

BI 211 General Biology: Cells Syllabus for Summer Term 2008

Instructor: Lisa Turnbull

Course website: <http://biology.uoregon.edu/classes/bi211sum08>

Contact information

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Office Hour Location: Klamath 5

Course Background

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 whose interests lie more in the areas of ecology or whole-organism biology.
- Students who intend 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 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. 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 (Ch101, Ch102 or Ch199 are not sufficient). If you are going to take only one chemistry course, then we recommend that you take Ch111 rather than the general chemistry sequence. A year of general chemistry (Ch221-223), with lab, is required for biology majors. 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.

Schedule

| | <i>Date</i> | <i>Lecture</i> | <i>Lab</i> | <i>Assignments**</i> |
|----|-------------|---|---|---|
| M | 6/23 | L1: Macromolecules | Lab 1: Discovering cells | |
| Tu | 6/24 | L2: Cell structure and function/ Introduction to issues project | | |
| W | 6/25 | L3: Energy, enzymes and ATP Harvesting chemical energy | Lab 2: Finding references for issues project | |
| Th | 6/26 | L4: Harvesting chemical energy Quiz 1 (lectures 1-3 and lab 1) | | Issues paper proposal due before 4pm 6/27 |
| M | 6/30 | L5: Photosynthesis | Lab 3: Modeling cellular respiration* | |
| Tu | 7/1 | L6: DNA structure and the cell cycle Quiz 2 (lectures 4-5 and lab 3) | | |
| W | 7/2 | L7: Cell cycle including mitosis | Lab 4: Modeling photosynthesis* | |
| Th | 7/3 | Midterm exam (lectures and 1-7 and labs 1-4) | | Issues paper outline due before 4pm |
| M | 7/7 | L8: Protein synthesis | Lab 5: Cell cycle* | |
| Tu | 7/8 | L9: Protein synthesis | | |
| W | 7/9 | L10: Meiosis and the sexual life cycle | Lab 6: Modeling protein synthesis* | |
| Th | 7/10 | L11: Genetics: Mendel's laws Review of initial papers Quiz 3 (lectures 8-10 and labs 5-6) | | Initial paper due in class |
| M | 7/14 | L12: Pedigrees, genetic basis of sex | Lab 7: Modeling simple genetic traits | |
| Tu | 7/15 | L13: Incomplete dominance, codominance, multiple alleles Quiz 4 (lectures 11-12 and lab 7) | | |
| W | 7/16 | L14: Complex traits | Lab 8: Modeling complex genetic traits | |
| Th | 7/17 | Final exam (normal lecture time) | | Final paper due at final exam |

* It will be helpful to bring your book to lab for labs 3-6

** Also make sure to make note of your review project presentation date

Components of this Class:

Lectures:

Lectures are Monday thru Thursday 10-11:50 in Klamath 5. You should do the reading before coming to lecture. Your active participation in lectures will be required. Be sure to bring the lecture handouts in the course packet to lecture with you so that you can participate in small group discussion and activities. Lecture slides will be posted on the course website after class.

Lab Activities:

Labs are Monday and Wednesday afternoons from 1-2:50 also in Klamath 5. Lab handouts can be found in the course packet. The handouts will usually be due at the end of lab, but occasionally an alternate due date will be announced. Each lab will be graded on a 5 point scale. Late labs will not be accepted. Some labs cannot be made up because they involve additional materials and set-up. Modeling labs may be able to be made up during the office hours if arrangements are made PRIOR to your absence.

Issues Project:

The issues project is worth 20% of your grade, and consists of three parts: proposal (2%), outline (3%) and paper (15%). Detailed instructions and grading criteria for the issues project can be found in the course packet. Each of you will write a 4-5 page paper (typed and double spaced) on an issue related to cellular biology. By our definition, “an issue is a question on which informed people disagree.” One of the most challenging parts of the assignment may be identifying an issue. Your instructors will help to guide you in this process, but expect to spend some time working to identify an issue for your paper. The proposal and outline will give you opportunities to get valuable feedback before you submit your final paper.

Late work related to the issues project will be accepted up to one week late. A penalty of 3% per day (excluding weekends) will be deducted from your score. If you need to turn in portions of the assignment outside of class time use the Biology 211 box.

Review Project:

Each person will work in a group of 4 people to present a review activity during the lecture portion of the class at some point during the term. You will be assigned to a topic and group on the first day of class. Review activities will each focus on a different topic that is important to understanding basic cellular biology. Your group must use some creative content, material from outside the textbook, and/or method to engage the class in your presentation. This assignment is worth 5% of your grade.

Practice Problems:

Practice problems will be posted on the web. The questions are similar to the quiz and exam questions. The practice problems will give you a good idea of the content we expect you to focus on and the type of problem solving skills we expect you to use. We encourage you to come to our office hours to come work through the problems that you have difficulty solving.

