

Bio 141, Cell Biology and Genetics
Course Syllabus

Dr. Steven Nilsen
Fall 2007

Instructor: Dr. Steven Nilsen
Office: Room 106, Pierce Hall
Office Hours: M&W 11:00-12:00, Th 2:00-5:00, F 2:00-4:00 and see below
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Lecture: MWF 9:35-10:25, Room 102, Pierce Hall
Laboratory: W 2:00-5:00, Room 125, Pierce Hall

Required Texts:

- 1) *Biology*, N.A. Campbell and J.B. Reece, 2005, 7th edition, Benjamin/Cummings Publishing Co., Inc. The optional Study Guide is available on reserve in the library.
- 2) *Investigating Biology*, 5th ed. Morgan, J. G. and M. E. B. Carter. Benjamin/Cummings Publishing Company, Inc. 2005. *Used lab manuals are not permitted.*

Optional Texts:

- 1) *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.
- 2) *A Guide to Biology Lab*, Rust, T.G., Southwest Educational Ent.
- 3) *Practicing Biology*, Heitz, Jean. Benjamin/Cummings Publishing Co., Inc. 2005. A terrific workbook that is useful alone or in study groups. Some materials used in SI.

Course Objectives:

- 1) Become familiar with the process of scientific inquiry.
- 2) Become familiar with the fundamental principles of biology and learn how they can be applied as an investigator.
- 3) Develop a framework of knowledge on...
 - a. chemistry of cellular life
 - b. source of cellular energy
 - c. cellular division and replication and organismal growth
 - d. applied evolutionary theory to generate testable hypotheses

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Lecture Syllabus

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Date	Topic	Assigned Reading
	<u>I. Introduction</u>	
W, Aug 29	Science as a Way of Knowing	1
F, Aug 31	Major themes in Biology	1
M, Sept 3	** Labor Day **	--
	<u>II. Molecules of life</u>	
W, Sept 5	Hierarchies: beginning with living chemistry and water	2,3
Th, Sept 6	8:15 – 9:30 am <i>Scientific Literature and Research (Library - Required)</i>	
“ “	9:30 – 10:45 am “ “ “ “ “ “ “ “	
F, Sept 7	Building biological macromolecules: carbohydrates and lipids	4,5
M, Sept 10	Proteins and nucleic acids	5
	<u>III. The cell</u>	
W, Sept 12	Structure and function revealed in cells	6
F, Sept 14	Cellular Case Studies	---
M, Sept 17	Membrane structure and cellular transport	7
W, Sept 19	Transport problems	--
	<u>IV. Energy</u>	
F, Sept 21	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M, Sept 24	Cellular respiration I - Glycolysis	9
T, Sept 25	Exam 8:00 - 9:30 a.m. (on I-III.)	
W, Sept 26	Cellular respiration II - Transition and the Krebs Cycle	9
Th, Sept 27	8:30 – 9:30 am <i>Presentation of Scientific Data – Pierce 123 (Required)</i>	
F, Sept 28	2:00-3:00 pm “ “ “ “ “ “ “ “	
F, Sept 28	Cellular respiration III - Chemiosmosis and the Electron Transport System	9
F, Sept 28	<i>Due today: group research proposals</i>	
M, Oct 1	Review and recapitulation: Accounting Day	--
	<u>V. Photosynthesis</u>	
W, Oct 3	Homage to photosynthesis;	10
F, Oct 5	Photosynthesis I: the light dependent reactions	10
M, Oct 8	** Fall Break **	
W, Oct 10	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10

