

**Lecture Section**

Section	Time	Room
001	10:15am – 11:05pm M,W,F	Bostian 3712

**Instructor**

Ted H. Emigh	Office	e-mail	Phone	Fax	Home
	4105 Gardner Hall	Genetics.411@gmail.com	515-5753	515-3355	821-3206
Office Hours	9:00 – 10:00 am	MWH	My office phone is on a voice-mail system. If I am		
(or by appointment)	1:30 – 2:30 pm	TWH	on the phone when you call, it will transfer you to the voice-mail system (allow at least 8 rings)		

**Texts and Calculator**

- Genetics, A Conceptual Approach, Second Edition, B.A. Pierce, 2005
- The Genetics Notebook, Third Edition, T.H. Emigh, 2004, GN 411 Coursepak
- Simple Calculator. For exams, you may use only a simple (non-programmable) calculator (no cell phones).

**Computing Resources**

Genetics Web Site: <http://www.cals.ncsu.edu/genetics/>

Genetics 411 Web Site: <http://www.cals.ncsu.edu/course/gn411/>

GN 411P has a WebCT page: <http://webct.ncsu.edu/> (NOT the newer Vista site)

The link, **Genetics Resources on the Net**, from the GN 411 site contains many useful links.

**Recitation Sessions**

You **must** register for a recitation section (GN 411P). They are all held on Thursday.

Section	Time	Day	Room	Instructor	e-mail
401	8:30am – 9:20am	H	HA 141	Mark Vaders	mark.vaders@gmail.com
402	9:10am – 10:00am	H	HA 181	Kristin Wilson	kawilson@ncsu.edu
403	9:10am – 10:00am	H	HA 141	Mark Vaders	mark.vaders@gmail.com
404	10:15am – 11:05am	H	HA 181	Deepa Sambandan	dsamban@ncsu.edu
405	10:15am – 11:05am	H	HA 141	Ian Ehrenreich	imehrenr@ncsu.edu
406	11:20am – 12:10pm	H	HA 141	Ian Ehrenreich	imehrenr@ncsu.edu
407	11:20am – 12:10pm	H	HA 181	Deepa Sambandan	dsamban@ncsu.edu
408	1:30pm – 2:20pm	H	HA 141	Kristin Wilson	kawilson@ncsu.edu
409	1:30pm – 2:20pm	H	HA 371	Mark Vaders	mark.vaders@gmail.com
410	3:00pm – 3:50pm	H	HA 141	Kristin Wilson	kawilson@ncsu.edu
413	1:30pm – 2:20pm	H	HA 170	Ian Ehrenreich	imehrenr@ncsu.edu

All Recitation Sections Start on 12 January (This week)!

## Outline

Topic	Date	Lecture Material	Genetics Notebook	Genetics Textbook
1	January 9	Genetics, Chromosomes, & Inheritance	Introduction, Chapter 1	Chapter 1, Chapter 2
2	11	Mendelian Genetics	Chapter 2	Chapter 3
3	13	Mendelian Genetics	Chapter 2	Chapter 3
—	16	<b>VACATION</b>	—	—
4	18	Sex Determination and Sex Chromosomes	Chapter 5	Chapter 4
5	20	Extensions of Mendelian Genetics	Chapter 4	Chapter 5
6	23	Extensions of Mendelian Genetics	Chapter 4	Chapter 5
7	25	Pedigrees	Chapter 3	Chapter 6
8	27	Linkage, Crossing Over, and Mapping in Eukaryotes	Chapter 6	Chapter 7
9	30	Linkage, Crossing Over, and Mapping in Eukaryotes	Chapter 6	Chapter 7
—	February 1	<b>EXAM 1 (Topics 1-7)</b>	—	—
10	3	Quantitative Genetics	Chapter 7	Chapter 22
11	6	Quantitative Genetics and Population Genetics	Chapter 7, 8	Chapter 22, 23
12	8	Population Genetics	Chapter 8	Chapter 23
13	10	Chromosome Mutations	Chapter 9	Chapter 9
14	13	Chromosome Mutations	Chapter 9	Chapter 9
15	15	Behavior	Chapter 25	—
16	17	The Central Dogma of Genetics	Chapter 10	Chapter 10
17	20	DNA: Experiments & Analysis	Chapter 12	Chapter 10
—	22	<b>EXAM 2 (Topics 8-15)</b>	—	—
18	24	DNA: Chromosomal Structure	Chapter 17	Chapter 11
19	27	Gene and Sequence Arrangement	Chapter 18 (excluding 18.5-18.6)	Chapter 11
20	March 1	DNA Replication	Chapter 13	Chapter 12
21	3	DNA Replication	Chapter 13	Chapter 12
—	6	<b>VACATION</b>	—	—
—	8	<b>VACATION</b>	—	—
—	10	<b>VACATION</b>	—	—

