Bi211 General Biology I: Cells

Syllabus for Fall Quarter 2011

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Bi211is designed for biology majors and other sciences who want an overview of the field of biology.

Students beginning the General Biology sequence with Bi211 need a competency in math and chemistry, but should continue their studies in these areas if they want to be able to take Bi214 and leave open the option of becoming biology majors. Bi211 is the only prerequisite for Bi212 and Bi213. Students completing Bi213 should be eligible to take some, but not all, upper division biology courses. Completion of Bi211-214 will allow students to take any 300-level biology course and to major in biology.

Course Prerequisites

Students must have successfully completed Ch111 or higher. If you will take only one chemistry course, we recommend Ch111 rather than the general chemistry sequence. A year of general chemistry (Ch221-223), with lab, is required for biology majors. **Prerequisites for Bi211-214 are strictly enforced.**

Course Goals

Concepts: Because Bi211 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: Science and technology strongly influences our lives. It is important for all citizens to be scientifically literate, whether or not they are in a science profession. A part of science literacy is the skill to find information, recognize the difference between opinion and fact, appreciate the fact that not all opinions are equally valid, evaluate information, and communicate or act on collected 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: Society can function better if everyone, not just scientists, understand the process of science. Science is a special way of learning how our universe functions. 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 hypothesis testing and modeling.

Course Format

Lectures: (Monday, Wednesday and Friday, 10:00-10:50 in room 150 Columbia). 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.

Labs: (Wednesday, Thursday and Fridays in room 5 or 21 Klamath) The lab is a small group of about 30 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. Attend only the section for which you are registered. Attending other sections will only be allowed in extraordinary situations with **prior** approval from your GTF. Attendance is mandatory; it is not possible to make up labs.

Problem Solving Sessions: (most Mondays 11-11:50 in Kla21) The single biggest problem students have in general biology is solving the kinds of problems presented in homeworks and exams. These are similar to the kinds of questions that biologists ask; they generally can't be solved by memorization of facts, but by the application of facts to novel situations. In problem solving sessions, we will review homework problems and discuss ways to approach these problems. Attendance is not required at Problem Solving Sessions, but you may want to attend them on a regular basis, regularly attend GTF office hours, or visit tutoring sessions of a Biology Peer Tutor to better understanding the course material.

Staff office hours and BPT tutoring sessions: See course blackboard site for times and locations.

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 one week after the posting to notify us about a mistake or omission.

Problem sets (homeworks): The term's 7 problem sets will be available on blackboard. Problems are similar to exam problems. They are graded on a 5-point scale. Due dates are listed on the course schedule. All problem sets, except problem set #6, are due on Fridays by 12 pm noon. In the box outside of Klamath 5. **No late homework will be accepted.** Solutions to each week's problems will be posted on blackboard shortly after each assignment is due. We may not have time to return some homeworks before exams, so we suggest that you photocopy your homework before turning it in and compare your answers to those posted. Staff members will enjoy discussing problem sets in office hours and in the peer tutor center. Problems sets will also be discussed in the weekly problem solving sessions (see above).

Laboratory activities: Lab handouts will be turned in at the end of each lab period or at the beginning of lab the following week as announced in lab. Each lab will be graded on a 5-point scale. For some labs, part of this grade will be based on your active engagement in the lab. Most labs cannot be made up because they involve additional materials. **Late labs will not be accepted.**

Issues project: Each student will work on a live issue related to cellular biology. You will choose your issue topic during week 2 and work on the project during the term. The project is worth 20% of your grade, and consists of three parts: a proposal (5%), a paper outline (3%), and a paper (12%). Late work on all three parts will be accepted but deducted 3% for each day (including weekends) that it is late. No work will be accepted more than one week late.

