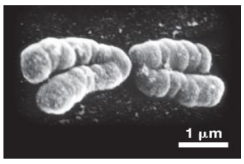


# Bi 211 General Biology I: Cells

**Information Sheet and Syllabus for Winter Quarter 2016**

**Instructors: Dr. Jana Prikryl and Dr. Peter Wetherwax**

## Student Learning Outcomes for BI 211 General Biology I: Cells

In this first course of the general biology sequence, we study biological processes from a molecular and cellular prospective. These concepts are central to understanding all other areas of biology. All organisms must accomplish two major functions: 1) extract energy from their environments to build and maintain their bodies, and 2) reproduce themselves. We start by studying the four types of biological macromolecules that build organismal bodies: carbohydrates, lipids (e.g., fats), proteins and nucleic acids (e.g., DNA). We then examine how cells obtain from the environment the building blocks for constructing these macromolecules and the energy for manipulating them to carry out body functions. Next we examine reproductive functions, beginning with the two types of cell division, mitosis and meiosis. From there we study genetics, how traits pass from parent to offspring, starting with the structure and replication of DNA followed by how genes code for proteins. Finally we look at the genetic basis of inheritance, including Mendelian genetics, pedigree analysis and the genetics of complex traits. Many of these topics are taught using a case-study approach, mostly using examples of genetic diseases in humans. BI 211 is a prerequisite for all the other general biology courses in the sequence (BI 212, BI 213, and BI 214).

The goals for BI 211 fall into two general categories: (1) to learn the foundational concepts related to cellular and molecular biology and (2) to develop skills in analytical thinking that will serve students in subsequent biology classes (and courses in other subjects) and scientific research experiences as they progress through their academic program.

**Concept-based goals:**

1. To describe the chemical structures and major functions of the four major types of large biological molecules that make up all living organisms.
2. To understand energy harvest pathways, including cellular respiration, fermentation and photosynthesis, and their relevance to human disease.
3. To describe and illustrate chromosomal and cellular events during the various stages of both mitosis and meiosis, with a focus on their roles in cancer and Down Syndrome.
4. To understand and describe the major processes involved in gene expression, including the mechanisms of protein synthesis, comprising transcription and translation, and how they are controlled to determine phenotype.
5. To understand the basis of transmission genetics and solve problems using Mendel's first and second laws; to analyze genetic pedigrees.

**Skill-based goals:**

1. To develop competency in the basic terminology and methodologies used in the biological sciences.
2. To learn the process of scientific inquiry and its applications.
3. To learn how to learn about biology.
4. To learn to communicate knowledge, ideas and reasoning clearly and effectively in oral and written forms.
5. To become familiar with the use of science relevant search engines, and learn to identify primary work and understand the merits of the peer review process; to develop the ability to think critically about information, evaluate the validity of arguments, and weigh the merits of disparate scientific conclusions.

## Course Prerequisites

Students taking 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 must have taken Ch111 or higher. If you are going to take only one chemistry course, we recommend that you take Ch111, Ch113 or Ch114 rather than Ch221 or Ch 224. A year of general chemistry (Ch221-223 or Ch224-226), with lab, is required for biology majors. **The prerequisites for Bi211-214 will be strictly enforced.**

## Course Format

***Lectures*** (Monday, Wednesday and Friday, 9:00-9:50 & 10:00-10:50 in 123 Pacific)

Attend the lecture for which you are registered. **Do the assigned readings before coming to class.** Some lectures will include activities that help you to actively engage with the material. These activities will often be done collaboratively with a small group of students discussing the problem together for a few minutes before discussing it as a whole class. Your active participation will help you to understand the material and better prepare you for exams.

One of the most effective ways to master the material for this class is to engage in conversations with other students, faculty, and staff. You will have the opportunity to do this through group-work, office hours, and problem solving sessions. In addition you might find it very helpful to form study groups with your peers in which you discuss class content and work through problems together.

