

BIO 343 INTRODUCTION TO GENETICS
LECTURER: Dr. Lisa Dorn

OFFICE: HS 45; LAB: HS 47/50 PHONE: 424-3064; E-MAIL: dorn@uwosh.edu

OFFICE HRS: Posted to D2L

LECTURE HOURS: 11:30 am – 12:30 pm in Halsey Science Building; Rm.57

TEXT: **Brooker, Genetics: Analysis & Principles (UWO custom 4th edition)** McGraw Hill.

OBJECTIVES: Genetics and its experimental methods is one of the broadest and most rapidly evolving fields of science. I cannot possibly cover it all, so my goal is to teach you how to think like a geneticist, while learning genetics concepts so that you can judge for yourself the value of emerging genetic technologies and discoveries. This course covers Mendelian genetics and its complications, the molecular basis of genes and their affect on phenotypes, the methods of identifying and characterizing the genetic basis of diseases and other phenotypes as well as population and evolutionary genetics.

The prerequisites for this course are Bio105 and 323, which by extension means you have taken Chem 105 and 106 as well as Bio111 or 112. The laboratory part of this course will expand on what you have learned in Molecular and Cell Biology (Bio 323). I will assume you have mastered the Bio323 material and will not waste much time reviewing this material but there will be some review of 323 materials in lab.

ASSESSMENT: How are you going to earn your grade?

EXAMS: 4 exams each worth 100 points. They will be mostly problems similar to those in your D2L quizzes. (400 total points).

Note: For exams you will need a calculator. **YOU CANNOT USE YOUR PHONE AS A CALCULATOR ON EXAMS.**

PROBLEM SOLVING: There will be **8 D2L** problem-solving sessions where you will be required to solve problems that will be available on D2L. They are **worth 10 points each (total = 80 points)**. These problems are presented as quizzes that will be available ~1 week before the due date for that quiz. During that week you may open it, print it and discuss potential solutions with your peers and me. The time for submission will always be 10:30pm. After that time you have a 6 hr grace period to submit late. After that, you lose 1 pt for every hour the quiz is late. You can make up some or all of those lost points at the end of the semester with the extra credit quiz depending on how many quizzes you miss.

You should *save* the answers as you enter them. You can still change answers even after saving but once you submit the quiz you cannot. You can see the answers 1 day after the late submission deadline.

*****IMPORTANT***:** D2L can be temperamental. **Do not wait for the last hour to submit your answers.** D2L tells me when you are logged on, if you tried to submit a quiz and even if you have opened the quiz.

Excuses for waiving late submission penalties that **will NOT be accepted** include:

- D2L problems in the last hour before the deadline.
- I forgot to save my answers
- I forgot after I went to work
- My internet service at home failed.

BUT if you have submitted by the deadline and D2L fails to recognize your submitted quiz send me an e-mail. In most cases, I have your quiz and can force D2L to accept it.

EXTRA CREDIT QUIZZES: There will be **one** extra credit quiz at the end of the semester worth **5** points. Your incentive for this quiz, besides the extra credit, is that it will be very similar to questions you will find on the last exam. Therefore, I highly recommend that you take this quiz but it is not a required quiz. ***NOTE:** Extra credit points from this quiz can be used to pass the course but, other opportunities for extra credit points may change your letter grade but these EC points cannot be used to **pass** the course.

IMMEDIATE OPPORTUNITY FOR EXTRA CREDIT: Go to this website and take this quiz. It's going to be hard but don't worry about it, do it anyway. You get points just for taking the quiz.

<http://www.bio.davidson.edu/projects/gcat/assessment/assess.html>

LABORATORY: Is worth **105 points**. The lab syllabus is appended to the end of this document.

LABORATORY ATTENDANCE: Lose 5 pts on a report for every unexcused absence during the weeks of that reports exercises.

Total Possible points = 400 + 80 + 105 = 585.

GRADING SCALE:

A = 93 - 100%,
A- = 90 - 92.9%
B+ = 88 - 89.9%
B = 83 - 87.9%
B- = 80 - 82.9%
C+ = 78 - 79.9%
C = 73 - 77.9%
C- = 70 - 72.9%
D+ = 68 - 69.9%
D = 63 - 67.9%
D- = 60 - 62.9%
F (Failure) < 60%

Grades may be “curved” at the end, if necessary.