Clickers (personal response systems): Clickers will be used in almost every class to encourage participation and to provide feedback to instructors and students. Each student should purchase a clicker for this class and register the clicker number on the course blackboard site. (If you've already registered your clicker *this term*, for another class, then you don't need to register it again). Questions during lecture that require clickers are usually multiple choice or true/false. Points will be earned two different ways: (1) For two-point questions, points will be awarded based on participation alone, not on whether the question is answered correctly; (2) For four-point questions, correct answers earn 4 points and incorrect answers earn 2 points. Total percent for the clicker portion of your grade will be based on 85% of the total possible points: if you get 85% of the total available clicker points, you earn full credit for this part of the course.

Exams: This course has three exams: two 50-minute, in-class midterms and a final. All exams will use the same short answer format. The final exam is cumulative. Exams will cover material from all aspects of the course including lectures, labs, readings, and homeworks. Exams will probe a deep understanding of the concepts and principles discussed, not merely a recitation of facts, and an ability to apply the concepts to novel situations, rather than a memorization of detail. Exams cannot be made up. Exams are graded by the GTFs under the supervision of faculty. To promote consistency, a single person grades each question. Everyone is required to take the final exam, which is on **Thursday 12/8 at 1015am**. No early or late exams will be given. Your final course grade will be automatically calculated two ways and the better grade will be assigned. Version A uses the score of all three exams. Version B uses the score of your best midterm and the final. If you miss a midterm, **for any reason**, then we will use version B to calculate your final grade.

Exam regrade policy: To be fair to all students, it is essential that all exams be graded according to the same criteria. If you wish to submit a midterm for a regrade, you must use the following guidelines. First, refer to the exam key available on blackboard to compare your answer to the key. If you still wish to have a midterm exam answer regraded, you must submit a written statement within one week of the return of the exam, along with your original exam, explaining specifically why your answer merits a higher score. Keep in mind that we will regrade the entire exam and a regrade may result in a higher, lower, or unchanged score. Please do not abuse this system. We reserve the right to eliminate this option at our discretion.

Calculation of course grade: Your course grade will be awarded based on the following table.

Activity	Value	Percent of course grade
Laboratory activities	1% each	9%
Problem sets (homeworks)	1% each	7%
Clicker questions		4%
Exams Version A Two midterm exams Final exam	 15% each 30%	 60%
Exams Version B Best midterm exam Final exam	 20% 40%	60%
Issues Project Proposal Outline Paper (initial paper and final paper)	 5% 3% 12%	 20%
	Total	100%

Students with disabilities: The University of Oregon is working to create inclusive learning environments. Please notify us if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu

Professional conduct: Cheating diminishes the value of your academic degree and the reputation of our institution, its faculty, and its students. Academic misconduct is particularly unfair to the vast majority of students who do their work with integrity and honor. The University Student Conduct Code (available at http://studentlife.uoregon.edu/StudentConductandCommunityStandards/ StudentConductCode/tabid/69/Default.aspx) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only sources and resources authorized by the instructor. For any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at www.libweb.uoregon.edu/ guides/plagiarism/students. We want you to learn and to do well in the course, but will not tolerate academic dishonesty. Sanctions for academic dishonesty will be lowering 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 immediately. Personal crises do happen. If you are having difficulties that are interfering with your ability to do well in the class, please discuss the situation with an instructor. 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 cope 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.