***Labs*** (Wednesdays and Thursdays in 111 & 129 Huestis)

The lab session is a small group of students that meets once a week. In lab, 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 mechanisms of inheritance. You can attend only 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*** (most Mondays at 1PM with Dr. Prikryl and 2PM with Dr. Wetherwax; see Course Schedule for dates and location)

The single biggest difficulty students have in general biology is solving the kinds of problems presented in problem sets and exams. These are similar to the kinds of questions that biologists ask; they generally can't be solved by memorization of facts, but instead require the application of facts to novel situations. In problem solving sessions, we will go over practice problem sets and discuss ways to approach the problems. Graded problem sets will not be solved in these sessions. Attendance is not required, but we strongly suggest that you attend them on a regular basis. In addition, many students find it helpful or essential to regularly attend GTF office hours or visit tutoring sessions of a Biology Tutors for Undergraduates (BTU) to better understand the course material.

***GTF Office Hours and BTU Tutor Sessions*** Times will posted on *Canvas* during week 1.

### *Problem Sets*

***Practice Problem Sets*** Practice problem sets will be made available on *Canvas*. While you are not required to turn these in, you are strongly encouraged to work on the practice problems. A good learning strategy is to work on a problem set by yourself for a while to answer or at least try to answer every question, and then compare your solutions with those of a friend who is in the class. Work through the logic of the problems together, particularly problems for with you have different answers. In addition, you can get help understanding how to solve these problems in the staff office hours, tutoring sessions, and problem solving sessions. Practice problems are very similar to the types of questions you will see on the exams; in fact, most practice problems are from previous exams. Practice problems are designed to help you master the material needed to successfully solve the graded problem sets.

***Graded Problem Sets*** The course will have six graded problem sets posted on *Canvas* from Tuesday 5 p.m. until Thursday 5 p.m. You will submit your answers to these graded questions on *Canvas*. **No late problem sets will be accepted.** Solutions to each problem set will be posted on *Canvas* soon after each due date by looking at your score on the grades page of *Canvas*. In sharp contrast to the practice problems, you must do your own work on these graded questions. Copied work will be treated as academic dishonesty (see *Professional conduct* below)

***Laboratory Activities*** Lab handout reports will usually be turned in at the end of each lab period. Each lab will be graded on a 5-point scale. For some labs, part of the grade will be based on your active engagement in the lab. Most labs cannot be made up because they involve materials specially prepared and available for the lab periods. **Late lab reports will not be accepted.**

***Issues Project*** Each of you will work on an issue related to cellular or genetic 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, consists of two parts: A proposal (3%), and a paper (15%). Late work on both parts will be accepted but with a deduction of 3% for each day (including 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 and on a different topic.**

***iClickers (Personal Response Systems)*** **i**Clickers will be used in almost every class to encourage active participation and to provide feedback to instructors and students. In fact, many days will begin with a couple clicker questions. Each student should purchase a clicker for use in this class before the first day of classes. You must register your clicker on the course *Canvas* 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 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 the correct answer, 2 points for an incorrect answer. Total percent for the clicker portion of your grade will be based on 85% of the total possible iClicker points: your clicker grade = (total points earned)/(85% of total points possible). iClicker problems ask students to grapple in real time with the material under discussion. Furthermore, they provide an opportunity to exercise the principle that the speaker is the one doing the learning because first, when you answer the iClicker problem you are 'speaking', and second, you will have to verbally argue your answer to either the class or to a student who selected a different solution than yours.

***Exams:*** This course has three exams: two 50-minute, in-class midterms and a 2-hour 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 problem sets. 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 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 scheduled for **Monday 3/14 from 5-7 p.m.** This is a combined final exam for both sections of 211. **No early or late exams will be given.** Note the dates of the final and other exams and don't plan to be gone on these days. We will calculate your final course grade two ways and assign you the better grade. Version A gives more weight to the two midterms. Version B gives more weight to the final exam. See the Evaluation table for details.

***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. 1) Refer to the exam key available on *Canvas* to compare your answer to the key. 2) If you still wish to have a midterm exam answer regraded, you must submit to your lab GTF a written statement within one week of the return of the exam. 3) You must submit also 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.

