

Biology 141 Cell Biology and Genetics Syllabus

Fall Semester 2009

Professor: Dr. M. Eloise Brown Carter

Office: Pierce Hall #107(side porch of Pierce)

Phone: (770)784-8343

Lecture Hours: Monday, Wednesday, Friday 9:35 a.m. – 10:30 p.m. **Room:** Pierce 102

Lab Hours: Monday 2 p.m. – 5 p.m. **Room:** Pierce 125

Office Hours: Tuesday, 1:00 – 2:00 p.m. and Wednesday – 10:30 to 11:30 a.m. Students are encouraged to see Dr. Carter during class to make appointments for other times.

Required Texts: *Biology*, N.A. Campbell and J.B. Reece, 2008, 8th edition, Benjamin/Cummings Publishing
Practicing Biology, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2008.

Required Lab Text: *Investigating Biology*, 6th ed. Morgan, J. G. and M. E. B. Carter. Benjamin/Cummings Publishing Company, Inc. 2008. A customized edition published for BIO 141 is available in the bookstore. *Used lab manuals are not permitted.*

Optional Writing Book: *A Student Handbook for Writing in Biology*, Karen Knisely, 2008, 3rd edition, W.H. Freeman and Co. This is a great resource for writing, and is also on reserve in the library.

Web Site: *MasteringBiology* provides online study materials, practice exams, learning activities and strategies for success. www.masteringbio.com Your text has instructions for accessing the site.

<u>Date</u>	<u>Topic</u>	<u>Assigned Reading</u>
W, Aug 26	Science as a Way of Knowing	1
F, Aug 28	Major themes in Biology	1
M, Aug 31	Hierarchies: beginning with living chemistry and water	2,3
W, Sep 2	Building biological macromolecules: carbohydrates and lipids	4
Thurs., Sep 3rd	<i>Scientific Literature and Research (Library - Required)</i> 8:00 – 8:45 am and 9:00 – 9:45 am and 3:00 - 3:45 pm	
F, Sep 4	Proteins and nucleic acids	5
M, Sep 7	**Labor Day**	
W, Sep 9	Structure and function revealed in cells	6
F, Sep 11	Cellular Case Studies	
M, Sep 14	Membrane structure and cellular transport	7
W, Sep 16	Transport problems	
Thurs., Sep 17th	<i>Presentation of Scientific Data – Pierce 206 (Required)</i> 8:00 - 8:45 am and 9:00 – 9:45 am and 3:00 - 3:45 pm	
F, Sep 18	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M, Sep 21	Cellular respiration I - Glycolysis	9
Tues, Sep 22	EXAM I 8:00 - 9:30 a.m. (through membrane transport)	
W, Sep 23	Cellular respiration II - Transition and the Krebs Cycle	9
F, Sep 25	Cellular respiration III – Chemiosmosis and the Electron Transport System	9

M, Sep 28	Review and recapitulation: Accounting Day	
W, Sep 30	Homage to photosynthesis;	
F, Oct 2	Photosynthesis I: the light dependent reactions	10
M, Oct 5	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
W, Oct 7	Cell reproduction: cell cycle, mitosis	12
F, Oct 9	Sexual life cycles and meiosis	13
M, Oct 12	*** Fall Break***	
W, Oct 14	Chromosomal mutations	15 pp. 297-300
Thur, Oct 15	EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)	
F, Oct 16	Mendelian principles; genes and chromosomes	14, 15 pp. 286-288
M, Oct 19	Patterns of inheritance	14, pp. 271-280
W, Oct 21	Chromosomal theory and linkage	15
Thur, Oct 22 nd	2-3and 3 - 4 p.m., <i>Effective Presentations Workshop - Pierce 206 (optional)</i>	
F, Oct 23	Genetics problems and review	14, 15
M, Oct 26	DNA structure	16
W, Oct 28	DNA replication	16
F, Oct 30	Gene to Protein I: transcription and the genetic code	17
M, Nov 2	Gene to Protein II: translation and genetic mutations	17
W, Nov 4	Molecular genetics workshop	
F, Nov 6	Charles Darwin and development of evolutionary concepts	22
M, Nov 9	Evidence for evolution	22,25, pp. 481-495
W, Nov 11	Population Genetics and Hardy Weinberg	23
Thur, Nov 12	EXAM III - 8:00 – 9:30 a.m. (through genetics)	
F, Nov 13	Microevolution: genetic drift, gene flow and mutation <i>Scientific Papers – “Ask the Experts”- 2:00 p.m.</i>	23
M, Nov 16	Genetic variation and selection	23
W, Nov 18	Simulations – Evolution and population genetics	
F, Nov 20	Speciation <i>Research papers due in class</i>	24, pp. 487-501
M, Nov 23	Evolution of land plants:	29
W, F 25-27	** Thanksgiving Break **	
M, Nov 30	Bryophytes and seedless vascular plants	29
W, Dec 2	Seed plants: gymnosperms and angiosperms	30
F, Dec 4	Evolutionary trends in land plants	
M, Dec 7	The Big Themes Revisited	