Week	Date	Lectures	Lab Activity
1	9/26 9/28 9/30	L1: Macromolecules: carbs & lipids (case: Gaucher disease) L2: Macromolecules: proteins & nucleic acids (case: Gaucher disease) L3: Cell Structure & Function (case: Gaucher disease)	Lab 1: Discovering Cells
2	10/3 10/5 10/7	L4: Cell Structure & Function L5: Energy, Enzymes and ATP L6: Harvesting Chemical Energy (case: Kristine) ***Problem set #1 due by 12:00 p.m.**	Lab 2: Introduction to Issues Project & Finding References for Project
3	10/10 10/12 10/14	L7: Harvesting Chemical Energy (case: Kristine) L8: Harvesting Chemical Energy (case: Kristine) L9: Photosynthesis ***Problem set #2 due by 12:00 p.m.**	Lab 3: Modeling Cellular Respiration
4	10/17 10/19 10/21	L10: Photosynthesis L11: DNA Structure L12: Cell Cycle: introduction, DNA replication ***Problem set #3 due by 12:00 p.m.**	Lab 4: Modeling Photosynthesis ***Issues paper proposal due in lab**
5	10/24 10/26 10/28	**Midterm 1 on lectures 1-10 and labs 1-4** L13: Cell Cycle: mitosis L14: Cell cycle and cancer	Lab 5: Cell Cycle in Onion Root Tips and Introduction to *Drosophila* Genetics
6	10/31 11/2 11/4	L15: Transcription L16: Translation L17: Mutation&Regulation ***Problem set #4 due by 12:00 p.m.**	Lab 6: Modeling Protein Synthesis ***Issues paper outline due in lab**
7	11/7 11/9 11/11	L18: Meiosis & Sexual Life Cycle (case: Down syndrome) L19: Meiosis & Transmission Genetics L20: Genetics: Mendel's 1st Law ***Problem set #5 due by 12:00 p.m.**	Lab 7: *Drosophila* Genetics and Modeling Meiosis
8	11/14 11/16 11/18	**Midterm 2 on lectures 11-18 and labs 5-7** L21: Genetics: Mendel's 2nd Law L22: Genetics: Recombination ***Problem set #6 due by 12:00 p.m.**	Lab 8: Modeling Simple Genetic Traits and peer review of issues paper ***Initial paper due in lab**
9	11/21 11/23 11/25	L23: Genetics: Human Genetics and Pedigrees L24: Genetic Basis of Sex (case: Maria Patino) NO CLASS: HAPPY THANKSGIVING	No labs this week ***Final issues paper due Wednesday by 4 p.m. (in box outside KL5)**
10	11/28 13/30 12/2	L25: Sex-linked Traits and Pedigrees L26: Incomplete Dominance, Codominance & Multiple Alleles L27: Complex Traits (case: BRCA genes) ***Problem set #7 due by 12:00 p.m.**	Lab 9: Modeling Complex Genetic Traits
final	12/8	**Thurs 10:15: Final exam on entire course**	Issues paper returned at final exam

Readings

Textbook : The text, *Biological Science* by S. Freeman, 3rd **or** 4th edition, will be used as general reference in Bi211, Bi212, and Bi213. Readings include background material useful to prepare you for lecture and to study for exams. We don't expect you to remember all details in this material. A good strategy is 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, and issues project instructions.

Copies of both editions of the textbook and the course packet will be on reserve in the Science Library.

