Biology 143 – Genetics
Course Syllabus
Spring 2004

Faculty Information: Dr. Nitya Jacob, *Office*: Room 104, Pierce Hall; *Phone*: 770-784-8346
Office Hours: TTh 9:30-10:30 AM and Th 1:30-3:00 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 Books:

Text: *Genetics – Analysis of Genes and Genomes*. Fifth Edition. By Daniel L. Hartl and Elizabeth W. Jones. 2001. 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: Understanding the language of genes is a critical component of being a biologist because genes are the foundation of all structural features and physiological functions of every living organism. 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 characteristics manifested in a whole organism, the effect of mutations and the whole organism, how genes are distributed and transmitted within populations 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, 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

Date	Topic	Assigned Reading
W, Jan 14	Introduction The impact of genetics in today's world	
F, Jan 16	DNA – the substance of inheritance	Ch. 1
M, Jan 19	MLK Jr Day - no class	
W, Jan 21	DNA structure	Ch. 2
F, Jan 23	DNA technology	Ch. 2
M, Jan 26	Transmission of genes Human pedigree analysis	Ch. 3, Ch. 4: p161-165
W, Jan 28	Gene-gene interactions	Ch. 3
F, Jan 30	Genes and cell division	Ch. 4: p.132-148
M, Feb 2	Sex and inheritance	Ch. 4
W, Feb 4	Discussion day	Article
F, Feb 6	Linkage and chromosome maps	Ch. 5
M, Feb 9	Linkage and chromosome maps	Ch. 5 (skip p.195-201)
W, Feb 11	Application: genetic disorders	Handout
Thurs, Feb 12	**EXAM I - 8:00-9:30 AM, Chs 1-5, discussion and application**	
F, Feb 13	DNA replication	Ch. 6: p.222-249
M, Feb 16	DNA recombination	Ch. 6: p.222-249
W, Feb 18	DNA mutation and repair	Ch. 7
F, Feb 20	DNA mutation and repair	Ch. 7
M, Feb 23	Transposable elements	Ch. 7
W, Feb 25	Application: Gene Therapy	Handout
F, Feb 27	Chromosome organization	Ch. 8
M, Mar 1	Discussion day	Article
W, Mar 3	Genomes and karyotypes	Ch. 9
F, Mar 5	Chromosome mutations	Ch. 9
Mar 8-12	**SPRING BREAK!**	
M, Mar 15	Review and catch up	
Tues, Mar 16	**EXAM II – 8:00-9:30 AM, Chs 6-9, discussion and application**	
W, Mar 17	Bacterial and viral DNA	(ref – Ch. 10)
F, Mar 19	Gene expression – transcription	Ch. 11

Bio 143 Lecture Schedule (continued)

Date	Topic	Assigned Reading
M, Mar 22	Gene expression – translation	Ch. 11
W, Mar 24	Transcriptional regulation	Ch. 12: p.490-498
F, Mar 26	Transcriptional regulation	Ch. 12: p.507-522
M, Mar 29	Post-transcriptional regulation	Ch. 12: p.522-526
W, Mar 31	Genetics of cancer	Ch. 15
F, Apr 2	Genetics of cancer	Ch. 15
M, Apr 5	Discussion day	Article
W, Apr 7	Application: Genetically Modified Organisms	(Chap. 13 – ref)
F, Apr 9	Genes in a population	Ch. 17: p.706-720
M, Apr 12	Population genetics and evolution	Ch. 17: p.727-739
Thursday, Apr 15	**EXAM III – 8:00-9:30 AM, Chs. 11, 12, 15, bacterial DNA, discussion and application**	
W, Apr 14	Complex traits	Ch. 18: p.748-760
F, Apr 16	Complex traits	Ch. 18: p.772-776
M, Apr 19	Review and catch up	
W, Apr 21	Current research interests in genetics	Handout
F, Apr 23	Celebrate your DNA day	TBA
M, Apr 26	The world of genetics – re-visited	

**** FINAL EXAMINATION** Monday May 3, 2:00-5:00PM Comprehensive**

Syllabus continues on next page

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

Please read the lab exercise handout prior to each lab. Please bring all handouts and lecture text to the lab.

Date	**Topic**	**Writing Assignment**
Jan 14	No Lab	
Jan 21	Introduction to the genetics laboratory	
Jan 28	Introduction to *Drosophila melanogaster* Fly cross setup Chromosome isolation	
Feb 4	Analysis of DNA by restriction enzymes	
Feb 11	Human DNA extraction & PCR I	
Feb 18	Human DNA extraction & PCR II	Lab report (due Feb 25)
Feb 25	Using computers for genetic analysis Research Project Introduction	
Mar 3	Yeast mutation analysis	Research Proposal due in lab Lab notebooks due in lab
Mar 10	***SPRING BREAK***	
Mar 17	Research Project – yeast mutations	Scientific Paper (due Apr 7)
Mar 24	Gene expression– transformed plants	
Mar 31	Research Symposium	Rough drafts due
Apr 7	Gene expression – transformed bacteria	
Apr 14	Linkage analysis	Report and map (due Apr 27)
Apr 21	Geneticist Extraordinaire Certification	Lab notebooks due in lab

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.

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. Mike Woodworth 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. The conference will be used extensively for this course. Therefore you are expected to be more than a passive reader. You must make it a point to be active in discussions and to bring up questions on the conference. Please check and use this conference on a regular basis. Periodic information about genetics will be posted on the conference, including web links, lab supplementary materials and discussion questions.

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, a group of 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.

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. Details about the Geneticist Extraordinare Certification will be explained in lab.

Scientific Writing and Laboratory Project: There are several writing assignments in the form of lab reports and one scientific paper. The format for each will be explained to you in lab. You will also 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.

PBS Series: This month, PBS is running a four-part series on DNA. We will watch parts of the first two episodes in class. The third episode, "The Human Race" will air on Atlanta's PBS channel 30 at 11pm on Tuesday, January 20. The fourth episode, "Curing Cancer", will air on the same channel at 11pm on Tuesday, January 27. You are required to watch at least one of these two episodes (not shown in class) and respond to the discussion questions that will be posted on the conference. This assignment will be counted towards your discussion and participation points.

Class Participation: Biology 143 is an interactive course. Class participation will be assessed according to your contributions to regular lecture material, to and the learnlink conference.

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.

Course evaluation point distribution is shown on the next page.

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 and participation	50 points
Final exam	150 points

Laboratory:

PCR lab report	25 points
Linkage analysis	25 points
Fly log	15 points
Lab notebooks	60 points
Research Project w / paper	60 points
Certification	25 points
Total	**710 points**

Final grade determination

(Plus and minus grades are given)

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