Bi 211 General Biology I: Cells

Information Sheet for Fall Quarter 2007

Course web site: biology.uoregon.edu/classes/Bi211f07
name: bi211; password: student

Course Background

This course is designed for majors in biology and certain other sciences who want an overview of the field of biology. This includes:

- Biology majors with interests more in ecology or organismal biology.
- Students intending to major in a science other than biology and do not need the extended coverage of biochemistry and molecular genetics that is provided by the Bi251-253 sequence (e.g. Environmental Science, Environmental Studies, Psychology, Computer and Information Science majors).
- Students who are interested in teaching.

Students beginning the General Biology sequence with Bi 211 need a competency in math and chemistry, but should continue their studies in these areas if they want to be able to take Bi 214 and leave open the option of becoming biology majors. Students completing Bi 213 should be eligible to take some, but not all, upper division biology courses. Completion of Bi 211-214 will allow students to take any 300-level biology course and major in biology.

Course Prerequisites

Students must have taken Ch111 or higher (Ch101, Ch102 or Ch199 are not sufficient). If you are going to take only one chemistry course, then we recommend Ch111 rather than the general chemistry sequence. A year of general chemistry, with lab, is required for biology majors. Prerequisites for Bi211-214 will be strictly enforced

Course Goals

Concepts Because this is a survey course, we cover all major areas of biology. Biology, however, is a large field, so we concentrate on a few fundamentals, rather than covering everything superficially. To pass Bi211, students must demonstrate understanding of the major concepts of cellular biology: how cells carry out the functions of living organisms; the genetic basis of inheritance; and how genes and proteins work.

Skills It is important for all citizens to be scientifically literate, whether or not they are in a science profession. Part of literacy is the ability to find information, evaluate the information and communicate or act on that information. In this course we will help you learn to find reliable information related to biology, evaluate the quality of that information, and communicate that information to your peers and instructors.

Science We think that it is important for everyone, not just scientists, to understand the process of science. To understand how scientists learn about the world, you will read papers from various sources (including original research papers) for your issues project. You will perform the methods of science whenever possible including such scientific methods as hypothesis testing (this will even occur in lecture) and modeling.

Course Format

Lectures (Monday, Wednesday and Friday, 10:00-10:50 in room 282 Lillis). You should do the assigned readings before coming to lectures. Some lectures will include activities that help you to actively address the material. These activities will often be done collaboratively with two or three students discussing the problem together for a few minutes before each independently writes a solution. You will not turn these in but your active participation will help you to truly understand the material and better prepare you for exams.

Lab/Discussion activities (Wednesday and Thursday in room 5 Klamath)
The lab/discussion is a small group of about 26 students that meets once a week for 110 minutes. You will explore the diversity and complexities of cells, model major concepts in cellular biology, discuss issues related to cellular biology and perform scientific investigations to understand the mechanism of inheritance. You should attend the section for which you are registered. Attending other sections will only be allowed in extraordinary situations and with prior approval from your GTF.

*Problem Solving Session*s (Wednesdays 11:00, location TBD and Thursdays time & location TBD)
The single biggest problem students have in general biology is solving the kinds or problems presented in homeworks and exams. These are similar to the kinds of questions that biologists ask; they can't be solved by memorization of facts. In the problem solving sessions, we will go over both homework problems and discuss ways to approach these problems. Although attendance is not required, we strongly encourage you to attend at least one of these sessions on a regular basis.

Course Evaluation

Posting of Grades
Scores for assignments and exams will be posted on the web a couple of times during the term. We will make announcements in class when they are posted. Check your scores each time we post them because you will have only <u>one week</u> after the posting to notify us about a mistake or omission.

Problem Sets (homeworks)
There are seven problem sets that can be found in the course packet. The problems are similar to the types of problems used in exams. They will be graded on a 5-point scale and are due at the beginning of your lab. No late homework will be accepted. The solutions to each week's problems will be posted on the course website on Thursdays after 4PM so that you can see them before Friday exams. We will not have time to return the homework before the exams so we suggest that you photocopy your homework before turning it in and then compare your answers to those posted. Every staff member will be happy to discuss the problems during their office hours and in the peer tutor center. There are two weekly problem solving sessions where the problems sets will be discussed. The location of the sessions will be announced during the first week of class.

Laboratory Activities
Lab handouts will be turned in at the end of a lab period or at the beginning of the lab the following week. The due date for each lab will be announced in lab. Each lab will be graded on a 5-point scale. Part of this grade will be based on participation in lab. Most labs <u>cannot</u> be made up because they involve additional materials. <u>Late labs will not be accepted</u>.

Issues Paper
Each of you will work on an issue related to cellular biology. You will choose your issue topic during the second week and work on the project during the entire term. The project is worth 20% of your grade, and consists of three parts: a proposal (2%), a paper outline (3%), and a full paper (15%). Late work on all three parts will be accepted but deducted 3% for each day (excluding weekends) that it is late. No work will be accepted more than one week late.