Lecture	Readings (Freeman 3rd edition)
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 the sections on cells (p. 2-4), classification (p. 6-10), and science as a process (p. 11-15). It is highly recommended that you review basic chemistry principles in Ch 2. • Ch 5: read the entire chapter on carbohydrates • Ch 6: focus on pgs. 95-104 (types, structure of lipids); skim pgs. 105-107 to review diffusion and osmosis
2	• Ch 3: read pgs. 43-58 to focus on protein structure and function • Ch 4: read pgs. 67-71 for an introduction to nucleic acid structure and function
3 & 4	• Ch 28-32: skim over the chapters to answer questions about kingdoms for Lab #1 • Ch 7: read the entire chapter on cells; focus on characteristics of prokaryote and eukaryote cells (p. 120-124) and organelles (p. 124-130); skim the rest of the chapter to gain understand cell dynamics • Ch 6: read about cell membranes on pgs. 107-109 • For more info: study area at www.masteringbio.com: Ch 7 BioFlix Animations: Tour of an Animal Cell, Tour of a Plant Cell
5	• Ch 2: read pgs. 31-35 to focus on chemical reactions and energy • Ch 3: read pgs. 58-64 to focus on enzymes, effects of temperature and pH on enzymes • Ch 9: read pgs. 170-175 for basic understanding of ATP and redox reactions
6, 7 & 8	• Most students will have to read Ch 9 on cellular respiration several times carefully. Read the entire chapter fairly quickly the first time to get general ideas and vocabulary. Then reread more carefully 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. Pgs. 175-178 provide a nice overview of cellular respiration, pgs. 180-192 provide more detail of the processes of cellular respiration, and pgs. 192-194 discuss fermentation. • For more info: study area at www.masteringbio.com: Ch 9 BioFlix Animations: Cellular Respiration
9 & 10	• Most students will have to read Ch10 on photosynthesis several times carefully. Read the entire chapter fairly quickly the first time to get general ideas and vocabulary. Then read again more carefully specific pages that are listed. Pgs. 199-201 provide a nice overview of photosynthesis, pgs. 207-212 (light reactions) and pgs. 213-215 (Calvin Cycle) cover the details of photosynthesis. • For more info: study area at www.masteringbio.com: Ch 10 BioFlix Animations: Photosynthesis
11	• Ch 4: read pgs. 71-75 on DNA structure and function • For more info: study area at www.masteringbio.com: Ch 4 Web Animation: Nucleic Acid Structure
12, 13 & 14	• Ch 11: read pgs. 222-226 for an introduction to the cell cycle; pgs. 227-233 for details of mitosis; pgs 233-237 for control of the cell cycle; pgs. 237-240 for cancer and the cell cycle • Ch 14: read pgs. 295-313; focus on pgs. 303-307 (DNA synthesis) • For more info: study area at www.masteringbio.com: Ch 11 BioFlix Animations: The Phases of Mitosis; Mitosis; Ch 14 Web Animation: DNA synthesis
15, 16 & 17	• Ch 15: read pgs. 316-327 for an introduction to genes • Ch 16: read pgs. 329-346 for the details of protein synthesis; pgs. 347-349 discuss mutations • Ch 4: read pgs. 76-77 for RNA structure and function • For more info: study area at www.masteringbio.com: Ch 16 BioFlix Animations: Protein Synthesis; Web Animation: Transcription, Translation
18 & 19	• Ch 12: read pgs. 243-258 for details of meiosis; pgs. 260-262 discuss mistakes in meiosis • For more info: study area at www.masteringbio.com: Ch 12 BioFlix Animation: Meiosis; Ch 12 Web Animation: Meiosis, Mistakes in Meiosis
20 & 21	• Ch 13: read pgs. 265-274; pgs. 268-272 discuss Mendel's 1st Law; pgs. 272-274 discuss Mendel's 2nd Law; B17 discusses some simple rules of probability that are useful for understanding Mendelian genetics • For more info: study area at www.masteringbio.com: Ch 13 Web Animation: Mendel's Experiments, The Principle of Independent Assortment
22	• Ch 13: read pgs. 274-276
23 & 24	• Ch 13: read pgs. 276-278 to focus on sex chromosomes and sex-linked inheritance; pgs. 286-289 discuss pedigrees
25,26,27	• Ch 13: read pgs. 281-283 to focus on incomplete dominance, codominance and multiple alleles

