	50%	340 points
1 final exam	19%	130 points
3 lab exams	20%	150 points
2 lab reports	4%	25 points
<u>Lab Research Project</u>	<u>8%</u>	<u>50 points</u>
Total	100%	680 points

Tests

There will be four lecture 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.

Problem Sets

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, you should complete the ten problem sets, which will be assigned in class and posted on the class conference. They will be due on the Mondays listed in the schedule below (as PS#). Problem sets are scored on a +, ✓, - system where + means perfect, ✓ means satisfactory (mostly correct and on-time), and - means unsatisfactory (mostly incorrect or late). Problem sets are optional and beneficial; the better you understand the problems, the better you will do on the exams, and the number of +s, ✓s, and -s will influence your final grade.

Class Participation

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

Labs

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 two 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 Project

Over the course of the semester, you and a lab partner you will complete a self-directed laboratory project. This will require time outside of lab. A written proposal outlining your project, the materials you will need, and methods you will use is due Monday Jan. 29. A written update on the status of your project is due Monday March 5. Together you will write a complete scientific paper presenting the results obtained in your project. A rough draft of your paper is due April 2. A revised draft is due April 16. The final (perfect) paper is due April 23 at which time you will present the project to your colleagues.

Lecture Schedule

Spring Semester 2001

<u>Week</u>	<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Book Chapters (pages)</u>
1	W	Jan. 17	Introductions; MendelWeb	1, 807-813
	F	Jan. 19	Genetics before 1865, Mendel	52-58
2	M	Jan. 22	Mendelian Analysis, Probability	59-64, 67
	W	Jan. 24	Pedigrees	64-68
	F	Jan. 26	Extensions of Mendel	4
3	M	Jan. 29	Finish Extensions of Mendel; PS1 due	4
	W	Jan. 31	Morgan, Flies, Sex linkage	116-128
	F	Feb. 2	Sex determination, dosage compensation	129-134
4	M	Feb. 5	Ploidy, Aneuploidy; PS2 due	138-155
	T	Feb. 6 (8am)	Exam I (through dosage compensation)	
	W	Feb. 7	Chromosomal Mutations	156-162
	F	Feb. 9	Linkage & Recombination I	8
5	M	Feb. 12	Linkage & Recombination II; PS3 due	8
	W	Feb. 14	Review Linkage	
	F	Feb. 16	Mapping	194-204
6	M	Feb. 19	Mutation I; PS4 due	78-80, 358-370
	W	Feb. 21	Mutation II	372-387
	F	Feb. 23	The Nature of the Gene	397-414
7	M	Feb. 26	Bacterial Genetics I; PS5 due	17
	T	Feb. 27 (8am)	Exam II (through mutations)	
	W	Feb. 28	Bacterial Genetics II	17
	F	Mar. 2	Viral Genetics I	429-434, 467-472
8	M	Mar. 5	Viral Genetics II; PS6 due	441-450
	W	Mar. 7	Discovery of DNA, <u>The Double Helix</u>	219-224
	F	Mar. 9	DNA structure	225-232

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Spring Break March 12-16

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<u>Week</u>	<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Book Chapters (pages)</u>
9	M	Mar. 19	Chromosome Structure	233-245
	W	Mar. 21	Genome Complexity	246-251
	Th	Mar. 22 (8am)	Exam III (through DNA)	
	F	Mar. 23	Replication I	11
10	M	Mar. 26	Replication II; PS7 due	11
	W	Mar. 28	Transcription I	12
	F	Mar. 30	Transcription II	12
11	M	Apr. 2	Translation I; PS8 due	13
	W	Apr. 4	Translation II	13
	F	Apr. 6	Molecular Genetics I	20
12	M	Apr. 9	Molecular Genetics II	21
	T	Apr. 10 (8am)	Exam IV (through translation)	
	W	Apr. 11	Molecular Genetics III	22
	F	Apr. 13	Gene Expression in prokaryotes	615-629
13	M	Apr. 16	Expression in eukaryotes; PS9 due	644-657, 740-748
	W	Apr. 18	Developmental Genetics I	675-682, 689-694
	F	Apr. 20	Developmental Genetics II	695-706
14	M	Apr. 23	Population Genetics: Hardy-Weinberg; PS10 due	776-779
	W	Apr. 25	Population Genetics: Non-Hardy-Weinberg	780-786
	F	Apr. 27	Speciation and Evolution	795-801
15	M	April 30	Review Day; Evaluations	
Finals Tuesday May 8 9am-12noon			Final Exam (comprehensive)	