	<u>VI. Growth and Inheritance</u>	
F, Oct 12	Cell reproduction: cell cycle, mitosis	12
<i>F, Oct 12</i>	<i>powerpoint workshop (1 group member must attend)</i>	
M, Oct 15	Sexual life cycles and meiosis	13
<i>T, Oct 16</i>	<i>Exam 8:00 – 9:30 a.m. (on IV-V.)</i>	
W, Oct 17	Chromosomal mutations	13, 15 pp. 285-288
F, Oct 19	Mendelian principles; genes and chromosomes	14, 15 pp. 274-275
M, Oct 22	Patterns of inheritance	14, pp. 260-270
W, Oct 24	Chromosomal theory and linkage	14
F, Oct 26	Genetics problems and review	15, pp. 276-285
	<u>VII. From genes to proteins</u>	
M, Oct 29	DNA structure	16
W, Oct 31	DNA replication	16
F, Nov 2	Gene to Protein I: transcription and the genetic code	17
<i>F, Nov 2</i>	<i>2:00 pm, writing forum to discuss research paper (library)</i>	
M, Nov 5	Gene to Protein II: translation and genetic mutations	17
	<i>Research paper due in class</i>	
W, Nov 7	Molecular genetics workshop	--
	<u>VIII. Evolutionary principals</u>	
F, Nov 9	Charles Darwin and development of evolutionary concepts	22
M, Nov 12	Evidence for evolution	22,25, pp. 481-495
W, Nov 14	Population Genetics and Hardy Weinberg	23
<i>Th, Nov 15</i>	<i>Exam 8:00 – 9:30 a.m. (on VI-VII.)</i>	
F, Nov 16	Microevolution: genetic drift, gene flow and mutation	23
M, Nov 19	Genetic variation and selection	23
W, F Nov 21-23	** Thanksgiving Break **	
	<u>IX. Application of evolutionary principals</u>	
M, Nov 26	Simulations – Evolution and population genetics	
W, Nov 28	Speciation	24, pp. 472-480
F, Nov 30	Evolution of land plants:	29
M, Dec 3	Bryophytes and seedless vascular plants	29
W, Dec 5	Seed plants: gymnosperms and angiosperms	30
F, Dec 7	Evolutionary trends in land plants	--
M, Dec 10	The Big Themes Revisited	--
<i>F, Dec 14</i>	<i>Final Exam 9:00-12:00 (50% on I-VII. and 50% on VIII-IX.)</i>	

Date	Lab Topic (#)	Writing Assignment
Sept. 4,5*	Scientific Investigation (1)	Title page; Introduction; References (<i>due in class on 9/17</i>)
11,12	Microscopes and Cells (3)	Review table ⁺
18,19	Diffusion and Osmosis (4)	Table; Figures; Results; (<i>due in class 10/1</i>)
25,26	Enzymes (2)	Materials & methods; Figures; Discussion (<i>due in class on 10/10</i>)
<i>Oct. 2nd (Tues.) LAB EXAM (1,2,3,4) (8:00 – 9:15 a.m. or 8:30 – 9:45 a.m.)</i>		
Oct. 2,3	Cellular respiration (5) Research project	Research symposium (<i>in lab on 10/23,24</i>) Research paper (<i>due in class on 11/5</i>)
8,9	***Fall Break***	
10,12	Time to repeat experiments for research project	
16,17	Mitosis and Meiosis (7)	Comparison table ⁺
23,24	Research Symposium (<i>Technology Rehearsal, 9 a.m. Pierce 102</i>)	
<i>Oct. 30th (Tues.) LAB EXAM (5, 7, and outcrops) (8:00 – 9:15 a.m. or 8:30 – 9:45 a.m.)</i>		
30,31	Field Trip: Ecology and Evolution on the Outcrops	
Nov. 6,7	Molecular Biology (10)	Map ⁺
13,14	Microbial Diversity (13)	
20,21	***Thanksgiving Break***	
27,28	Plant Diversity I & II (15, 16)	
Dec. 4,5	Molecular Phylogeny	Report
<i>Dec. 6th (Thurs.) LAB EXAM (10, 13, 15, 16) (8:00 – 9:15 a.m. or 8:30 – 9:45 a.m.)</i>		

* First date is Dr. Jacob's section, second date is Dr. Nilsen's section, exams are joined.

⁺ These assignments are not turned in for a grade.

EXPECTATIONS, EVALUATION AND TIPS FOR SUCCESS IN BIOLOGY 141

Welcome to Biology 141! Please read carefully and follow the information in this handout and any accompanying materials. You are responsible for understanding all of the information presented here, so please ask questions if needed.

Biology 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. The course demands that you learn detailed and complicated information, organize this information within the major concepts of biology, and apply your knowledge. In addition, there are multiple exams and assignments associated with this course. Your competence in basic biology will be assumed in other Biology courses, thus it is crucial for you to succeed in this course. Many of you will be taking examinations to enter graduate or professional schools, and the knowledge you will gain here will be required for these tests.