***** FINAL EXAMINATION *** To Be Announced *****

BIOLOGY 141
LABORATORY SCHEDULE
Fall 2009
Dr. Eloise Carter

<u>Date</u>	<u>Lab Topic (#)</u>	<u>Writing Assignment*</u>
Aug. 31		
Sept. 1, 2	Scientific Investigation	Title page; Introduction, References
Sept. 7	Labor Day – Monday lab students should see professor of schedule lab Fri., Sept. 11th	
8, 9	Microscopes and Cells	Review table+
14, 15, 16	Diffusion and Osmosis	Results; Table; Figure
21, 22, 23	Enzymes	Materials and Methods
28, 29, 30	Cellular Respiration and Fermentation	Title page; Table; Discussion; References (<i>Due 10/9 in class</i>)
Oct. 1st (Thur.) LAB EXAM (thru enzymes) (7:45 – 9:15 a.m. or 8:15 – 9:45 a.m.)		
5, 6, 7	Mitosis; Introduction to Research	Comparison Table+
12, 13	***Fall Break*** No Labs	
16	<i>Proposals submitted to conference by 8 a.m. on 10/16</i>	
19, 20, 21	Field Research: Ecology and Evolution on the Outcrops	
26, 27, 28	Microbial Diversity (Bacteriology)	<i>Research papers due in class on 11/20</i>
Oct. 29th (Thur.) LAB EXAM (Respiration, Mitosis, and outcrops) (7:45 – 9:15 a.m. or 8:15 – 9:45 a.m.)		
Nov. 2, 3, 4	Research Symposium (<i>Technology Rehearsal – 9 a.m. – Pierce 101; one team member must be there</i>)	
9, 10, 11	Molecular Biology	Map+
16, 17, 18	Plant Diversity I & II	
23, 24, 25	***Thanksgiving Break*** No Labs	
Nov. 30		
Dec. 1, 2	Molecular Phylogeny of Plants	Report completed in lab
Dec. 3rd (Thurs.) LAB EXAM (7:45 – 9:15 a.m. or 8:15 – 9:45 a.m.)		

***Writing assignments are due one week later at the beginning of the lab period unless otherwise noted.**
***These assignments are not turned in for a grade.**





STUDENT'S GUIDE TO BIOLOGY 141

Welcome to Biology 141! The information in this handout and accompanying materials should be read and followed by all students in Cell Biology and Genetics. If you do not understand everything in this handout, you should ask for clarification.

Introductory Biology (141) is designed for students who **plan to major in biology or neuroscience and behavioral biology**, attend **professional school in a health related field**, or have a **strong background in biology** and have chosen biology to fulfill their distribution requirements. This may be one of the more difficult courses you will take, demanding that you learn detailed and complex information, organize this information around conceptual themes and apply your knowledge. This knowledge will be essential to your success in other biology courses, where your competence in fundamental biology will be assumed. Many of you will be taking examinations to enter graduate or professional schools, and the knowledge you gain here will be required for your success.