Quizzes and Exams:

Quizzes and exams will primarily be short answer. Quizzes cannot be made up. Since the lowest quiz score is dropped, a missed quiz will result in the dropping of that score. Both the midterm and final are cumulative. If you anticipate a problem with the scheduled midterm or final exam times, alternate arrangements need to be made during the first week of the term. If you think there is an error in the grading of a question on a quiz or an exam, please put your concerns in writing and return with your original exam within one week.

Communication and conduct:

Please take advantage of the small class size this summer to maintain close contact with your instructors. Let us know how we can improve the class and help you to learn the material. If you are having difficulty in class due to a personal crisis, let us know as soon as possible so we can discuss the situation and potentially make some special arrangements. Academic dishonesty (cheating, plagiarizing, etc.) will be taken seriously and will result in a lower or failing final grade. Finally, please respect other students and your instructors. Remember, we want you to succeed in this class and to learn the course material. Hopefully you have the same goals.

Evaluation

| <i>Component</i> | <i>Percent of Grade</i> |
|------------------------------------|-------------------------|
| Laboratory activities (2% each) | 16% |
| Quizzes (best 3 out of 4; 4% each) | 12% |
| Midterm exam | 15% |
| Final exam | 32% |
| Issues paper proposal | 2% |
| Issues paper outline | 3% |
| Issues paper | 15% |
| Review project | 5% |

Readings

The text, *Biology* by Campbell, Reece and Mitchell, 7th edition, is being used for Bi 211 and 213 during summer session 2008. 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 specific pages that are assigned.

| Week | Lecture | Readings |
|------|---------|--|
| 1 | 1 | <ul style="list-style-type: none"> 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 3-8), classification (p 12-14), and science as a process (p 19-26). Ch 2-4: Review basic chemistry principles you learned in your chemistry courses. Pay particular attention to energy levels of electrons (p 36-39), chemical bonds (p39-45), water (p 47-48) carbon (p58-61). Ch 5: read the entire chapter on macromolecules. Focus on the following pages: 68-80, 86-88. Understand basic structures, subunits and function. Ch 26-32: don't read all of these chapters! Just skim over parts of this in order to answer questions about kingdoms for Lab #1. |
| | 2 | <ul style="list-style-type: none"> Ch 6: section on microscope (p 94-97) 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 102-111). Ch 7: cell membranes (p124-129, 137-138). |
| | 3 | <ul style="list-style-type: none"> 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) |
| | 4 | <p>Most students will have to carefully read Ch 9 on cellular respiration and Ch 10 on photosynthesis several times.</p> <ul style="list-style-type: none"> Ch 9: Read the entire chapters fairly quickly the first time to get the general ideas and vocabulary. Then read more carefully the specific pages that are listed. 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). |
| 2 | 5 | <ul style="list-style-type: none"> Ch 10: photosynthesis in nature (p 181-183), the light reactions and the Calvin cycle <i>an overview</i> (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 lecture and lab. |
| | 6 | <ul style="list-style-type: none"> Ch 16: (p 293-298) discusses some of the important work that leads to the discovery of DNA as the genetic material. Read all of this but focus more on Watson and Cricks work (p 296-298). Ch 16: DNA replication- focus on (p 299-301) Ch 12: Cell cycle (p 218-227), pay special attention to figure 12.5 and 12.6 |
| | 7 | <ul style="list-style-type: none"> Ch 12: regulation of the cell cycle and how it relates to cancer (p 228-233). Ch 19: the molecular biology of cancer (p 370-374). |
| | midterm | <ul style="list-style-type: none"> Review your notes and practice problems. |
| 3 | 8 | <ul style="list-style-type: none"> 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) discusses mutations; (p 331) shows a nice drawing summarizing protein synthesis. |
| | 9 | <ul style="list-style-type: none"> Ch 20: gene therapy is briefly discussed (p 403-404) |
| | 10 | <ul style="list-style-type: none"> Ch13: (p 238-243) gives an overview of the sexual life-cycle; (p 243-247) gives details of meiosis and compares this type of cell division with mitosis. Ch13: (p 247-248) discusses the three processes responsible for genetic recombination. |
| | 11 | <ul style="list-style-type: none"> Ch14: (p 251-258) cover some basic info regarding Mendelian inheritance for mono- and dihybrid crosses; (p 258-260) discusses some simple rules about probability that are useful for understanding Mendelian inheritance |
| 4 | 12 | <ul style="list-style-type: none"> Ch14: (p 265-268) discusses pedigrees and human traits. Ch15: (p 282-284) on sex chromosomes and sex-linkage; |
| | 13 | <ul style="list-style-type: none"> Ch 15: (p 285-288) on errors in meiosis, including Down syndrome. Ch14: (p 260-262) discusses incomplete dominance, codominance and multiple alleles |
| | 14 | <ul style="list-style-type: none"> Start reviewing your notes for the final |