Topic	Date	Lecture Material	Genetics Notebook	Genetics Textbook
22	March 13	Transcription	Chapter 14	Chapter 13
23	15	Transcription, Processing & Proteins	Chapter 14, 11	Chapter 13, 14, 15
24	17	Translation	Chapter 15	Chapter 15
25	20	Regulation of Gene Expression in Prokaryotes	Chapter 16	Chapter 16
26	22	Regulation of Gene Expression in Prokaryotes	Chapter 16	Chapter 16
27	24	Regulation of Gene Expression in Eukaryotes	Chapter 19	Chapter 16
28	27	Regulation of Gene Expression in Eukaryotes	Chapter 19	Chapter 16
—	29	<b>EXAM 3 (Topics 16-26)</b>	—	—
29	31	Developmental Genetics	Chapter 20, Section 18.5	Chapter 21
30	April 3	Developmental Genetics	Chapter 20, Section 18.5	Chapter 21
31	5	Gene Mutation & Repair	Chapter 21	Chapter 17
32	7	Recombination and Mapping in Prokaryotes	Chapter 23	Chapter 8
33	10	Recombination/Mapping in Prokaryotes & Biotechnology	Chapter 23, 24	Chapter 8
34	12	Biotechnology	Chapter 24	Chapter 18
35	14	<b>VACATION</b>	—	—
36	17	Biotechnology	Section 24.1-24.5, 24.8-24.9	Chapter 18
37	19	Genetics and Cancer	Chapter 22	Chapter 21
—	21	<b>EXAM 4 (Topics 27 – 37)</b>	—	—
38	24	Special Topics (Genetics and Ethics)	Chapter 26	—
39	26	Special Topics (Genetic Revolution)	Section 24.6, 24.7, 24.10, 24.11	Chapter 19
40	28	Special Topics (Genomics)	Section 24.6, 24.7, 24.10, 24.11	Chapter 19
Wednesday, 3 May		<b>FINAL EXAM (COMPREHENSIVE)</b>	8 - 11 am	—
Note: The outline is a guide only. Some minor date or topic changes should be expected.				

## Recitation Topics

Week	Date	Topic
1	January 12	Introduction and Model Organisms
2	19	Mendelian Genetics, Chi Square Analysis, & Sex Determination
3	26	Modifications of Mendelian Genetics & Pedigrees
4	February 2	Linkage
5	9	Quantitative Genetics and Population Genetics Intro
6	16	Population Genetics Forces, Chromosome Mutations, and Behavior
7	23	Central Dogma, DNA Experiments
8	2	Chromosome Structure & DNA Replication
—	March 9	<b>VACATION</b>
9	16	Transcription, Processing, & Translation
—	23	Prokaryotic Regulation
10	30	Eukaryotic Regulation
11	April 6	Development & Mutation
12	13	<b>VACATION</b>
13	20	Bacterial Recombination, Biotechnology
14	27	Ethics and Current Topics ( <b>Extra Credit Assignment Due</b> )

### The Course

GN 411 is an upper level survey of the field of modern genetics. We will cover the broad spectrum of topics, ranging from the molecular (Molecular Genetics) through the individual (Classical Genetics) to populations of individuals (Population & Quantitative Genetics). Each of these topics is viewed through the perspective of evolution and the development of biological systems. We will emphasize understanding the unifying theme underlying the disparate areas of genetics.

## Course Requirements

### Exams

There are four 50-minute exams plus the final. Each are held in the classroom during the class listed in the outline. Due to the size of this class, we are unable to change the dates for students with heavy exam loads. Please plan your schedule accordingly.