Lectures	Readings (Freeman 4th edition)
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 the sections on cells (p. 2-4), classification (p. 5-8), and science as a process (p. 8-12). It is highly recommended that you review basic chemistry principles in Ch 2. • Ch 5: read the entire chapter on carbohydrates • Ch 6: focus on pgs. 82-88 (types, structure of lipids); skim pgs. 89-91 to review diffusion and osmosis
2	• Ch 3: read pgs. 38-51 to focus on protein structure and function • Ch 4: read pgs. 59-62 for an introduction to nucleic acid structure and function
3 & 4	• Ch 28-32: skim over the chapters to answer questions about kingdoms and Lab #1 • Ch 7: read the entire chapter on cells; focus on characteristics of prokaryote and eukaryote cells and organelles (p. 103-114); read pgs. 115- 122 to gain a deeper understanding of cell dynamics. • Ch 6: read about cell membranes and membrane proteins on pgs. 92-94 • For more info: study area at www.masteringbio.com: Ch 7 BioFlix Animations: Tour of an Animal Cell, Tour of a Plant Cell
5	• Ch 2: read pgs. 27-33 to focus on chemical reactions and energy • Ch 3: read pgs. 51-56 to focus on enzymes, effects of temperature and pH on enzymes • Ch 9: read pgs. 149-152 for basic understanding of ATP and redox reactions
6, 7 & 8	• Most students will have to carefully read Ch 9 on cellular respiration several times. Read the entire chapter 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. Pgs. 153-154 provide a nice overview of cellular respiration, pgs. 155-166 provide more detail of the processes of cellular respiration, and pgs. 166-168 discuss fermentation. • For more info: study area at www.masteringbio.com: Ch 9 BioFlix Animations: Cellular Respiration
9 & 10	• Most students will have to carefully read Ch10 on photosynthesis several times. Read the entire chapter fairly quickly the first time to get the general ideas and vocabulary. Then read again more carefully the specific pages that are listed. Pgs. 173-174 provide a brief overview of photosynthesis, pgs. 179-184 (light reactions) and pgs. 184-186 (Calvin Cycle) cover the details of photosynthesis. • For more info: study area at www.masteringbio.com: Ch 10 BioFlix Animations: Photosynthesis • The Big Picture: pgs. 192-193 provides nice overview of energy concepts
11	• Ch 4: read pgs. 62-66 on DNA structure and function • For more info: study area at www.masteringbio.com: Ch 4 Web Animation: Nucleic Acid Structure
12, 13 & 14	• Ch 11: read pgs. 194-196 for an introduction to the cell cycle; pgs. 197-200 for details of mitosis; pgs 202-205 for control of the cell cycle; pgs. 206-209 for cancer and the cell cycle • Ch 14: read pgs. 258-263; focus carefully on pgs. 263-268 (DNA synthesis); read pgs. 271-274 (correcting mistakes in DNA synthesis) • For more info: study area at www.masteringbio.com: Ch 11 BioFlix Animations: Mitosis; Web Animation: The Phases of Mitosis; Ch 14 BioFlix Animations: DNA Replication; Web Animation: DNA Synthesis
15, 16 & 17	• Ch 15: read pgs. 277-285 for an introduction to genes, the central dogma, and the genetic code; pgs. 285-286 discusses mutations • Ch 16: read the entire chapter for the details of protein synthesis • Ch 4: read pgs. 66-68 for RNA structure and function • For more info: study area at www.masteringbio.com: Ch 16 BioFlix Animations: Protein Synthesis; Web Animation: Synthesizing Proteins
18 & 19	• Ch 12: read pgs. 211-223 for details of meiosis; pgs. 225-227 discuss mistakes in meiosis • For more info: study area at www.masteringbio.com: Ch 12 BioFlix Animation: Meiosis
20 & 21	• Ch 13: read pgs. 230-239; pgs. 232-236 discuss Mendel's 1st Law; pgs. 236-238 discuss Mendel's 2nd Law; pg. B19 (Bioskills 13) discusses some simple rules of probability that are useful for understanding Mendelian genetics • For more info: study area at www.masteringbio.com: Ch 13 Web Animation: Mendel's Experiments, The Principle of Independent Assortment
22	• Ch 13: read pgs. 239-241; 243-245 and Box 13.1 on pg. 246
23 & 24	• Ch 13: read pgs. 241-242 to focus on sex chromosomes and sex-linked inheritance; pgs. 250-252 discuss human genetics and pedigrees
25, 26,27	• Ch 13: read pgs. 245-247 to focus on incomplete dominance, codominance and multiple alleles