## Evaluation

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

***Learning Environment*** 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 the Accessible Education Center in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu. If you have a documented disability and anticipate needing accommodations in this course, please talk to your instructors during the first week of class. Please request that the Counselor for Students with Disabilities send a letter verifying your situation.

***Professional conduct*** Please arrive to lab and lecture on time and stay until class is over. Late arrivals and early departures make unnecessary noise and disruption that distracts your classmates.

Please do not chat during lectures except when asked to discuss problems with other students. This is disruptive to those around you and inhibits their chance to learn; it's not fair to your classmates. Likewise, using your cell phone, tablet, or computer to check email, Facebook, surf the web etc. is disruptive to those around you. Extraneous images on computer screens can be a great distraction for those behind you and simply is not fair to them.

Cheating devalues the reputation of our institution, its faculty, its students, and the significance and value of your academic degree. Academic misconduct is particularly unfair for students who do their work with integrity and honor. The University Student Conduct Code (https://uodos.uoregon.edu/StudentConductandCommunityStandards/AcademicMisconduct.aspx) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. For 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. If you have any question about whether an act constitutes academic misconduct, it is your 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 http://library.uoregon.edu/guides/plagiarism/students/index.html

We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty can include 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. Don't hesitate to call the campus crisis center (541 346-3227) if you or a friend need assistance. 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.

We support Title IX and have a duty to report relevant information. The UO is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. Any UO employee who becomes aware that such behavior is occurring has a duty to report that information to their supervisor or the Office of Affirmative Action and Equal Opportunity. The University Health Center and University Counseling and Testing Center can provide assistance and have a greater ability to work confidentially with students.

## Schedule

| Week | Date | Lectures, Exams and Problem Sets | Lab/Discussion |
|---|---|---|---|
| 1 | 1/4<br>1/6<br>1/8 | L1: Macromolecules: carbohydrates (case: Gaucher disease)<br>L2: Macromolecules: lipids and proteins (case: Gaucher)<br>L3: Macromolecules: proteins and nucleic acids (case: Gaucher) | Lab 1: Discovering Molecules |
| 2 | 1/11<br><br>1/13<br>1/14<br>1/15 | L4: Cell Structure & Function (case: Gaucher disease)<br>*Problem solving session in 111 Huestis Monday at 1 and 2*<br>L5: Cell Structure & Function (case: Gaucher disease)<br>**Problem Set #1 due by 5PM Thursday**<br>L6: Energy, ATP and Enzymes | Lab 2: Discovering Cells |
| 3 | 1/18<br>1/20<br>1/22 | *No Class: Martin Luther King Day*<br>L7: Harvesting Chemical Energy (case: Kristine)<br>L8: Harvesting Chemical Energy | Lab 3: Finding References for Project |
| 4 | 1/25<br><br>1/27<br>1/28<br>1/29 | L9: Harvesting Chemical Energy<br>*Problem solving session in 111 Huestis Monday at 1 and 2*<br>L10: Photosynthesis<br>**Problem Set #2 due by 5PM Thursday**<br>L11: Photosynthesis | Lab 4: Modeling Cellular Respiration<br>***Issues paper proposal due** |
| 5 | 2/1<br>2/3<br>2/5 | **Midterm Exam on lectures 1-9 and labs 1-3**<br>L12: DNA Structure<br>L13: DNA Replication and Cell Cycle | Lab 5: Modeling Photosynthesis |
| 6 | 2/8<br><br>2/10<br>2/11<br>2/12 | L14: Cell Cycle: mitosis<br>*Problem solving session in 111 Huestis Monday at 1 and 2*<br>L15: Cell Cycle: cancer (case: HER2 gene)<br>**Problem Set #3 due by 5PM Thursday**<br>L16: Protein Synthesis (case: cystic fibrosis) | Lab 6: Cell Cycle/Intro to *Drosophila* genetics |
| 7 | 2/15<br><br>2/17<br>2/18<br>2/19 | L17: Protein Synthesis (case: cystic fibrosis)<br>*Problem solving session in 111 Huestis Monday at 1 and 2*<br>L18: Protein Synthesis (case: cystic fibrosis)<br>**Problem Set #4 due by 5PM Thursday**<br>L19: Meiosis & Sexual Life Cycle (case: Down syndrome) | Lab 7: Protein Synthesis: Analyzing the Human Beta-Globin Gene Sequence |
| 8 | 2/22<br>2/24<br>2/26 | **Midterm Exam on lectures 10-18 and labs 4-7**<br>L20: Meiosis & Transmission Genetics<br>L21: Genetics: Mendel's Laws | Lab 8: Modeling Meiosis and *Drosophila* Genetics<br>***Initial paper due in lab** |
| 9 | 2/29<br><br>3/2<br>3/3<br>3/4 | L22: Genetics: Recombination and Gene Mapping<br>*Problem solving session in 111 Huestis Monday at 1 and 2*<br>L23: Genetic Basis of Sex (case: Maria)<br>**Problem Set #5 due by 5PM Thursday**<br>L24: Sex-linked Traits and Pedigrees | Lab 9: Modeling Simple Genetic Traits<br>***Final paper due in lab** |
| 10 | 3/7<br><br>3/9<br>3/10<br>3/11 | L25: Incomplete Dominance, Codominance and Multiple Alleles<br>*Problem solving session in 111 Huestis Monday at 1 and 2*<br>L26: Complex Traits (case: BRCA genes)<br>**Problem Set #6 due by 5PM Thursday**<br>L27: Wrap-up (case: Leber disease) | Lab 10: Modeling Complex Genetic Traits |
| final | 3/14 | **Final Exam (combined) on entire course, Monday 5-7PM** | Issues paper returned at final exam |