### Recitation Weekly Grade

You will be given a weekly grade for the Recitation Sessions. This grade is composed of two parts:

- Attendance and Participation. **Attendance is taken at the beginning of class.** If you have a conflict on a certain day, you can attend any other section. In this case, you must e-mail your instructor to tell them which section you attended.
- Recitation Worksheet. The Recitation Worksheet is due at the **beginning** of Recitation. The worksheets will be handed out in Recitation the week before they are due. In general, they are composed of two parts: Homework covering material from the previous week; and Questions covering the reading for the current week. These will be graded by the TA and returned to you in Recitation Class. Worksheets that are not turned in on time (within the first 5 minutes of the class) will not be graded. Your TA will correct it, but the grade will be recorded as zero.
  - ◆ **Note: Worksheets are due at the time of your regularly scheduled time or makeup class, whichever comes first.**

## The Final Grade

The following are the points for all exams, and the final percentage needed for each grade. Sometimes I will adjust an exam upward, and in the final determination of grades, I may go slightly below the percentage indicated.

Type	Points
4 Exams (100 pts. each)	350 <sup>b</sup>
1 Final Exam (Comprehensive)	100
Recitation Weekly Grade	
Attendance and Participation	46
Recitation Worksheets	104
Total	600

Grades	Percentages Needed <sup>a</sup>
A+,A,A-	<sup>c</sup> , 91, 90
B+,B,B-	89,81,80
C+,C,C-	79, 70, <sup>d</sup>
D+,D,D-	69, 61, 60

- A student who does significantly better on the final exam (65, 75, 85, 95) and does not quite make the next higher grade based on averages may be “bumped” up.
- Only half of the lowest grade is used. If your exams are 90, 70, 85, 95, your exam grade is  $90+70/2+85+95 = 305$  out of 350, or 87%.
- I have serious misgivings concerning assigning grades that give quality points greater than 4.0. As such, I use A+ very sparingly. An A+ student must be an exceptional student in attitude & performance. It may be that no students meet this standard in any given semester, or that only one or two will.
- I also have serious misgivings concerning assigning “C-Wall” grades that give quality points less than 2.0. As such, I will not assign any grades as C-, except for those students showing C level work on the final whose average is D+ or D.

## Grading

### Legibility

Answers and work must be legible. If the graders cannot read it, they will not be able to grade the work. This is particularly true on worksheets where you have the time to be neat.

### Partial Credit

*The work leading up to the answers is considered an integral part of the answer (in most situations, particularly with Worksheets, giving just an answer is not enough).* In grading homework and exams, the graders strive to give partial credit where there are partial answers. We can only do that consistently if you show a reasonable amount of work. If appropriate in multi-part questions, we will follow your mistake through the rest of the question. On the other hand, written fishing expeditions are taken as a sign you do not know the answer.

### Calculators

Because of problems in the past, you may use only a simple, nonprogrammable calculator for exams. We suggest you practice with borrowed calculators before the exam. Make sure the calculator has the precision needed (see the section on Precision). You may not use a cell phone for a calculator.

### Arithmetic Mistakes

- For worksheets, we assume you will have enough time to make sure your calculations are correct, so you will be counted off for simple arithmetic mistakes.
- Simple calculators are allowed on exams. On exams, **if you show your work**, we will not take off for what we consider to be “calculator mistakes.” Mistakes of this sort are:  $2+2=5$ . If you do not show your work, we cannot be sure the mistakes are arithmetic or conceptual and will assume they are conceptual.

## Precision

It is unfortunate, but many of the calculations required in Genetics must have a high degree of precision. In experimental situations, the precision of the calculations is dependent on the size of the experiment. For this class, we suggest you store intermediate values in your calculator (thus using the maximum precision of your calculator). For grading, we will use the following as a minimum standard. Except for quantitative genetics, the precision is given as decimal places, rather than significant digits. On exams, the precision required is given along with the problem.

- **Chi Square Goodness of Fit Tests.** In the column for expected numbers, you should use at least **two decimal places**.
- **Linkage Problems.** For linkage problems, use at least **four decimal places** for recombination fractions (**two decimal places** for map distances). This allows the graders to assess whether you have included/excluded the proper terms. In real life, the size of the experiment would dictate the precision.
- **Population Genetics Problems.** Small differences in how you round can make large differences in the results. You must use at least **five decimal places**. There may be situations where I will tell you to use more.
- **Quantitative Genetic Problems.** These problems are less sensitive. You must use at least **four significant digits**.

## Multiple Choice/Matching Questions on Exams

**Unless otherwise stated**, there is only one correct answer to multiple choice or matching questions. If you give more than one answer, the entire problem will be counted wrong. Choose the *best* single answer. If there is more than one answer, the question will state this (*e.g.*, Circle **ALL** the traits that are Simple Mendelian).

