

Genetics BIOL 3140, Sections 2, 3, and 4
Fall 2011

Dr. Theresa Spradling

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Office hours (in my office or my lab): 11:00 Monday, Wednesday, & Friday;
also, I'll do whatever I can to meet at your convenience

Lecture: 10:00 MWF, room 037 MSH

Lab: 8:00-10:00, 10:00-12:00, 1:00-3:00 Thursday, MSH 151

Course web page: <http://faculty.cns.uni.edu/~spradlin/genetics/home.html>

Textbook: Biology, Eighth Edition, by Campbell and Reece. Pearson Education, Benjamin Cummings, 2008. ISBN-10: 0-8053-6844-2, ISBN-13: 978-0-8053-6844-4. **Required. Lectures will refer to topics by figure. The ninth edition of this book is acceptable, but likely would cost you more money.**

Lab book: The lab book is required and will be provided for a small cash or U-bill fee at the 1st lab.

Course description: This course is designed to provide you with current information from the field of genetic research and a good perspective on the history that makes the current research possible.

Grading:

5 lecture exams (50 - 100 pts. each) = 440

4 lab quizzes (10- 20 pts. each) = 50

7 data summaries from lab (5 - 10 pts. each) = about 50

several lecture assignments (usually 2-5 pts. each) = about 60

Total points = about 600

Grading scale:

93-100% = A, 90-92% = A-, 87-89% = B+, 83-86% = B, 80-82% = B-, 77-79% = C+, 73-76% = C, 70-72% = C-, 67-69% = D+, 63-66% = D, 60-62% = D- , less than 60% = F

Exams: There will be four exams (primarily short answer, short essay, and multiple-choice questions), each worth 100 points. The fourth exam will be taken during finals week. On this fourth exam, 75% of the material will be new material since exam 3, and the other 25% will be comprehensive (these questions will cover major concepts from the semester). Exams are scheduled for the following dates and are not expected to change (lab quiz dates are also given here for your convenience):

Exam 1 warm up	Friday, September 2 nd	40 pts.
Exam 1	Friday, September 16 th (covers everything from beginning)	100 pts.
Exam 2	Friday, October 14 th	100 pts.
Exam 3	Friday, November 11 th	100 pts.
Exam 4	10:00 Monday, December 12 th (25% comprehensive)	100 pts.

Lab quizzes tentatively scheduled for: September 1, 8, 15, and October 27.

If you **MUST** miss an exam, please notify me **BEFORE** exam time. Only if an exam is missed for an **excusable** reason will a make-up exam be given. Make-up exams likely will be a different format from the original exam. **Exams must be completed in the allotted class time.** If you require additional time for tests, please see **The Americans with Disabilities Act** statement below.

Lecture Assignments: Throughout the semester, a number of in-class assignments and homework assignments will be provided. These assignments will not be announced in advance. Frequently, these assignments will provide you with an opportunity to work in groups to discuss and solve problems, thereby giving you an opportunity to consider the information we have been covering and to help each other with it. Completed, satisfactory work will earn approximately five points per assignment. There will be about ten of these assignments. In-class assignments generally **cannot** be completed for credit if you are not in class. If you are involved in any UNI activity that will require you to miss class, please see me. Likewise, please talk to me about any other absences (in advance if medically possible) and we will make appropriate arrangements concerning the missed work.

Lab Assignments: Lab activities are group-learning times (you are part of a team). Also, most labs will involve intensive preparation time for the instructor. Therefore, it usually will not be possible to make up a missed lab. There will be approximately nine lab summaries that will be turned in (5-10 points each) at the end of the corresponding lab. These summaries can only be turned in for full credit if you attend and participate in all of the lab activities for the day. Again, please see me regarding excusable absences and we will make the appropriate arrangements.

Success in this class: Attendance is very important to your success in this class. It is also very important to your success that you try to keep up with the course material on a daily basis, because new material will frequently build on concepts and vocabulary previously discussed. I know that you have heard this before, but I really mean it! Try to understand concepts and make connections between different topics, where possible, rather than to simply memorize facts.

- I am very happy to spend extra time with anyone who would like a little extra help with the material. Please let me know if you believe you are having trouble with any of the material we cover well before the scheduled exam date.
- Also, consider contacting Academic Services on campus if you want to learn skills to help you study more effectively. UNI's Academic Learning Center is located in 008 ITTC. Visit the website at <http://www.uni.edu/unialc/> or phone 319-273-2361 for more information.
- Make-up work and make-up exams are not offered for unexcused absences.
- Focus in class! Dividing your attention (texting) is inefficient at best. Studies show it leads to poor recall of material.

