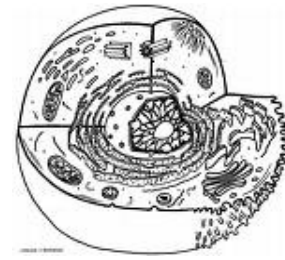


Biology 141 Cell Biology and Genetics

Syllabus

Spring Semester 2010



Professor: Dr. Steve Baker

Office: Pierce Hall #117A

Lecture Hours: 11A; 11:45-12:35

Both sections meet in Pierce 101

Office Hours: I am generally in office or in nearby lab 2:30-4:30 MWF, Tuesday/Thursday 9:30-11 AM, or by appointment...see me after class or email to set up. You are welcome to talk to me anytime if I am in the office or lab.

Required Texts: (1) *Biology*, N.A. Campbell and J.B. Reece, 2008, 8th edition, Benjamin/Cummings Publishing Co., Inc. The optional Study Guide is available on reserve in the library. (2) *Practicing Biology*, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2008. A terrific workbook that is useful alone or in study groups.

Optional Writing Book: *A Student Handbook for Writing in Biology*, Karen Knisely, 2005, 2nd edition, W.H. Freeman and Co. This is a great resource for writing, and is on reserve in the library.

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.*

Web Site: www.masteringbio.com. Mastering Biology provides online study materials. Your text has instructions for accessing the site.

Course Objectives: This course is designed to serve as an introduction to the basic themes of biology and to begin your training as a scientist by introducing you to the basics of investigative science and science writing. The topics covered by the course will expose you to the basics of biology at the molecular, cellular, and organismal levels. Initially, you will learn about biological molecules and how they lead to cell structure and function. Secondly, we will learn about vital cell functions such as transport and the production of energy. A third objective will include the basics of molecular biology and inheritance, and how genetics are responsible for evolution. Your work in the lab will involve investigations addressing these topics, in order to broaden your understanding and to help you begin to learn how to “think and act like a scientist.” These basic themes will prepare you well for more advanced study in biology.

BIOLOGY 141 SPRING 2010 LECTURE SCHEDULE

			Chapters
Jan.	13	Science as a Way of Knowing	1
	15	Major themes in Biology	1
	18	<i>Martin Luther King Holiday</i>	
	20	Hierarchies: beginning with living chemistry and water (<i>PB Activity 3.1</i>)	2,3
	22	Building biological macromolecules: carbohydrates and lipids	4,5
	25	Proteins and nucleic acids (<i>PB Activities 4.1-5.2</i>)	5
	27	Structure and function revealed in cells	6
	29	Cellular Case Studies (<i>PB p. 17</i>)	
Feb.	1	Membrane structure and cellular transport	7
	3	Transport problems (<i>PB Activity 7.1</i>)	
	2/4	<i>Scientific Research and Research (Library), 8:15-9:30 am. Required! 8:00-8:45 am and 9:00-9:45 am</i>	
	5	Fundamentals of energy transformations: enzymes, ATP and electron carriers (<i>PB Activity 8.1</i>)	8
	8	Cellular respiration I - Glycolysis <i>Begin work on accounting problems!</i>	9
	9 (Tues.)	EXAM I 8:00 - 9:30 a.m. (through membrane transport)	
	10	Cellular respiration II - Transition and the Krebs Cycle	9
	12	Presentation of Scientific Data	
	15	Cellular respiration III – Chemiosmosis and the Electron Transport System (<i>PB p. 38-39</i>)	9
	17	Review and recapitulation: Accounting Day	

19	Homage to photosynthesis;	
22	Photosynthesis I: the light dependent reactions	10
24	Photosynthesis II: the light independent reactions and variations (C4 and CAM) (PB 10.1; 1-4, 10.2; 1)	10
3/25	8:15-9:00, 9:00-9:45 <i>Effective Presentations – P. 206 (optional)</i>	
26	Cell reproduction: cell cycle, mitosis (PB Activity 12.1)	12
March 1	Sexual life cycles and meiosis (PB Activity 13.1, 13.2)	13
2 (Tues)	EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)	
3	Chromosomal mutations	13, 15 pp. 297-300
5	Mendelian principles; genes and chromosomes (PB Activity 14.3, 14.4, <i>Practice genetics problems!</i>)	14, 15 pp. 286-288
8-12	SPRING BREAK!	
15	Patterns of inheritance	14, pp. 271-280
17	Chromosomal theory and linkage	15
19	Genetics problems and review	14, 15
22	DNA structure Powerpoint workshop, time and location TBA	16
24	DNA replication (Review terms p. 93, in class models)	16
26	Gene to Protein I: transcription and the genetic code	17
29	Gene to Protein II: translation and genetic mutations (PB, review terms p. 95; Activity 17.1; 4, 6)	17
31	Molecular genetics workshop	
April 2	Charles Darwin and development of evolutionary concepts Research Papers due in class	22
5	Evidence for evolution (PB, 22.1; 1-8)	22

