

Biology 143 – Genetics
Course Syllabus
Spring 2003

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Office Hours: TTh 9:30-10:30 AM, M: 3:00-4:00 PM or by appointment
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Lecture: MWF 9:35-10:25 AM, Room 102, Pierce Hall

Laboratory: Wednesday 2:00-5:00 PM, Room 123, Pierce Hall

Required Textbook: *iGenetics* by Peter Russell. 2002. Benjamin/Cummings Publishing Co., Inc.

Supplementary material will be provided for the laboratory.

Course Objectives: Genes are the basis for all biological activity that sustains a living organism. Therefore understanding the language of genes is a critical component of being a biologist. This year marks the 50th anniversary of the discovery of the DNA double helix. It is also the year of the completion of the human genome sequence. It is an exciting time to study genetics. Biology 143 is designed to help you discover the physical/chemical properties of genes, how they are transmitted from one generation to another, how genes are chemically processed within cells, the relationship between genes and the physical features in a whole organism, the effect of mutations and the whole organism, the existence and transmission of genes within populations and the relationship between genes and evolution. Major technological advances have been made to facilitate the study of genetics. You will be introduced to these techniques in the laboratory by working with DNA analysis, analysis of traits, mutations, and recombinant DNA technology. In addition, you will become familiar with the use of computers in genetic analysis. An important aspect of this course is learning to apply your knowledge. You will have the opportunity to examine practical applications of genetics in medicine and agriculture – two major human concerns. Through the course of the semester, it is my hope that you will also begin to think objectively about the social and ethical issues that are currently raised by genetic research.

Biology 143 – Genetics
Lecture Schedule

<u>Date</u>	<u>Topic</u>	<u>Assigned Reading</u>
W, Jan 15	Introduction	
F, Jan 17	The impact of genetics in society Cellular Reproduction	Chapter 1
M, Jan 20	MLK Jr Day - no class	
W, Jan 22	The discovery of nucleotides	Chapter 2
F, Jan 24	Chromosome organization	Chapter 2
M, Jan 27	The basics of DNA replication	Chapter 3
W, Jan 29	Mechanics of DNA replication	Chapter 3
F, Jan 31	Gene – enzyme relationship	Chapter 4
M, Feb 3	Discussion day (response due)	Handout
W, Feb 5	Mechanics of transcription	Chapter 5
F, Feb 7	The genetic language	Chapter 6
M, Feb 10	Mechanics of translation	Chapter 6
W, Feb 12	Protein sorting	Chapter 6
	Cloning	Chapter 7
Thurs, Feb 13	EXAM I - 8:00-9:30 AM, Chapters 1-6	
F, Feb 14	Applications of genetic technology	Chapter 8
M, Feb 17	Genome analysis	Chapter 9
W, Feb 19	Re-visiting with Mendel	Chapter 10
F, Feb 21	Pedigree analysis	Chapter 10
M, Feb 24	Chromosome theory, sex linkage	Chapter 11
W, Feb 26	Sex determination	Chapter 11
F, Feb 28	Discussion day (response due)	Handout
M, Mar 3	Molecular basis of genetic phenomena	Chapter 12
W, Mar 5	Gene expression & environment	Chapter 12
F, Mar 7	Gene linkage and gene mapping	Chapter 13
Mar 10-14	SPRING BREAK!	
M, Mar 17	Review and catch up	
Tues, Mar 18	EXAM II – 8:00-9:30 AM, Chapters 7-13	
W, Mar 19	Prokaryotic gene regulation - operons	Chapter 16
F, Mar 21	Prokaryotic gene regulation - operons	Chapter 16

Bio 143 Lecture Schedule (continued)

Date	Topic	Assigned Reading
M, Mar 24	Eukaryotic gene regulation	Chapter 17
W, Mar 26	Eukaryotic gene regulation	Chapter 17
F, Mar 28	Mechanism of eukaryotic gene regulation	Chapter 17
M, Mar 31	Discussion day (response due)	Handout
W, Apr 2	Cancer	Chapter 18
F, Apr 4	Cancer	Chapter 18
M, Apr 7	Mutations	Chapters 19, 21
W, Apr 9	Mutations	Chapters 19, 21
F, Apr 11	Transposons	Chapter 20
M, Apr 14	Population genetics	Chapter 22
Tuesday, Apr 15	EXAM III – 8:00-9:30 AM, Chapters 16-19, 21	
W, Apr 16	Population genetics	Chapter 22
F, Apr 18	Quantitative genetics, Molecular evolution	Chapters 23, 24
M, Apr 21	Molecular evolution	Chapter 24
W, Apr 23	Review and catch up	
F, Apr 25	National DNA day celebration	
M, Apr 28	The puzzle pieces of genetics	
*** FINAL EXAMINATION*** Thursday May 1, 2:00-5:00 PM		Comprehensive