## Regrades

We strive to grade your work without error, but may fall short of that mark. You may ask for a regrade of particular problems (or to fix addition mistakes) until the time of the next exam for exams or the next Problem Session for Worksheets. You must state (in writing) the reason for the regrade on the exam (or attach a separate paper), and list the numbers of the questions you want regraded on the front of the test. Some common mistakes to look for are

- **Addition Mistakes.** The total points given for a page is listed on the bottom right, and the overall total is listed on the back. Make sure they add up correctly.
- **Partial Credit.** Sometimes the graders cannot follow your reasoning. If you feel you should get more credit, you will need to explain your reasoning (in writing).
- **Ambiguously Worded Questions.** It will occasionally happen that a question can be reasonably interpreted to have a different answer than the one given. State your case on the exam or on another sheet of paper & we will consider it. It is possible this will lead to regrading the entire class (and you will be a hero!).

Changing answers before returning your exam for regrading is cheating and will be dealt with through the Office of Student Conduct.

## Late Work

As a general rule, late work will not be accepted. You can e-mail your answers to me or your TA (on time) & turn in the work at a later time in some emergency circumstances. For GN 411P, your worksheets are due **at the beginning of your regularly scheduled section or the makeup section, whichever comes first**. Attendance can be with any GN 411P Section. Use e-mail! It works! The departmental FAX is 515-3355 (Please put your TA's name on the first page).

## Makeup Work/Extra Credit

There will be an optional assignment that will make up for a missed or low grade on a Recitation Session Worksheet. It will be due at the last meeting of your Recitation Class. You will be given details about the assignment later. The due date is during dead week, but you will be given time to complete it prior to then. Some exams may have extra credit questions. Other than those possibilities, there will not be extra credit or makeup work. Excused work is not graded, but will not count against you (instead, your grade will reflect the average of the remaining work).

## Excused Work

### Illness

Although I understand the problem with short-term illnesses, we cannot excuse work missed due to these conditions. *Documented* serious or long-term illness will be considered case-by-case.

## University Sponsored Events

You will rarely run into a situation where a University Sponsored Event is a surprise. You must let your instructor know well ahead of time (at least one week) so you can arrange to complete your GN 411 work *prior* to the event. The attendance grade in GN 411P will be adjusted to reflect the percentage of classes you have attended excluding the ones for these events.

## Deaths in the Family

See your instructor or one of the TAs as soon as possible.

## Disabilities

If you have a handicap or disability and need special accommodations please let your instructor know.

## Assumed Knowledge

It is assumed that you are familiar with the following areas. By this, we mean that you will be able to spend some time outside of class to refamiliarize yourself with these topics. **All** of these topics were covered in BIO 181, 183, but you may have forgotten some of them in the years since you took that class. In this class, we will spend very limited class time reviewing these topics.

### Organismal Topics

Prokaryotes & Eukaryotes — Definition, Cell Structure, Cell Division (Mitosis & Meiosis)

### Simple Mendelian Topics

Monohybrid Cross and Segregation, Dominant and Recessive

Dihybrid Cross — Independent Assortment (General Familiarity, not Details)

### Molecular Topics

DNA & RNA — Structure and Chemical Composition

If you have trouble remembering any of these topics, please ask for assistance from your TA or Instructor.

## Academic Honesty

- **Worksheets**  
We encourage students to study together, exchanging information and acting as peer tutors. However, we expect worksheets to be your own work. Simply copying the answers to the problems will not help you learn the material and is cheating.
- **Exams**  
Exams are closed book and closed notes. The exams are to be completed individually. You are allowed to bring in a *simple* nonprogrammable calculator (no beeping or cell phone calculators, please).  
Exams are to be completed during the normal class time. Final collection of the exams will be 5 minutes after the end of the period (5 minute grace period).  
In addition to the classroom, we will arrange for a separate room for the exams. Students who wish more space, a quieter environment, or who like to look around the room during the exam should consider taking the exam in this room. The students in this separate room will have exactly the same amount of time as the rest of the class. If you require special assistance, please see your instructor.
- **Regrades**  
Changing answers before returning them for regrading is a serious violation of the Code of Student Conduct. When you return your exams, you should clearly mark comments and notes that were added after the exam (a different color is normally best, but you can also circle added comments). We take precautions to identify changes.
- **Violations of The Code of Student Conduct**  
Academic dishonesty will be dealt with through The Office of Student Conduct.