Disputing a grade: if you feel your exam has been misgraded, you must submit to me a request for re-grade within a week of the day I have passed exams back (not the day you picked it up). That request must be in writing accompanied by a copy of the exam in question that I will keep.

Students With Disabilities are welcome in this class! If you need special accommodations please contact me during office hours in the first week of class. This includes students with diagnosed learning disabilities. If you feel you should be evaluated for a learning disability, please contact the **Project Success** office at 920 424-1033 or go to their website at <http://www.uwosh.edu/organizations/success>.

Classroom Etiquette: please silence all pagers, cell phones; or iPods etc. and do not talk or whisper unless called upon in turn (but feel free to raise your hand for a question or comment at ANY time!). **This includes texting.** If you want to waste your valuable tuition dollars texting inanities, that is your problem, but it’s simply not fair to others when you want my help because you haven’t been paying attention while others wait for your obvious question.

Incomplete Grades may be given in extreme circumstances, such as when a student becomes too ill to complete the semester's work. Please talk to me if you think your situation warrants an "I" grade and be prepared to provide documentation.

Make up exams. If you cannot make **one** exam, several alternatives may be available to you depending on the rest of my teaching obligations at that time. I will do what I can, given your circumstance. If you know ahead of time that you must miss an exam (for instance if your job requires that you work that day) please let me know ahead of time.

The schedule of lectures, exams and due dates for problems. There may be minor changes to this schedule of lectures without notice. I will announce such changes in class. Exams and quizzes will stay on schedule unless (for quizzes) there are problems with D2L.

Lec #	Day	Date	Topics	Book	Week
1	Wed	7-Sep	Mendels Laws; Monohybrids & Dihybrids	Ch. 2	1
2	Fri	9-Sep	Dihybrids & Pedigrees	Ch. 2	1
3	Mon	12-Sep	Pedigrees; Probability	Ch. 2	2
4	Wed	14-Sep	Chi-Square Chromosomes Sex-Linkage	Ch. 3:	2
5	Fri	16-Sep	Sex Determination; Meiosis	Quiz 1 Due Ch. 3:	2

6	Mon	19-Sep	Recessive Lethals		Ch. 3/4	3
7	Wed	21-Sep	Pleiotropy; Incomplete Dominance		Ch. 4	3
8	Fri	23-Sep	Co-Dominance, Overdominance,		Ch. 4	3
9	Mon	26-Sep	Penetrance, Complementation	Quiz 2 Due	Ch. 4	4
	Wed	28-Sep	EXAM 1 (covers up to lecture 8)		2, 3, 4	4
10	Fri	30-Sep	Epistasis, Linkage and Recombination		Ch. 4,6	4
11	Mon	3-Oct	Linkage and Recombination;		Ch. 6	5
12	Wed	5-Oct	Mapping genes: dihybrid crosses		Ch. 6	5
13	Fri	7-Oct	Mapping genes: Trihybrid crosses		Ch. 6	5
14	Mon	10-Oct	Mapping genes: Trihybrid crosses	Quiz 3 Due	Ch. 6	6
15	Wed	12-Oct	Intragenic Mapping, bacteriophage		Ch. 7	6
16	Fri	14-Oct	Complementation tests and deletion mapping;		Ch. 7	6
17	Mon	17-Oct	Complementation tests and deletion mapping;	Quiz 4 Due	Ch. 7	7
	Wed	19-Oct	EXAM 2		4, 6, 7	7
	Fri	21-Oct	CLASS CANCELLED			7
18	Mon	24-Oct	Chromosomes: Change in Number		Ch. 8	8
19	Wed	26-Oct	Chromosomes: Structure; Variation & Mutations		Ch. 8	8
20	Fri	28-Oct	Chromosomes: Polyploidy		Ch. 8	8
21	Mon	31-Oct	Gene Mutation		Ch. 16	9
22	Wed	2-Nov	Gene Mutation		Ch. 16	9
23	Fri	4-Nov	Gene Mutation	Quiz 5 Due	Ch. 16	9
24	Mon	7-Nov	Post-Transcriptional Processing		Ch. 12	10
25	Wed	9-Nov	Post-Transcriptional Processing		Ch. 12	10
26	Fri	11-Nov	Transcriptional Regulation in Eukaryotes		Ch. 15	10