Exams
The course has three types of exams: quizzes, a midterm and a final. All exams will be the same short-answer format. Quizzes will cover material from the previous week's lectures (see schedule for lectures). The midterm and final are cumulative. Exams cover material from all aspects of the course including lectures, labs, readings, and problem sets. Your problem sets will help you to concentrate on the reading material that we think is particularly important and give you practice with the kind of questions you will see on the exams. (Most of the questions in the problem sets are from previous-years' exams.) Exams will be designed to probe a deep understanding of the concepts and principles discussed, and an ability to apply the concepts to novel situations rather than a memorization of detail. Exams cannot be made up. We will drop the lowest score of the quizzes. If you miss a quiz for any reason, that will be the dropped quiz. Everyone is required to take the midterm and final exam. Make your travel plans now as there will be no early exams and no late exams. GTFs grade exams under supervision of course faculty. To promote consistency, a single person generally grades each question.

Laboratory activities (1% each)	**9%**
Problem sets (homeworks) (1% each)	**7%**
Exams	**64%**
best 4 of 5 quizzes (1% each; 4% total)	
midterm exam (20%)	
final exam (40%)	
Issues Project	**20%**
proposal (2%)	
outline (3%)	
paper (initial paper and final paper) (15%)	

Professional Conduct
We will work hard to make this a course from which you can learn the fundamental concepts of biology and develop important skills. We welcome suggestions from you at anytime about things you think could be done to improve the course. In return, we ask that you arrive at lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates. Please read the student conduct code at the back of the time schedule; academic dishonesty includes cheating, plagiarizing (taking credit for the work of others) or knowingly supplying false information -- it is a serious offense. We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty will be a lowering of the final grade or failure. If you find yourself in trouble, or if you are aware of academic dishonesty occurring, please talk to one of the instructors. Personal crises do happen. If you are having difficulties that are interfering with your ability to do well in the class, please tell an instructor as soon as possible. We may be able to refer you to someone for help or to make special arrangements if the need is real and if you have done your best to deal with the situation in a timely manner. Finally, we promise to respect you as students and as individuals, and ask that you return that respect to us and to your fellow classmates.

Schedule

Week	Date	Lectures	Lab/Discussion
1	9/24 9/26 9/28	L1: Macromolecules (case: Gaucher disease) L2: Macromolecules (case: Gaucher disease) L3: Cell Structure & Function (case: Gaucher disease)	Lab 1: Discovering Cells
2	10/1 10/3 10/5	L4: Cell Structure & Function L5: Energy, Enzymes and ATP L6: **Quiz 1 on L1-L4** Harvesting Chemical Energy (case: Kristine)	Lab 2: Introduction to Issues Project & Finding References for Project ***Problem set #1 due at beginning of lab**
3	10/8 10/10 10/12	L7: Harvesting Chemical Energy (case: Kristine) L8: Harvesting Chemical Energy (case: Kristine) L9: **Quiz 2 on L5-L8** Photosynthesis	Lab 3: Modeling Cellular Respiration ***Problem set #2 due at beginning of lab**
4	10/15 10/17 10/19	L10: Photosynthesis L11: DNA Structure L12: **Quiz 3 on L9-L11** Cell Cycle (case: HER2 gene)	Lab 4: Modeling Photosynthesis ***Problem set #3 due at beginning of lab** **Issues paper proposal due*
5	10/22 10/24 10/26	L13: DNA replication L14: Mitosis **Midterm Exam on L1-L14**	Lab 5: Review for Midterm
6	10/29 10/31 11/2	L15: Cell Cycle and Cancer (case: HER2 gene) L16: Protein Synthesis (case: cystic fibrosis) L17: Protein Synthesis (case: cystic fibrosis)	Lab 6: Cell Cycle/Intro to *Drosophila* **Issues paper outline due*
7	11/5 11/7 11/9	L18: Protein Synthesis: Gene Therapy L19: Meiosis (case: Down syndrome) L20: **Quiz 4 on L15-L18** Meiosis & Sexual Life Cycle	Lab 7: Modeling Protein Synthesis ***Problem set #4 due at beginning of lab**
8	11/12 11/14 11/16	L21: Genetics: Mendel's 1st Law L22: Genetics: Mendel's 2nd Law L23: **Quiz 5 on L19-L22** Genetics: Meiosis & Pedigrees	Lab 8: Modeling Simple Genetic Traits ***Problem set #5 due at beginning of lab** **Initial paper due in lab*
9	11/19 11/21 11/23	L24: Genetic Basis of Sex (case: Maria Patino) L25: Sex-linked traits/ Pedigrees NO CLASS: HAPPY THANKSGIVING	No labs this week ***Problem set #6 due Wednesday by 4PM** **Final Paper due Wednesday by 4PM*
10	11/26 11/28 11/30	L26: Incomplete, Codominance & Multiple Alleles L27: Complex Traits (case: BRCA genes) L28: Wrap-up (case: Leber disease)/course evaluations	Lab 9: Modeling Complex Genetic Traits ***Problem set #7 due at beginning of lab**
final	12/7	**Friday 10:15: Final exam on entire course**	

Readings

Textbook

The text, *Biology* by Campbell & Reece, 7th edition, will be used as a general reference throughout the fist three quarters of General Biology. The readings include background material useful for preparing you for lecture and for studying for exams. We don't expect you to remember all the details in this material. A good strategy would be to skim over the entire chapter first, concentrating on the major concepts, then to read more carefully the assigned pages, focusing on the ideas discussed in lecture and lab.

