

<p style="text-align: center;">Biology 143 – Genetics Course Syllabus Spring 2005</p>
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Faculty Information: Dr. Nitya Jacob, *Office:* Room 104, Pierce Hall; *Phone:* 770-784-8346
Office Hours: T 9:30-10:30 AM and Th 3:30-4:30 PM, or by appointment
Email: njacob@learnlink.emory.edu

Lecture: MWF 9:35-10:25 AM, Room 102, Pierce Hall

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

Required Books:

Text: *Genetics – Analysis of Genes and Genomes*. Sixth Edition. By Daniel L. Hartl and Elizabeth W. Jones. 2005. Jones and Bartlett Publishers, Inc. This book will be used in lecture and lab.

Lab Book: Laboratory research notebook. This notebook should be purchased in the lab from the instructor. We will not be using a published laboratory manual for this course. Laboratory exercises will be provided as handouts prior to lab.

Course Objectives: Genes are the foundation of all structural features and physiological functions in every living organism. Biology 143 offers you an introduction to the widespread field of genetics covering transmission, molecular and population genetics. You will study in detail the physical/chemical properties of genes and how these physical particles are transmitted from one generation to another. You will learn about the chemical and cellular processes by which genes are manifested as physical characteristics in a whole organism. Genes are constantly subject to mutations, either spontaneous or induced. The causes of mutations and resulting genetic disorders, such as cancer, will be explored in this course. You will also become familiar with the study of gene transmission within a population and how genes are responsible for the evolution of organisms. Major technological advances have been made to facilitate the study of genetics. You will be introduced to techniques in the laboratory such as DNA analysis, recombinant DNA technology, analysis of gene transmission, transformation, chromosome mapping, and mutation analysis. In addition, you will become familiar with the use of computers in genetic analysis. Critical and analytical thinking is essential in the field of genetics. Therefore an important aspect of this course is learning to apply your knowledge. Practical applications of genetics in the areas of two major human concerns - medicine and agriculture –will be discussed. 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 19	Introduction	
	The DNA revolution	
F, Jan 21	Important people and history	Ch. 1
M, Jan 24	Major topics in genetics	Ch. 1
W, Jan 26	DNA structure	Ch. 2
F, Jan 28	DNA technology	Ch. 2
M, Jan 31	Transmission of genes	Ch. 3
	Human pedigree analysis	
W, Feb 2	Gene-gene interactions	Ch. 3
F, Feb 4	Genes and cell division	Ch. 4: p.136-149
M, Feb 7	Sex and inheritance, pedigrees	Ch. 4: p.150-158
W, Feb 9	Discussion day	Article
F, Feb 11	Linkage and chromosome maps	Ch. 5: p.176-194
M, Feb 14	Linkage and chromosome maps	Ch. 5: p.203-212
W, Feb 16	Application: genetic disorders, stem cells	Handout
Thurs, Feb 17	EXAM I - 8:00-9:30 AM, Chs 1-5, discussion and application	
F, Feb 18	DNA replication and recombination	Ch. 6: p.222-241 p.245-252
M, Feb 21	DNA sequencing	Ch. 6: p.241-245
W, Feb 23	Chromosome organization	Ch. 7
F, Feb 25	Karyotypes and chromosome mutations	Ch. 8
M, Feb 28	Polyploidy	Ch. 8
W, Mar 2	Bacteria and viruses – selected topics	Ch. 9
F, Mar 4	Application: Gene Therapy	Handout
M, Mar 7	Discussion day	Article
W, Mar 9	Colinearity and transcription	Ch. 10
F, Mar 11	Translation	Ch. 10
Mar 14-18	SPRING BREAK!	
M, Mar 21	Review and catch up	
W, Mar 23	Operons	Ch. 11
Thurs, Mar 24	EXAM II – 8:00-9:30 AM, Chs 6-10, discussion and application	
F, Mar 25	Eukaryotic gene regulation	Ch. 11

Bio 143 Lecture Schedule (continued)

Date	Topic	Assigned Reading
M, Mar 28	Eukaryotic gene regulation	Ch. 11
W, Mar 30	Types and causes of mutations	Ch. 14
F, Apr 1	Repairing mutations	Ch. 14
M, Apr 4	Review and catch up	
W, Apr 6	Cell cycle genes and proteins	Ch. 15
F, Apr 8	The genetics of cancer	Ch. 15
M, Apr 11	Discussion day – cancer research	Article
W, Apr 13	Population genetics and evolution	Ch. 17: p.716-734
F, Apr 15	Population genetics and evolution	Ch. 17: p.740-751
M, Apr 18	Complex inheritance – selected topics	Ch. 18: p.761-774
W, Apr 20	Complex inheritance – selected topics	Ch. 18: p.761-774
Thurs, Apr 21	EXAM III – 8:00-9:30 AM, Chs. 11, 12, 15, discussion	
F, Apr 22	Review and catch up	
M, Apr 25	Application: Genetically Modified Organisms	Handout
W, Apr 27	The DNA revolution – on a global scale	
F, Apr 29	Share your interests in genetics	
M, May 2	Sharing interests and the big picture	
** FINAL EXAMINATION** Tuesday, May 10, 2:00-5:00PM		Comprehensive