Course Objectives. The purpose of this course is to give you, the student, a firm foundation in the underlying themes of biology. You will study living organisms, cell structure and function, genetics and evolution. You will develop an understanding of the biochemical molecules that make up the structure of cells and how these molecules govern cell function. You will study the fundamentals of cell function, including transport across cell membranes, and energy transformation in living cells. Then you will explore cell reproduction, inheritance of biological traits and processing of genetic information. You will study the genetics of populations and how genes are responsible for evolution and biological diversity. Finally, a very important objective of this course is teaching you to “think and work like a scientist” through methods of scientific inquiry and the practice of scientific thinking. Both lecture and laboratory are designed to accomplish these goals with the two components of the course integrated through study, laboratory exercises, group work, scientific writing, and individual disciplined study.

Tips for Success: Biology 141 is an intensive course and requires time and commitment. If you are an average reader, you should spend about 8 hours a week outside class working in BIO 141. To perform well in this course, you must be diligent about the following:

-  *Keep up with assigned readings.* The readings listed for each lecture in the syllabus must be done **BEFORE** the lecture. The best overall study **approach is to read assignments over quickly at first for an overview. Then read more carefully, jotting down questions or areas of confusion for later checking and review.**
-  *Take good notes.* In lecture, I will explain the most significant concepts from your readings. At times, I will present examples that may not be given in your textbook. You are responsible for all of this information.
-  *Connect the lecture notes to your readings.* For the test, you are responsible for information in the textbook as well as the lecture notes. Make sure that you are able to grasp the major concepts thoroughly and in detail.
-  *Review material on a regular basis.* Study the diagrams in your text and lecture handouts. Practice writing out pathways and link the concepts. It is helpful to **prepare your own tables and diagrams** as a study aid and review for much of the material in BIO 141. Attend your SI sessions on a regular basis. Take advantage of my office hours to get individual assistance.

📌 *Memorize and think.* While studying, keep two things in mind: One is to **master the facts of biology** and most importantly, understand the connections among these biological facts. Second – it is crucial to remember that this course is designed to make you **think** and not just to have you memorize facts. Learning the facts is important to establish a knowledge base, but it is not sufficient! You must be able to apply your knowledge to think logically and analytically. Therefore you should be confident of what you know, what it means, and how it relates to major themes in biology.

📌 *Be an active learner.* Develop study guides, comparison charts, concept maps. Use the MasteringBiology web resources provided with your textbook. Complete assignments in *Practicing Biology*. Attend Supplemental Instruction and organize your own active study group. **Don't be lulled into thinking familiarity is the same as knowledge.** The latter takes time and hard work!

📌 *Be prepared for laboratory and invest time and effort in lab each week.* Read the lab and review terminology and diagrams BEFORE lab each week. During lab complete all components of the lab. Take good notes and make detailed observations. Answer all questions in the lab manual during or after lab. Immediately after lab review the objectives and prepare a study guide for the lab materials and activities. Be serious about completing the writing assignments!

Supplemental Instruction. is provided for all students in BIO 141. The instructor will explain this important program that provides assistance for all students who wish to improve their performance in biology. Your BIO 141 SI leader is *Michael Romanelli* this semester.

Examinations. There will be three lecture exams (100 pts. each) that will be a combination of multiple choice, short answer and short essay questions. Exams will cover all material covered in lecture in addition to assigned readings in the text. The final examination is comprehensive (175 pts.). There are three laboratory practical exams that include a written portion (50 pts. each). These exams cover the laboratory topics and exercises. Students should feel free to ask for clarification about any question during the exams.

Scientific Writing and Laboratory Project. Students will write individual sections of a scientific paper for specific laboratory exercises. Students will propose and implement an independent investigation as a team research project. For this laboratory, you will prepare a group symposium presentation and write an individual 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. Your signature on your work attests to your upholding the Honor Code. Please ask if you have any questions about an assignment.

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. This is essential for the laboratory portion of the course.

Evaluation. Students are evaluated on their performance in the classroom and laboratory. Plus and minus grades are given. The assignment of points will be:

300 points	3 lecture exams	Final grade determination:	
150 points	3 laboratory exams	90 – 100%	A
175 points	final examination	80 – 89%	B
40 points	scientific writing	70 – 79%	C
60 points	lab project	60 – 69%	D
725 points	total	<60	F