Course Packet

This packet contains many of the handouts you will need during the quarter including lecture handouts, lab handouts, problem sets, and issues project instructions.

Week	Lecture	Readings
1	1	• Ch 1: read quickly to get an overview of the book and the overall structure of the field of biology. Pay particular attention to section on cells (p. 5-8), classification (p. 12-14), and science as a process (p. 19-21). • Ch 5: polymers (p. 68-69); four major biological molecules (p. 69-89) understand basic structure of macromolecules, monomer types, and function.
	2	• CDRom Ch5 concept activities 5.2-5.5
	3	• Ch 26-32: skim over parts to answer questions about Kingdoms and Lab #1. • Ch 6: section on microscope (p. 95-97) is necessary to understand labs and graphics you will see in the text and lecture; size diagram is useful (p. 95); focus on characteristics of prokaryote and eukaryote cells (p. 98-101) and organelles (p. 102-110).
2	4	• CDRom Ch6 concept activities 6.2-6.6
	5	• Ch 8: read the following parts of this chapter for basic understanding; metabolic pathways (p. 141-142), transforming energy (p. 143-147), ATP (p. 148-150), enzymes (p. 150-154), effects of temperature and pH on enzyme activity (p. 154). CDRom Ch8 concept activities 8.1, 8.3, 8.4
	6	• Most students will have to carefully read Ch 9 on cellular respiration and Ch 10 on photosynthesis several times. Read the entire chapters fairly quickly the first time to get the general ideas and vocabulary. Then read again more carefully the specific pages that are listed. You must gain a basic understanding of the following material but don't need to memorize all of the chemicals. The principles of energy harvest (p.160-164) will help you understand underlying principles in many parts of cellular respiration and fermentation, cellular respiration (p. 164-174), fermentation (p. 174-176).

3	7	• CDRom Ch9 concept activities 9.1-9.5
	8	• CDRom Ch9 concept activities 9.1-9.5
	9	• Ch 10: photosynthesis in nature (p. 181-183), the light reactions and the Calvin cycle, *an overview* (p. 184 -185): you should understand this overview in detail. The next part of the chapter covers details of the light reactions and the Calvin cycle (p. 186-195). Read this section carefully, and understand at the level covered in class.
4	10	• CDRom Ch10 concept activities 10.1-10.3
	11	• Ch 16: (p 293-298) discusses some of the important work that led to the discovery of DNA as the genetic material. Read all of this and focus on the work of Watson and Crick (p 296-298). CDRom Ch5 concept activities 5.5; Ch16 concept activities 16.1
	12	• Ch 12: cell cycle (p. 218-227), regulation of the cell cycle and how it relates to cancer (p. 228-233).
5	13	• Ch 16: DNA replication. Read the entire chapter and focus on (p. 299-307). CDRom Ch16 concept activities 16.2
	14	• CDRom Ch12 concept activities 12.1-12.2
6	15	• Ch 19: the molecular biology of cancer (p. 370-374). CDRom Ch12 concept activity 12.3
	16	• Ch 17: protein synthesis introduction (p. 309-314), (p. 315-319) covers the details of transcription, (p. 320-326) covers the details of translation- many of these details will be covered in lecture and you should understand them, (p. 328-330) discuss mutations, (p. 331) shows a nice drawing summarizing protein synthesis.
	17	• CDRom Ch17 concept activities 17.1-17.4
7	18	• Ch 20: gene therapy is briefly discussed (p. 403-404)
	19	• Ch13: (p. 238-243) give an overview of the sexual life-cycle, (p. 243-247) give details of meiosis and compares this type of cell division with mitosis. CDRom Ch13 concept activities 13.1 and 13.3
	20	• Ch13: (p. 247-248) discusses the three processes responsible for genetic recombination. CDRom Ch13 concept activity 13.4
8	21	• Ch14: (p. 251-258) cover some basic info regarding Mendelian inheritance for mono- and dihybrid crosses, (p. 258-260) discuss some simple rules about probability that are useful for understanding Mendelian inheritance. CDRom Ch14 concept activity 14.1 (monohybrid cross)
	22	• CDRom Ch14 concept activity 14.1 (dihybrid cross)
	23	• Ch14: (p. 265-268) discusses pedigrees and human traits.
9	24	• Ch15: (p. 282-284) on sex chromosomes and sex-linkage, (p. 285-288) on errors in meiosis, including Down Syndrome. CDRom Ch15 concept activity 15.3
	25	• Ch14: (p. 260-262) discusses incomplete dominance, codominance and multiple alleles. CDRom Ch14 concept activity 14.3
10	26	
	27	
	28	