| 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.<br>• Ch 5: read the entire chapter on carbohydrates<br>• 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<br>• 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 domains and Lab #1<br>• 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.<br>• Ch 6: read about cell membranes and membrane proteins on pgs. 92-94 |
| **5 & 6** | • Ch 2: read pgs. 27-33 to focus on chemical reactions and energy<br>• Ch 3: read pgs. 51-56 to focus on enzymes, effects of temperature and pH on enzymes<br>• Ch 9: read pgs. 149-152 for basic understanding of ATP and redox reactions |
| **7, 8 & 9** | • 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. |
| **10 & 11** | • 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.<br>• The Big Picture: pgs. 192-193 provides a nice overview of energy concepts |
| **12** | • Ch 4: read pgs. 62-66 on DNA structure and function |
| **13, 14 & 15** | • 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<br>• Ch 14: read pgs. 258-263; focus carefully on pgs. 263-268 (DNA synthesis); read pgs. 271-274 (correcting mistakes in DNA synthesis) |
| **16, 17 & 18** | • Ch 15: read pgs. 277-285 for an introduction to genes, the central dogma, and the genetic code; pgs. 285-286 discuss mutations<br>• Ch 16: read the entire chapter for the details of protein synthesis<br>• Ch 4: read pgs. 66-68 for RNA structure and function |
| **19 & 20** | • Ch 12: read pgs. 211-223 for details of meiosis; pgs. 225-227 discuss mistakes in meiosis |
| **21 & 22** | • 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 |
| **23** | • Ch 13: read pgs. 239-241; 243-245 and Box 13.1 on pg. 246 |
| **24 & 25** | • Ch 13: read pgs. 241-242 to focus on sex chromosomes and sex-linked inheritance; pgs. 250-252 discuss human genetics and pedigrees |
| **26 & 27** | • Ch 13: read pgs. 245-247 to focus on incomplete dominance, codominance and multiple alleles |