Syllabus continues on next page

Biology 143 – Genetics
Laboratory Schedule – Spring 2003
Dr. Nitya Jacob

Date	Topic	Writing Assignment
Jan 15	No Lab	
Jan 22	Learning the basic techniques	Worksheet (due end of lab)
Jan 29	Let's meet some fruit flies! Chromosome isolation	Worksheet (due end of lab)
Feb 5	DNA fingerprinting	Lab report (due Feb 7)
Feb 12	DNA extraction & PCR I Set up linkage experiment	
Feb 19	DNA extraction & PCR II	Short paper (due Feb 26)
Feb 26	Using computers for genetic analysis Research Project introduction	Short assignment (due end of lab)
Mar 5	Linkage analysis	Lab report (due Apr 23) Research Proposal due
Mar 12	SPRING BREAK	
Mar 19	Making Glow-in-the-Dark bacteria Research Project	
Mar 26	Blue plants Research Project	Research paper (due Apr 9)
Apr 2	Research Symposium	
Apr 9	Yeast mutations	Worksheet (due end of lab)
Apr 16	Wrapping up experiments	
Apr 23	Genetics Investigator Extraordinaire Certification	

Read the lab handout prior to each lab

THE INS AND OUTS OF BIOLOGY 143

Please read this syllabus carefully and please be sure to clarify any doubts. This handout is your map to Biology 143! Please pay full attention to the information contained in this syllabus. Information in this syllabus is also subject to change according to my discretion, so please pay attention to any changes made during the semester.

Expectations/ Study tips. You are expected to read the assigned chapters from the book as well as any supplemental materials for both lab and lecture. You must read these assignments BEFORE you come to class or lab. If you are not prepared for class, you will certainly fall behind in your understanding, thereby affecting your performance on exams. You are expected to attend every lab and lecture (see absence policy). Please pay attention to the explanations that I give in class and take good notes. Good communication is always the key to success. Please take advantage of my office hours to communicate any doubts, concerns or questions. I am always ready to listen. We will be covering a vast amount of information, so it is wise to make a habit of reviewing the course material on a weekly basis. A really effective way to do this is to attend your SI sessions every week. Please remember that exams and lab exercises WILL test your ability to think analytically as well as your ability to remember facts. It is important that you practice problems regularly (the end of chapter problems are a great exercise) to help your analytical thinking.

Supplemental Instruction. Biology 143 has an SI program. Arielle Alford will offer weekly help sessions to review course material. Please check Learnlink for the specific times.

Learnlink Conference. There is a class conference for Biology 143 on Learnlink. Please make it a habit to check and use this conference on a regular basis. I will use it to communicate with the class especially for reminders, changes, etc. It is also a great way to exchange information or conduct discussions with your classmates. We will also use it to brainstorm ideas for National DNA day.

Examinations: The lecture exams will be a combination of multiple choice, short answer and short essay questions. Exams will cover all material in lecture in addition to assigned textbook readings. The final examination is comprehensive. Students should feel free to ask me about any questions about the material on the exam.

Discussion days. There are 3 scheduled discussion days for this course. One week prior to the discussion day, I will distribute an article pertaining to topics we cover in class up until that point. You are required to read the article and turn in a written response to the article at the beginning of class on the discussion day. We will discuss the article and your responses in class. You will be given guidelines for the response format in class.

Laboratory. There is no published lab manual for this course. I will supply a handout describing the lab exercise one week prior to the lab. There will also be a posting on Learnlink. You are expected to read it thoroughly and be fully prepared for each lab. For some labs, I may conduct pop quizzes at the beginning of lab. Please pay attention to the laboratory assignments. No lab practicals will be conducted. Instead, there will be a number of written assignments. On the last day of lab you will have the opportunity for your certification as “Genetics Investigator Extraordinaire” – details explained in lab.

Scientific Writing and Laboratory Project: In place of lab practicals, there are several writing assignments in the form of worksheets, lab reports and scientific papers. The format for each will be explained to you in lab. You will also conduct an independent investigation as a research project. For this laboratory, you will prepare a symposium presentation and write a complete scientific paper. Specific instructions will be provided in lab.

Honor Code: All examinations and work for credit in this course come under the regulations of the Honor Code. Please uphold the Honor Code and include your signature on your work as your pledge.

Absences: The policy on absences is provided in a separate handout. Unexcused absences or a failure to follow the procedures outlined in that handout will result in a reduction in your grade. Any questions about absences should be asked immediately.

Evaluation: Students are evaluated on their performance in the classroom and the laboratory. The following is the distribution of points:

Lecture:

Lecture exams (3)	300 points
Discussion responses and participation (3)	30 points
National DNA day	10 points
Final exam	150 points

Final grade determination

(Plus and minus grades are given)

90 - 100% A

80 - 89% B

70 - 79% C

60 - 69% D

<60 F

Laboratory:

Worksheets/Assignments (4)	40 points
Fingerprinting Lab report	10 points
Linkage Lab report	25 points
Short paper	25 points
Research Project w/paper	60 points
Pre-lab/Post-lab questions	15 points
Certification	25 points

Total 690 points