27	Mon	14-Nov	Transcriptional Regulation in Eukaryotes	Ch. 15	11
28	Wed	16-Nov	Transcriptional Regulation in Eukaryotes	Ch. 15	11
	Thu	17-Nov		Quiz 6 Due	11
29	Fri	18-Nov	Non-Mendelian Inheritance: X-inactivation & Imprinting	Ch. 5	11
	Mon	21-Nov	'EXAM 3 (Lectures 19 to 29)	8,16,12,15	12
	Tues	22-Nov	THANKS GIVING BREAK NO lab		12
	Wed	23-Nov	THANKS GIVING BREAK: NO lecture		12
	Thu	24-Nov	THANKS GIVING BREAK NO lab		12
	Fri	25-Nov	THANKS GIVING BREAK: NO lecture		12
30	Mon	28-Nov	Non-Mendelian Inheritance: X-inactivation & Imprinting	Ch. 5	13
31	Wed	30-Nov	Non-Mendelian Inheritance: X-inactivation & Imprinting	Ch. 5	13
32	Fri	2-Dec	Population Genetics	Ch. 7	13
33	Mon	5-Dec	Population Genetics	Ch. 25	14
34	Wed	7-Dec	Population Genetics	Quiz 7 due Ch. 25	14
35	Fri	9-Dec	Population Genetics	Ch 25	14
36	Mon	12-Dec	Population Genetics/ Review	Ch 25	15
	Tues	13-Dec		EC Quiz Due, Quiz 8 Due	
	Wed	14-Dec	EXAM 4 (Lectures 29-36)		
	Fri	16-Dec	Alternate Exam Day		

Genetics Lab Syllabus

Instructors: Lisa Dorn HS 45/47/50; dorn@uwosh.edu

Section A01L: Tues 9:40am – 11:40 am in HS 50,

Section A02L: Tues 1:20 pm – 3:20 pm in HS 50,

Section A03L: Thurs 9:40 – 11:40 am in HS 50

OBJECTIVES: Welcome to the laboratory portion of Biology 343. This course is designed to give you hands-on experience with modern genetics techniques. It is not designed to coincide very much with your lecture material but it will on occasion. You will learn molecular lab techniques that are useful for genetics, learn to debug those techniques, as well as how to interpret your results and what that means for understanding genes and their function. These exercises are based on molecular biology concepts you should have learned in 105 and 323. Therefore, we will use some lab time to review those molecular biology concepts. Despite this course's position as a core course there are only two hours a week devoted to laboratory. That means that your exercises will stretch out over a period of weeks. We will help you keep track. It may help if you use the schedule presented below as a checklist.

ORGANIZATION: The course consists of three basic sections or “modules”. Within each module are a series of exercises designed to teach the topics covered by that module. The first module *Basic Lab Techniques* teaches the basic techniques you will need for the rest of the semester. For some of you with experience in professors’ labs this module will be *very basic* at times. Please be patient. Remember this course is a required course for all biology majors even those who are not pursuing research that requires these techniques. Those of you with research experience may find that using your expertise to help less-experienced students a useful exercise. Last, some of these exercises are designed to at least partially fail so do not get discouraged.

GRADING: The lab part of the course is worth **105** points toward your total grade. There are four quizzes and five reports as shown in the table below.

Quiz/ Report		Points
Quiz 1: Nucleic Acids Review		10
Quiz 2: Replication		10
Report 1: Electronic PCR		10
Quiz 3: Optimization/ Polymorphisms		20
Report 2: Polymorphisms		15
Report 3: Marker Map		10
Quiz 4: Gene Expression		10
Report 4: RT-PCR		10
Report 5: Gene Families		10
	Total points	105

The schedule of labs is on the next page.

Date	Week	Due Dates	Module	Wet Lab Exercises	Computer Exercise	Lab Manual Pages	Notes	
Tue 6-Sep-11	1							
Thurs 8-Sep-11	1	NO LABS THIS WEEK						
Tue 13-Sep	2		Basic Lab Techniques	Pipettor Exercise,			Quiz 1 Available	
Thurs 15-Sep	2			Make Buffers				
Tue 20-Sep	3	Quiz 1 Due	Basic Lab Techniques	Extracting DNA				
Thurs 22-Sep	3	Quiz 1 Due						
Tue 27-Sep	4		Basic Lab Techniques:	Quantify DNA	Electronic PCR:		Quiz 2 Available	
Thurs 29-Sep	4							
Tue 4-Oct	5	Quiz 2 Due	Basic Lab Techniques:	PCR Optimization	Electronic PCR:			
Thurs 6-Oct	5	Quiz 2 Due						
Tue 11-Oct	6	Report 1: e-PCR	Genomics	Optimization Gel	Predict Polymorphism			
Thurs 13-Oct	6	Report 1: e-PCR		Polymorphism Screen				

