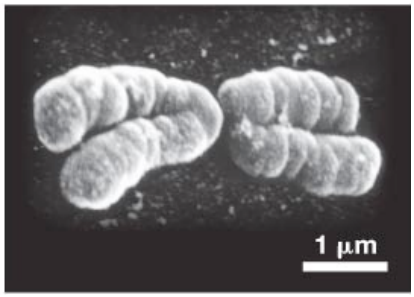


Bi211 General Biology I: Cells

Information Sheet and Syllabus for Winter Quarter 2013

Instructors: Dr. Jana Prikryl and Dr. Peter Wetherwax

Course Overview

This course is designed for both biology-majors and non-biology majors with a professional interest in science who want an overview of the field of biology. This includes:

- Biology-majors with interests in any area of biology.
- Any major with an interest in fields related to life science or professions in the health field.
- Students who are interested in teaching.

Students beginning the General Biology sequence with Bi 211 need a basic 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 may also stop the sequence after completing Bi 213 and be eligible to take some, but not all upper division biology courses. Bi211 is the only prerequisite for Bi212 and Bi213. Bi214 requires completion of both Bi212 and a year of general chemistry. Completion of Bi 211-214 will allow students to take any 300-level biology course and major in biology.

Course Prerequisites

Students need to have taken Ch111 or higher. A year of general chemistry (Ch221-223), with lab, is required for biology majors and several other science majors. If you are going to take only one chemistry course, then we recommend that you take one of the 100-level chemistry courses that are offered at the U of O, rather than the general chemistry sequence. **The prerequisites for Bi211-214 will be strictly enforced.**

Course Goals

There are 3 major goals for this course (and the entire Bi211-Bi213 sequence).

- *Concepts* Since this is a survey course, it is important that we cover the major areas of biology. However, biology is a large field so we will concentrate on a few major areas of biology, rather than try to cover everything superficially. To pass this course, students will need to demonstrate understanding of the major concepts of cellular biology: how cells carry out functions of living organisms; genetic basis of inheritance; 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 all people, not just scientists, to understand how to do science. To learn to be a better scientist you will read papers from various sources (including original research paper). You will perform the methods of science whenever possible including such scientific methods as hypothesis testing (this can even occur in lecture) and modeling.

Course Format

Lectures (Monday, Wednesday and Friday, 8:00-8:50 in room 100 Willamette and 10:00-10:50 in 123 GSH)
You must attend the lecture for which you are registered. You should do the assigned readings before coming to the lectures. During some of the lectures there will be activities (handouts are in the course packet) that will help you to stay actively involved during the lecture. These 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 (Wednesdays 11, 1, 3 & 5; Thursdays 8, 10, 12, & 2 in room 111 and 129 Huestis)
The lab/discussion is a small group (about 20 students) that meets once a week for 110 minutes. You will explore the structure and properties of major biological macromolecules, 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 mechanisms 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. Attendance is mandatory; it is not possible to make up labs.

Problem Solving Sessions (129 Huestis; most Mondays 11-11:50 with Jana & 1:00-1:50 with Peter; see schedule for exact dates) The single biggest problem students have in general biology is solving the kinds of problems presented on the exams. These problems 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 the practice problems and discuss ways to approach these problems. Although attendance is not required, we strongly encourage you to attend these sessions on a regular basis, or to regularly attend the office hours of one of the GTFs, or tutoring session of one of the Biology Tutors for Undergraduates (BTUs).

Office Hours and Tutoring Sessions times are posted on Blackboard.

Problem Sets (practice and graded) There are weekly practice problem sets in the course packet. It is very important that you work on these each week. We will help you to understand how to solve these problems in the office hours, tutoring sessions and problem solving sessions that are held each week. The practice problems are very similar to the types of questions you will see on the exams (in fact, most of the problems are from past exams). The practice problems are designed to help you master the material needed to successfully solve the graded problem sets.

There will be six graded problem sets posted on Blackboard from Tuesday 5PM until Thursday 5PM. You will submit your answers to these graded questions on Blackboard. No late homework will be accepted. The solutions to each week's problems will be posted on Blackboard on Thursday evening. You must do your own work on these graded questions. Copied work will be treated as academic dishonesty.

Laboratory Activities Lab handouts will be turned in at the end of each lab or, occasionally at a later time. 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. Labs cannot be made up because they involve additional materials. Late labs will not be accepted. All of the labs are held on Wednesdays and Thursdays.

Issues Project Each of you will work on an issue related to cellular biology. You will choose your issue topic during the 3rd week and work on the project during the entire term. The project, worth 18% of your grade, consist of two parts: a proposal (3%) and a paper (15%). Late work on both 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.

If you are retaking this course, you will not be allowed to resubmit issues project work from the previous time you took Bi211. The work you turn in this term must be original.

Clickers (Personal Response Systems) Clickers will be used in almost every class to encourage participation and to provide valuable feedback to instructors and students. Each student is expected to purchase a clicker for use in this class. You should register your clicker 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 will be multiple choice. Points will be earned two different ways: (1) 2-point questions: 2 points will be awarded based on participation alone, not on whether the question is answered correctly; (2) 4-point questions: 4 points for correct answer, 2 points for incorrect answer. Total percent for the clicker portion of your grade will be based on 85% of the total possible points: your clicker grade = total points earned/85% of total possible.