Tips for Success: Biology 141 is an intensive course and requires time. To perform well in this course, you must manage your time appropriately. You must have a proper study plan, beginning from the first day of class. The following are some good study habits that will help you succeed in Biology 141:

- * Keep up with assigned readings. The readings listed against each lecture in the syllabus must be done BEFORE the lecture.
- * 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. Ask questions in class to help you connect with the concepts.
- * 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. In addition, connect the concepts learned in lecture to the lab exercises.
- * Review material on a regular basis. Study the diagrams in your text and lecture handouts. Practice writing out pathways and linking concepts. Use the blank figures handed out in class for your study. Attend your SI sessions on a regular basis. Take advantage of my office hours to get individual direction.
- * Keep two things in mind: first, learn terminology and most importantly, understand the relevance of that terminology to biological function; and second, this course is designed to make you think and not just to have you memorize facts. Memorizing facts is important to establish a basis for your knowledge but it is not sufficient. You must be able to use your knowledge to think logically and

analytically. Many of the test questions will revolve around applying your knowledge. Therefore you should be confident of what you know and what it means.

- * Lab is equally important. The laboratory component of this course is intensive and requires time as well. Please read your lab manual BEFORE lab and pay attention to the details. Take good notes during the lab and take time to make detailed observations. Answer questions in the lab manual either during lab or immediately following lab. Pay attention to information about lab exams. Make use of open lab time. Learn to manage your time well and prepare in advance for the lab writing assignments.

Supplemental Instruction (SI) is provided for all students in Biology 141. I will explain this important program that provides assistance for students who wish to improve their performance in biology. Your Biology 141 SI leader is Maulikkumai (Maulik) Patel.

Evaluation Criteria:

- ✧ *Examinations* – There will be three lecture exams, each worth 100 points, including multiple choice, short answer and short essay questions. Exams will cover all material in lecture in addition to assigned textbook readings and other supplemental materials. Use the knowledge you gain in lab to help with understanding the lecture material. The final examination, worth 175 points, is comprehensive. Three laboratory exams, each worth 50 points, will be given in this course. Each lab exams will cover the material from the lab exercises. The lab exams will include a practical and a written portion.
- ✧ *Scientific Writing and Laboratory Project* - You will write individual sections of a scientific paper for specific laboratory exercises. The lab also involves a group independent investigation as a 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.

Absences

Please become familiar with the attached absence policy. If you need an excused absence, please contact me. Poorly excused, e.g. oversleeping, or unexcused absences will not be tolerated and any student who greater than 15 minutes late for class will be counted as absent on that day. I strongly recommend using *multiple* battery-powered alarm clocks as oversleeping will not qualify as an excuse.

Mobile Phones

Please turn off and stow away your mobile phones during lecture and lab. Mobile phones are *not permitted in the classroom during lecture or laboratory examinations*.

Honor Code

The Honor Code of our institute applies to all work submitted for credit in this class, hard copy or digital format, and all such work shall be pledged to be your and yours alone.

Office Hours

Please come by, at your leisure, to introduce yourselves early in the semester. I will have an open door policy in addition to my office hours and you may schedule appointments with me as well. If I think that your exam score(s) are not fairing well, you will be asked to visit me in the office where you will have the opportunity of discussing matters related to your education which may be hindering your performance.

LearnLink Class Conference

A class conference labeled “Nilsen 141” has been set up for this course on LearnLink. I will post announcements, additional materials, syllabus alterations and laboratory information onto the forum. You may discuss, amongst yourselves, all matters related to this course here. I can be more reliably found in my office than on this forum.

Additional Supplementary Sessions

We have two required supplementary instruction sessions in this course for library and information technology. These sessions are held outside of class time and are critical for your laboratory assignments.

Evaluation Points

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

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

Final grade determination

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

Important Dates for Biology 141 (includes out of class supplemental sessions)

September:

- 5 Last day for changing courses
- 6 *Literature workshop, preliminary references due*
- 17 Title page, Introduction and references due in class
- 25 Exam I**
- 26/27 *Data presentation workshop*
- 28 Cellular respiration research project group proposal due on Learnlink by 9AM

October:

- 1 Materials and Methods; Results with figure and table due in class
- 2 Lab Exam I**
- 3 Last day to drop classes
- 10 Discussion with figure, table and references due in class
- 12 *Powerpoint workshop (optional, 1 group member must attend)*
- 16 Exam II**
- 23 Research symposium
- 30 Lab Exam II**

November:

- 2 *Writing forum to discuss research paper*
- 5 Research paper due in class**
- 15 Exam III**

December:

- 6 Lab Exam III**
- 14 Final Exam**