	Date	Week	Due Dates	Module	Wet Lab Exercises	Computer Exercise	Lab Manual Pages	Notes																																																																
Tue	18-Oct	7		Genomics	Polymorphism Gel	Predict Polymorphism																																																																		
Thurs	20-Oct	7							Tue	25-Oct	8	Report 2: Polymorphisms due	Genomics	None	Draw Recombinants		Quiz 3 Available	Thurs	27-Oct	8	Report 2: Polymorphisms due	Tue	1-Nov	9	Quiz3: Opt/Poly	Functional Genomics	Reverse Transcription	None		Work on Molecular Map; Handout mapping gel pictures	Thurs	3-Nov	9	Quiz3: Opt/Poly	Tue	8-Nov	10		Functional Genomics	PCR part of RT-PCR	Predict RT-PCR products		Keep Working on Map	Thurs	10-Nov	10		Tue	15-Nov	11	Report 3: Marker Map	Functional Genomics	RT-PCR gel	Predict RT-PCR			Thurs	17-Nov	11		Tue	22-Nov	12	Thanksgiving Break NO LABS					Quiz4 Available	Thurs	24-Nov	12
Tue	25-Oct	8	Report 2: Polymorphisms due	Genomics	None	Draw Recombinants		Quiz 3 Available																																																																
Thurs	27-Oct	8	Report 2: Polymorphisms due						Tue	1-Nov	9	Quiz3: Opt/Poly	Functional Genomics	Reverse Transcription	None		Work on Molecular Map; Handout mapping gel pictures	Thurs	3-Nov	9	Quiz3: Opt/Poly	Tue	8-Nov	10		Functional Genomics	PCR part of RT-PCR	Predict RT-PCR products		Keep Working on Map	Thurs	10-Nov	10		Tue	15-Nov	11	Report 3: Marker Map	Functional Genomics	RT-PCR gel	Predict RT-PCR			Thurs	17-Nov	11		Tue	22-Nov	12	Thanksgiving Break NO LABS					Quiz4 Available	Thurs	24-Nov	12													
Tue	1-Nov	9	Quiz3: Opt/Poly	Functional Genomics	Reverse Transcription	None		Work on Molecular Map; Handout mapping gel pictures																																																																
Thurs	3-Nov	9	Quiz3: Opt/Poly						Tue	8-Nov	10		Functional Genomics	PCR part of RT-PCR	Predict RT-PCR products		Keep Working on Map	Thurs	10-Nov	10		Tue	15-Nov	11	Report 3: Marker Map	Functional Genomics	RT-PCR gel	Predict RT-PCR			Thurs	17-Nov	11		Tue	22-Nov	12	Thanksgiving Break NO LABS					Quiz4 Available	Thurs	24-Nov	12																										
Tue	8-Nov	10		Functional Genomics	PCR part of RT-PCR	Predict RT-PCR products		Keep Working on Map																																																																
Thurs	10-Nov	10							Tue	15-Nov	11	Report 3: Marker Map	Functional Genomics	RT-PCR gel	Predict RT-PCR			Thurs	17-Nov	11		Tue	22-Nov	12	Thanksgiving Break NO LABS					Quiz4 Available	Thurs	24-Nov	12																																							
Tue	15-Nov	11	Report 3: Marker Map	Functional Genomics	RT-PCR gel	Predict RT-PCR																																																																		
Thurs	17-Nov	11							Tue	22-Nov	12	Thanksgiving Break NO LABS					Quiz4 Available	Thurs	24-Nov	12																																																				
Tue	22-Nov	12	Thanksgiving Break NO LABS					Quiz4 Available																																																																
Thurs	24-Nov	12																																																																						

	Date	Week	Due Dates	Module	Wet Lab Exercises	Computer Exercise	Lab Manual Pages	Notes
Tue	29-Nov	13	Quiz 4: Gene Expression	Functional Genomics	None	Gene Families		Examine RT-PCR gels
Thurs	1-Dec	13						
Tue	6-Dec	14	Report 4: RT-PCR	Functional Genomics	None	Gene Families		
Thurs	8-Dec	14						
Tue	13-Dec	15	Report 5: Gene Families	No Labs	None	None		
Thurs	15-Dec	15						