6 (Thurs)	EXAM III - 8:00 - 9:30 a.m. (through genetics)	
7	Population Genetics and Hardy Weinberg <i>Practice H-W problems!</i>	23
9	Microevolution: genetic drift, gene flow and mutation, and selection (PB; p. 143)	23
12	Population Genetics I	23 and Lab Topic 11
14	Speciation/Intro to life cycles	24
16	Evolution of land plants: <i>Review worksheets from class!</i> <i>Research papers due in class</i>	29
19	Bryophytes and seedless vascular plants	29
21	Seed plants: gymnosperms and angiosperms	30
23	Evolutionary trends in land plants	
26	The Big Themes Revisited	

*** **FINAL EXAMINATION*****

Thursday, April 29, 2010 - 7:00 - 10:00 p.m.

BIOLOGY 141 - LABORATORY SCHEDULE
Spring 2010/ Dr. Steve Baker

Lab: 2:30-5:30 PM

Lab meets in Pierce 123

<u>Date</u>	<u>Lab Topic</u>	<u>Writing Assignment</u>
Jan. 19	Scientific Investigation	Materials and Methods
26	Microscopes and Cells	Review table***
Feb. 2	Diffusion and Osmosis	Title Page, Introduction, References
9	Enzymes	Results; Table; Figure
16	Cellular Respiration (5)	Title Page; Table; Discussion; References
Feb. 18 (Thurs.)	LAB EXAM (through enzymes) (8:15 - 9:15 a.m. or 8:30-9:45 a.m.)	
23	Mitosis and Meiosis	Comparison table***
March 2	Meet in research groups; Proposal development <i>Proposals submitted to conference by 1 pm on Friday, 3/5</i>	
March 8-14 ***SPRING BREAK***		
16	Field Research: Ecology and Evolution on the Outcrops	
MARCH 18 (Thurs)	LAB EXAM (Respiration, Mitosis, and outcrops) 8:15 a.m. – 9:15 a.m., or 8:30-9:45 a.m	
23	Microbial Diversity (Bacteriology)	Research Papers due in class
30	Research Symposium (Technology rehearsal – 9:00 am- Pierce 101; one team member must be there)	
April 6	Molecular Biology	Map***
13	Plant Diversity I and II	
20	Molecular Phylogeny	Report completed in lab
April 22 (Thurs)	LAB EXAM 8:15 a.m. – 9:15 a.m., or 8:30-9:45 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.**

- **The instructor reserves the right to adjust dates and topics on lecture and lab syllabi if he determines it is necessary.**

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 Introductory Biology. If you do not understand everything in this handout, you should ask for clarification.

Cell Biology and Genetics (141) is designed for students who **plan to major in 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 not only learn and apply complex information, but that you also organize this information within the major concepts of biology. This information will be essential to your success in other biology courses, where your competence in basic biology will be assumed. In addition many of you will be taking examinations to enter graduate or professional schools, and the knowledge you gain here will be required later.

Course Objectives. In Biology 141 students are introduced to basic concepts in biology following the hierarchy of life from basic biological molecules, to cell structure and function, fundamentals of genetics, evolution and organismal diversity (specifically plants). Students master detailed information within the broad themes of unity and diversity, structure and function, and evolution.

The laboratory component of the course emphasizes student use of scientific methods of inquiry, fundamental concepts and techniques in biology, and communicating scientific results through laboratory presentations and scientific writing. Students participate in an independent team research project: proposal, research, symposium and scientific paper.

Tips for Studying: Biology 141 is an intensive course and requires time. 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.



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.



Memorize and think. While studying, keep two things in mind: One is to **learn terminology** and most importantly, understand the relevance of that terminology to biological function. Second – it is crucial to remember that this course is designed to make you **think** and not just to have you memorize facts. Many of the test questions will revolve around applying your knowledge. Therefore you should be confident of what you know and what it means.



Be an active learner. Attend Supplemental Instruction and organize an active study group. Develop study guides, comparison charts, concept maps (see Study Guide). Use the CD Study Guide and web resources for your textbook. **Don't be lulled into thinking familiarity is the same as knowledge.** The latter takes 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. After lab review the objectives, answer all questions and prepare a study guide for the lab materials.

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 SI leader is **Michael Romanelli**.

Examinations. The lecture exams 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 points). There are three lab practical exams that may include a written portion (50 points each). These exams cover lab 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 sections of a scientific paper for four laboratory exercises. Students will propose and implement an independent investigation as a research project. For this laboratory, they 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. Your signature on your work attests to your upholding the Honor Code.

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 laboratory.
The assignment of points will be:

300 points	3 lecture exams
150 points	3 laboratory exams
175 points	final examination
40 points	scientific writing
60 points	lab project

725 points	total
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Final grade determination:

90 - 100%	A
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80 - 89%	B
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70 - 79%	C
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60 - 69%	D
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<60	F
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Plus and minus grades are given.