Syllabus continues on next page

Biology 143 – Genetics
Laboratory Schedule – Spring 2005
Dr. Nitya Jacob

<u>Date</u>	<u>Topic</u>	<u>Writing Assignment</u>
Jan 19	No Lab	
Jan 26	Introduction to the genetics laboratory Analysis of DNA by restriction enzymes	Results and discussion (due Feb 9)
Feb 6	Introduction to <i>Drosophila melanogaster</i> Fly cross setup	
Feb 9	Using computers for genetic analysis Research Project Introduction	Worksheet (due end of lab)
Feb 16	Human DNA extraction & PCR I Discuss project with groups	Proposal (due Feb 23)
Feb 23	Human DNA extraction & PCR II Primer design and order	
Mar 2	Fly Project and Linkage analysis Chromosome isolation	Report and map (due May 2)
Mar 9	Gene expression – transformed bacteria Lab notebooks due in lab	Results and discussion (due Mar 21)
Mar 16	SPRING BREAK	
Mar 23	Research Project – PCR analysis	Scientific Paper (due Apr 13)
Mar 30	Gene expression– transformed plants	
Apr 6	Research Symposium	Literature search due
Apr 13	Yeast mutation analysis I	
Apr 20	Yeast mutation analysis II	
Apr 27	Testing your genetics knowledge	Lab notebooks due

GUIDE TO 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 subject to change according to my discretion, so please pay attention to any changes made during the semester. Please check the class conference regularly for announcements and changes.

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 or make appointments with me to communicate any doubts, concerns or questions. I am always ready to listen. We will be covering a vast amount of information in a short period of time, so please make a habit of reviewing the course material on a weekly basis. Please remember that exams and lab exercises will test your ability to think analytically as well as your ability to remember facts and terminology. It is extremely important that you solve practice problems and questions at the end of each chapter regularly to help your analytical thinking.

Supplemental Instruction. Biology 143 has an SI program. You must attend your SI sessions on a regular basis to be able to perform well in this course. Beth Siddiqui will offer weekly help sessions to review course material. Please check Learnlink for the specific times.

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. I will assign an article from a scientific journal for each discussion day prior to the class meeting. Every student is required to read the article before class. For each discussion day, certain students will be selected to act as “discussion leaders”. On the day of the discussion, leaders must be prepared to present the article to the class and raise questions about the subject of the article. Every student in the class will have to be a discussion leader once during the semester. Discussion leaders must submit their pre-prepared notes for credit at the end of the discussion. Students who do not serve as leaders for a particular discussion must turn in a 1-2 page (double spaced) summary of the article.

Laboratory. There is no published lab manual for this course. I will supply handouts describing the lab exercise one week prior to the lab. These handouts will also be available

on Learnlink. I suggest keeping these handouts in a 3-ring binder so that they are easily available for use in lab. You are expected to read each exercise 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. You will also maintain a lab notebook which be collected for grading twice during the semester. Lab notebooks will be purchased from me on the first day of lab.

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

Class Participation and Learnlink Conference. Biology 143 is an interactive course. Class participation will be assessed according to your vocal interaction in the classroom, and your active contribution the learnlink conference. A class conference for Biology 143 is available on Learnlink. The conference will be used extensively for this course. Use the conference to bring up discussion points, post your own interests in genetics, and/or to post interesting websites related to genetics. Please check and use this conference on a regular basis. Please be professional and respectful when making your comments.

Application Topics: We will be covering several application topics and modern concerns in genetics. Discussion questions relating to lecture information will be posted on the conference. Participation is expected. Films will be placed on reserve for certain application topics.

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. Please see page 7 for the distribution of points.

Evaluation:**Lecture:**

Lecture exams (3)	300 points
Discussion and participation	50 points
Final exam	150 points

Laboratory:

Results and discussion reports	30 points
Fly project and Linkage analysis	40 points
Fly log	10 points
Lab notebooks	60 points
Research Project w/paper	60 points

Total	700 points
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Final grade determination*(Plus and minus grades are given)*

90 - 100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
<60	F