| Lectures | Readings (Freeman 5th 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. 6-9), and science as a process (p. 9 -14). It is highly recommended that you review basic chemistry principles in Ch 2.<br>• Ch 5: read the entire chapter on carbohydrates<br>• Ch 6: focus on pgs. 84-90 (types, structure of lipids); skim pgs. 91-93 to review diffusion and osmosis |
| **2** | • Ch 3: read the entire chapter on protein structure and function<br>• Ch 4: read pgs. 57-64 for an introduction to nucleic acid structure and function |
| **3 & 4** | • Ch 29-33: skim over the chapters to answer questions about domains and Lab #1<br>• Ch 7: read the entire chapter on cells; focus on characteristics of prokaryote and eukaryote cells (p. 107-110) and organelles (p. 110-127); skim the remainder of the chapter to gain a deeper understanding of cell dynamics<br>• Ch 6: read about cell membranes on pgs. 88-90 |
| **5 & 6** | • Ch 8: read pgs. 137-144 to focus on chemical reactions and energy; for a basic understanding of ATP and redox reactions; read pgs. 144-150 to focus on enzymes, effects of temperature and pH on enzymes |
| **7, 8 & 9** | • 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. 155-158 provide a nice overview of cellular respiration, pgs. 158-172 provide more detail of the processes of cellular respiration, and pgs. 172-173 discuss fermentation. |
| **10 & 11** | • 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. 176-184 provide a nice overview of photosynthesis, pgs. 184-190 (light reactions) and pgs. 190-192 (Calvin Cycle) cover the details of photosynthesis.<br>• The Big Picture: pgs. 198-199 provides a nice overview of energy concepts |
| **12** | • Ch 4: read pgs. 58-65 on DNA structure and function |
| **13, 14 & 15** | • Ch 12: read pgs. 219-223 for an introduction to the cell cycle; pgs. 223-228 for details of mitosis; pgs 229-232 for control of the cell cycle; pgs. 232-234 for cancer and the cell cycle<br>• Ch 15: read pgs. 284-301; focus on pgs. 289-295 (DNA synthesis) |
| **16, 17 & 18** | • Ch 16: read pgs. 304-312 for an introduction to genes, the central dogma, and the genetic code; pgs. 313-315 discuss mutations<br>• Ch 17: read the entire chapter for the details of protein synthesis<br>• Ch 4: read pgs. 65-68 for RNA structure and function |
| **19 & 20** | • Ch 13: read pgs. 237-246 for details of meiosis; pgs. 249-251 discuss mistakes in meiosis |
| **21 & 22** | • Ch 14: read pgs. 256-267; pgs. 261-263 discuss Mendel's 1st Law; pgs. 263-266 discuss Mendel's 2nd Law; B8 discusses some simple rules of probability that are useful for understanding Mendelian genetics |
| **23** | • Ch 14: read pgs. 269-271; read Quantitative Methods 14.1 on pg. 274 for creating genetic maps |
| **24 & 25** | • Ch 14: read pgs. 267-269 to focus on sex chromosomes and sex-linked inheritance; pgs. 277-279 discuss pedigrees |
| **26 & 27** | • Ch 14: read pgs. 271-272 to focus on incomplete dominance, codominance and multiple alleles |

# How to Succeed in General Biology without Really Trying
**(just kidding: you probably can only succeed by working hard)**

Students often ask us how to do better in the class, especially on the exams. Usually we get these questions right before the final, when it really is too late to learn all of the material that we cover in 10 weeks. Below is a checklist of things you should be doing if you want to learn the material in general biology. There is no easy, magic way to learn this material. It requires constant attention throughout the quarter.

## Check List

- ☐ Did I actively participate in every lecture?
  We *think that the lectures are important for learning the material in this course. Just reading the lecture slides does not substitute for attending lectures. If you don't come to lecture, you shouldn't expect to do well in the course. But simply attending the lectures isn't enough. You need to be an active participant. By active, we mean that your mind needs to be actively working with the information as it is presented. If you are confused or have a question, please raise your hand. Most students find it useful to write notes to help to keep their minds on the material, but you shouldn't try to write so much that you aren't even able to think about the material. Remember, all of the slides shown on the screen are posted on* Canvas *so you don't need to write down everything that is on the slide.*

- ☐ Did I read the lecture slides on the day of **every** lecture and then compare those notes with my own notes and the readings?
  *You should understand everything that we put on the slides. If the slide is a figure from your text, then you should look up that figure and read the material about that figure to make sure you understand it completely. If you have a question then you should come to one of the office hours or peer tutor sessions. Waiting until right before the exams to look at these lecture notes is no substitute for looking over the notes right after hearing the lecture.*