PS = Problem Set

Lab Schedule

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Mondays 2-5pm

<u>Week</u>	<u>Date</u>	<u>Lab Exercise</u>	<u>Assignment</u>
2	Jan. 22	Fly Husbandry Introduction to Projects	
3	Jan. 29	Genetic Model Systems	Project Proposal
4	Feb. 5	Mendelian Analysis in Maize Principles of Probability Set up <i>Sordaria</i> crosses	
5	Feb. 12	Meiosis and Nondisjunction <i>Drosophila</i> Salivary Chromosomes Set up sex linkage crosses	Maize Lab report
6	Feb. 19	Linkage in <i>Sordaria</i> Virtual FlyLab	
	Feb. 20 (Tuesday 8:15am)	LAB EXAM 1 (over weeks 2-5)	
7	Feb. 26	Isolation of DNA	FlyLab report
8	March 5	Polymerase Chain Reaction Digestion of DNA with restriction enzymes Analyze sex linkage crosses	Project status report
..... Spring Break March 12-16			
9	March 19	Gel Electrophoresis Human Chromosomes	
10	March 26	Analysis of Gels	
	March 27	(Tuesday 8:15am) LAB EXAM 2 (over weeks 6-9)	
11	April 2	Modeling the Central Dogma	Paper draft due

<u>Week</u>	<u>Date</u>	<u>Lab Exercise</u>	<u>Assignment</u>
12	April 9	Population Genetics (PTC Tasting & Blood Typing)	
13	April 16	More Population Genetics (Hardy-Weinberg; EvolveIT)	Paper revision due
14	April 23	Presentation of Projects	Project Paper due
15	April 30	(in lab) LAB EXAM 3 (over weeks 10 - 13)	

Projects

Maintaining fly cage for Hardy-Weinberg

Mapping a mutation to a chromosome (2 groups)

Establishing and characterizing new stock of *k6808*'

Hopout *k6808* (2 groups)

Complementation of ΔP s (2 groups)

Complementation of *Df(2R)s*

Sperm motility of *delorean*

Courtship behaviour of *delorean*

Dorsal closure of *Pkn* embryos

Dihybrid Inheritance in the plant *Brassica rapa* (2 groups)

Other suggestions?

ABSENCE POLICY - Biology Department

All students are expected to attend all lecture and laboratory sessions. However, emergencies may arise which will necessitate absences from class. **Students are allowed 4 cuts in lecture and NO CUTS in lab.** Students may only miss lab without penalty in cases of illness, family emergency or a school sponsored event which is cleared with the professor in advance. Students are responsible for all material which is covered in laboratory and lecture. When possible, students will be allowed to "make-up" laboratory material missed due to an excused absence, however, because of the nature of laboratory material, actual "make-up of missed activities is usually impossible.

PENALTIES

Students who exceed the 4 cut limit in lecture for whatever reasons or have an unacceptable absence from laboratory will have their FINAL grade reduced 5 points per absence. Students who miss 2 labs without acceptable reasons will fail the course (see below).

LECTURE ABSENCES:

THERE ARE NO EXCUSED ABSENCES FOR LECTURE. Each student may be absent four times without penalty. These four cuts may be used for any reason: illness, studying, travel, family emergency, etc. However, ANY additional cuts will result in grade reduction. **USE YOUR CUTS JUDICIOUSLY, e.g. for sick leave only.**

ACCEPTABLE LABORATORY ABSENCES

Although no discretionary absences, i.e. "cuts", are allowed regarding laboratory, on rare occasions, illness, family emergencies, or certain school sponsored events may make it necessary for a student to miss a laboratory session. The instructor **MUST** be notified prior to the day of the absence in all but the most extreme emergencies.

In all cases, the final decision regarding whether or not an absence is acceptable will be made by the instructor.

AN UNACCEPTABLE ABSENCE FROM LABORATORY RESULTS IN A FIVE POINT REDUCTION IN THE FINAL GRADE. TWO UNACCEPTABLE LABORATORY ABSENCES RESULT IN FAILURE OF THE COURSE.

MISSED TESTS

Ordinarily, tests cannot be made up, however, this is up to the instructor. If a student misses a test, and the absence is acceptable the missed test will not count either for or against the student. If the absence is not excused the grade will be a zero. Students are cautioned that any excuse for missing an exam will come under severe scrutiny by the instructor. **THE INSTRUCTOR MUST BE NOTIFIED PRIOR TO THE TIME OF THE EXAM, AND THE INSTRUCTOR MAKES THE FINAL DECISION REGARDING WHETHER OR NOT AN ABSENCE IS ACCEPTABLE.**

Laboratory tests which are missed for a reason that is excused **MUST** be made up. The instructor must be notified prior to the time of the test.

RELIGIOUS HOLIDAYS:

Students must notify the instructor one week in advance if they intend to be absent for a religious holiday.

TARDINESS

Being late to class is rude and distracting. Continued tardiness by any student will result in the assignment of absences and ultimately a reduction in the student's grade. Three tardies equal an absence. The tardy student is responsible for notifying the instructor that she/he entered the classroom late and, therefore, was not absent. The instructor reserves the option of excluding a person from further classroom or laboratory participation if the student is continuously tardy.

Falsification of information regarding absences from class or laboratory will be considered as a breach of academic integrity.