Exams There will be three exams: two midterms and a final. All exams will be the same format: short-answer. The final is cumulative. The exams will cover material from all aspects of the course including lectures, labs, readings and homeworks. 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. Exams are graded by the GTFs under the supervision of the faculty. To promote consistency, a single person grades each question. Everyone is required to take the final exam, which is on **Tuesday evening from 6-8** of final exam week. This is a combined final exam for both sections of Bi211. **There will be no early or late exams given.** Your final grade will be 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 for calculating your final grade.

Posting of Grades Scores for assignments and exams will be posted on the web three times during the term: right after each midterm and after the final exam Check your scores every times we post them as you will have only three days after the posting to notify us about mistakes or omission.

Evaluation

Component	**Percent of Grade**
Laboratory activities (1% each)	**10%**
Problem Sets (on Blackboard) (1% each)	**6%**
Clicker questions	**4%**
Exams Version A	**62%**
Both Midterm Exams (15% each)	
Final Exam (32%)	
Exams Version B	**62%**
Best midterm exam (20%)	
Final Exam (42%)	
Issues Project	**18%**
Proposal (3%)	
Paper (initial paper and final paper) (15%)	

Learning Environment The University of Oregon and we are 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 the UO Accessible Education Center in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu

Professional conduct We will work hard to make this course valuable to your learning. 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 to lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates. **Please put away and do not use your own computers, cell phones, or other electronic devices during lecture or lab.** Computers are not a very good way for taking notes in biology courses and they are distracting to other students.

Cheating devalues the reputation of our institution, its faculty, its students, and your academic degree. Academic misconduct is particularly unfair for students who do their work with integrity and honor. The University Student Conduct Code (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 the sources and resources authorized by the instructor. If there is 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 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. There is a crisis center on campus that you should not hesitate to call if you, or a friend, are in need of assistant. Their phone number is 346-4488. 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, Exams and Problem Sets	Lab/Discussion
1	1/7 1/09 1/11	L1: Macromolecules: carbohydrates & lipids (case: Gaucher disease) L2: Macromolecules: proteins & nucleic acids (case: Gaucher) L3: Cell Structure & Function (case: Gaucher disease)	Lab 1: Discovering Molecules
2	1/14 1/16 1/17 1/18	L4: Cell Structure & Function (case: Gaucher disease) *Problem solving session in 129 Huestis Monday at 11 and 1* L5: Energy and ATP **Problem Set #1 due by 5PM Thursday** L6: Enzymes	Lab 2: Discovering Cells
3	1/21 1/23 1/25	*No Class: Martin Luther King Day* L7: Harvesting Chemical Energy (case: Kristine) L8: Harvesting Chemical Energy	Lab 3: Finding References for Project
4	1/28 1/30 1/31 2/1	L9: Harvesting Chemical Energy *Problem solving session in 129 Huestis Monday at 11 and 1* L10: Photosynthesis **Problem Set #2 due by 5PM Thursday** L11: Photosynthesis	Lab 4: Modeling Cellular Respiration ***Issues paper proposal due***
5	2/4 2/6 2/8	**Midterm Exam on lectures 1-9 and labs 1-3** L12: DNA Structure L13: Cell Cycle (case: HER2 gene)	Lab 5: Modeling Photosynthesis
6	2/11 2/13 2/14 2/15	L14: Cell Cycle: mitosis *Problem solving session in 129 Huestis Monday at 11 and 1* L15: Cell Cycle: cancer **Problem Set #3 due by 5PM Thursday** L16: Protein Synthesis (case: cystic fibrosis)	Lab 6: Cell Cycle/Intro to *Drosophila* genetics
7	2/18 2/20 2/21 2/22	L17: Protein Synthesis (case: cystic fibrosis) *Problem solving session in 129 Huestis Monday at 11 and 1* L18: Protein Synthesis (case: cystic fibrosis) **Problem Set #4 due by 5PM Thursday** L19: Meiosis & Sexual Life Cycle (case: Down syndrome)	Lab 7: Modeling Protein Synthesis
8	2/25 2/27 3/1	**Midterm Exam on lectures 10-18 and labs 4-6** L20: Meiosis & Transmission Genetics L21: Genetics: Mendel's Laws	Lab 8: Modeling Meiosis and *Drosophila* Genetics ***Initial paper due in lab***
9	3/4 3/6 3/7 3/8	L22: Genetics: Recombination and Gene Mapping *Problem solving session in 129 Huestis Monday at 11 and 1* L23: Genetic Basis of Sex (case: Maria) **Problem Set #5 due by 5PM Thursday** L24: Sex-linked Traits and Pedigrees	Lab 9: Modeling Simple Genetic Traits ***Final paper due in lab***
10	3/11 3/13 3/14 3/15	L25: Incomplete Dominance, Codominance and Multiple Alleles *Problem solving session in 129 Huestis Monday at 11 and 1* L26: Complex Traits (case: BRCA genes) **Problem Set #6 due by 5PM Thursday** L27: Wrap-up (case: Leber disease)	Lab 10: Modeling Complex Genetic Traits
final	3/19	**Final Exam on entire course, Tuesday 6-8PM; location TBD**	Issues paper returned at final exam

Textbook The text, *Biological Science* by S. Freeman, 3rd **or** 4th edition, will be used as a general reference throughout the first 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, practice problems and issues project instructions.

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

Lectures	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 and 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 remainder of the chapter to gain a deeper understanding of 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 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. 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 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. 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