- ☐ Did I do all of the practice problems as the material was presented in lecture? After doing the problems did I attend help sessions to see how I did?
  *The practice problems that are posted on the course site mostly come from previous exams. They give you a good idea of your understanding of the material. They also help you to become more comfortable with solving these kinds of questions so you can perform better on the exams. Solving the problems on your own is probably the singly most important thing you should do (besides coming to class) in order to be successful in this course. The problems are often not simply asking you to repeat facts that you have learned. They often ask you to apply the concepts to novel situations. That is what scientists do and we want you to do science in this course. Just like you can't learn how to play a guitar by simply reading about it, you can't learn to do science (e.g., solve problems) without practicing doing science (i.e. practicing solving problems). If you just get the answers from a classmate or staff person at help sessions without trying to solve them yourself, then you aren't practicing.*

- ☐ Did I read all of the assigned readings in an active manner?
  *The textbook can be dry at times, but it presents the material in a very clear and concise manner. Much of the material cannot be understood by reading it once. You should be active as you read the material: take notes, underline key points, redraw important figures on your own. It's amazing how*

*many evaluations we get from students that say "I had trouble doing well in this class/" and also say "I hardly read the text at all." It is true that most of the material on the exams has been covered in the lectures. But most people need to study this material in several ways: listening in lectures, working on the concepts in labs AND reading about it.*

- ☐ Did I actively participate in all of the labs?
  *The labs have been designed to help you learn the concepts in this course. It is very easy to just go through the motions in lab and get full credit for the labs BUT then you are wasting your time and not taking advantage of a very powerful way to learn complex material: modeling. We have carefully designed the labs so that you work with the concepts in a very active way. It is basically the same concepts that you hear in lectures, and read about in the text, but most of us need to work with the material in a number of different forms. For many students, nothing works as well as modeling.*

- ☐ Did I visit the GTFs, BULAs (Biology Undergraduate Lab Assistants) and faculty during their office hours, tutoring sessions and/or problem solving sessions?
  *We don't charge for this service. ☺ You really should take advantage of the many hours we offer every week and get individual attention.*

- ☐ Did I compare my answers to the exam solutions and work on the material I missed?
  *If you didn't get it the first time, make sure you don't miss the problems on the .same concepts in subsequent exams. We've even been known to repeat similar questions that students missed on earlier exams.*

- ☐ Did I retake exam questions and resolve problem sets prior to the midterm and final?
  *Even though you've already seen the solutions, it still is a good idea to download the unsolved problems and exam questions and work on solving them again when studying for the midterms and final.*

- ☐ Did I try to make connections with the material to things I hear about and read about outside of class?
  *The best students try to see the connections in other courses and parts of their lives. They are thinking about and processing the information even when they aren't specifically working on readings or problem sets for the course. We love to hear about connections you are discovering outside of the assignments.*

**January (1)**

| | | | | |
|---|---|---|---|---|
| 4<br>First day of class<br>(PAC 123) | 5 | 6 | 7 | 8 |
| | | Labs start week 1 (HUE 111 & 129) | | |
| 11 | 12 | 13 | 14<br>PS 1 due at 5pm | 15 |
| 18 | 19 | 20 | 21 | 22 |
| 25 | 26 | 27 | 28<br>PS 2 due at 5pm | 29 |
| | | Issues paper proposal due in lab | | |

**February (2)**

| | | | | |
|---|---|---|---|---|
| 1<br>Exam 1 in lecture | 2 | 3 | 4 | 5 |
| 8 | 9 | 10 | 11<br>PS 3 due at 5pm | 12 |
| 15 | 16 | 17 | 18<br>PS 4 due at 5pm | 19 |
| 22<br>Exam 2 in lecture | 23 | 24 | 25 | 26 |
| | | Initial paper due in lab | | |

**March (3)**

| | | | | |
|---|---|---|---|---|
| 29 | 1 | 2 | 3<br>PS 5 due at 5pm | 4 |
| | | Final paper due in lab | | |
| 7 | 8 | 9 | 10<br>PS 6 due at 5pm | 11 |
| 14 Final @ 5pm<br>Location TBD | | | | |