Web Page: The web page will give you access to the course outline, the course calendar, associated reading assignments, and supplementary materials. Daily review questions will be posted to help you assess the quality of the notes that you are taking in class. With student permission, grades will be posted by student number.

The Americans with Disabilities Act of 1990 provides protection from illegal discrimination for qualified individuals with disabilities. Students requesting instructional accommodations due to disabilities must arrange for such accommodation through the Office of Disability Services. The ODS is located at: 213 Student Services Center, and the phone number is 273-2676.

Academic dishonesty of any kind is strictly prohibited by University policy. Any incident of academic dishonesty or violation of academic ethics will result in a grade of 0 on the exam or quiz in question, as well as a required letter to the Provost explaining the incident. Please see the University handbook for additional information regarding violation of academic ethics.

Courtesy:

- Questions during class are always welcome and appreciated; they let me be sure that I'm being clear.
- Please answer my questions whenever you can. The number of people willing to respond helps me gauge how well the group understands the material.
- I ask that you please do not talk at other times or text people during class. I always pay attention to students' reactions to material and even one person goofing off, texting, or talking (or whispering) inappropriately is distracting to me.

Lecture Schedule

Unit 1 (10 days):

DNA: DNA structure, DNA organization, the cell cycle and DNA replication
 Chromosomes: the importance of chromosome number, mitosis and meiosis, non-disjunction of homologs, non-disjunction of sister chromatids

Unit 2 (11 days):

DNA function (protein production: transcription/translation)
 The action of alleles at the molecular level
 Gene regulation
 Autosomal and sex-linked genes and inheritance patterns, laws of probability

Unit 3 (11 days):

Cancer: types of genes and types of mutations
 Mutations: spontaneous mutations, induced mutations and mutagens, DNA repair mechanisms
 The Genetic Revolution:
 "Cutting and pasting" DNA, gene cloning, GMO's, gene therapy
 DNA fingerprinting, reproductive and therapeutic cloning

Unit 4 (9 days):

Population genetics:
 Variation in allele frequency over space and time
 Factors that mold genotype and allele frequencies in a population:
 Mutation and migration
 Non-random breeding
 Genetic drift and Neutral Theory
 Natural selection
 Genetics and the origin of species

Lab Schedule

Week:	Topic:
Lab 1	Tour of lab equipment; Isolate DNA
Lab 2	Quiz on previous week's material 3 Mammals: Extract DNA and set up PCR ; Discuss articles
Lab 3	Quiz on previous week's material 3 Mammals: Agarose-gel electrophoresis of PCR products, discuss DNA sequencing (video)
Lab 4	Quiz on previous week's material Mitosis and Meiosis Lab
Lab 5	3 Mammals: Evaluate DNA sequences
Lab 6	Genetic disease article discussion
Lab 7	Explore a gene
Lab 8	Cat lab
Lab 9	Karyotyping cancer cells
Lab 10	Quiz on karyotyping Biotechnology video
Lab 11	Set up bacterial transformations
Lab 12	DNA fingerprinting: extract DNA and set up PCR reactions
Lab 13	Analyze DNA fingerprint data for our class
Lab 14	Genetic drift simulation lab
Lab 15	Vicariance and Dispersal simulation lab

UNI Biology Department Outcomes

This past year the UNI Biology Department has been thinking about the knowledge and skills our Biology graduates should possess when they leave UNI. Broadly speaking, the outcomes are as follows: Our graduates can...

Content/Discipline Knowledge and Skills

- 1. Demonstrate an understanding of genetics from molecules through populations.**
2. Demonstrate an understanding of the anatomy, development, and physiology of cells and organisms.
3. Demonstrate an understanding of biodiversity and the relationship of living things with their environment and with each other over time.
- 4. Demonstrate an understanding of evolution, including mechanisms, evolutionary history, and evolutionary theory.**

Critical Thinking Skills

- 5. Employ the practice of deductive reasoning and scientific methodology to answer questions about the biological world.**
- 6. Collect, organize, analyze, and interpret data.**
7. Critically read and evaluate primary and secondary research literature.
- 8. Evaluate current issues and ethical topics in biology.**

Communication Skills

- 9. Use biological terms and graphical representations properly in written and oral communications.**
10. Construct written documents in standard scientific style, including proper citation of others' work.
- 11. Procure and present biological data and information using a variety of appropriate methods.**

Genetics (840:140) is designed to contribute toward students accomplishing seven of these goals (shown in bold text).