Principles of Biology (Biol 101): Fall 2014
Dr. Kelly Hogan
MWF 9:00 – 9:50 AM (Section 1); GSB 100

Instructor: Dr. Kelly Hogan
leek@email.unc.edu
Office phone: 843-6047

*Office Hours (Wilson Hall 104B): Mondays 3-5 PM and Wednesdays: 10-11
*See Sakai “Sign up” to let me know you are coming. (Walk-ins welcome to try too.)

SUPPLEMENTAL INSTRUCTION TAs: Sarah McShane (smcshane@live.unc.edu)
Tony Boutelle (boutelle@live.unc.edu)

*SI times/locations: TBA (see Sakai for information)

Biology 101 is an introduction to biology at the college level that is intended to serve both majors and non-majors. It is assumed that students in this class do not have a great deal of practice with biology and that any prior experience is likely to be several years ago. Biol 101 students are expected to take a very active role in their learning by completing readings and homework before and after class and coming to class ready to participate directly with peers and through in-class technology. In this highly structured course, we have evidence that every student can achieve if they are motivated to be an active learner!

REQUIRED TEXT AND REQUIRED ONLINE MASTERING BIOLOGY ACCESS:
Feel free to choose a physical book or the ebook. **Required access to Mastering Biology, the online activity and homework tool. Mastering comes included with a NEW physical textbook or ebook. If you have a used physical book, you can buy the Mastering Biology with ebook access card at the bookstore. Why this extra tool? Students in previous semesters evaluated it with high marks and felt it kept them on schedule with their learning.

Required reading: Particular chapters are required (see “Guided Reading Questions (GRQs)” for specific details). You will be expected to read and answer the GRQs BEFORE completing Mastering Biology homework assignments. Note: there are books on reserve at the Undergraduate Library.

HOMEWORK VIA MASTERING BIOLOGY (MB): (10% of your grade) Homeworks will be due every Sunday and Thursday night by 11:55 PM. Some assignments will take you as little as 20 minutes and others will take over an hour with the animations and short tutorials interspersed in the homework. It is your responsibility to start it in a timely fashion, so that you finish it by 11:55 PM. To be safe, assume your clock is 5 minutes slower than the official Mastering Biology time. Late homeworks will receive zero credit, even though you can still do them for practice. Do not count on the Mastering program to give an accurate account of how long an assignment will take. These estimates can be wildly off! There will be numerous graded at-home assignments. See my Goal #1 below and realize that I am trying to help you succeed by giving you these regular assessments. Assignments post about one week before they are due. Note: These questions are often lower level and not equivalent to exam questions. They are meant to help you learn/practice. See Sakai for how to register; the course code is: MBHOGAN60123

QUIZZES VIA MASTERING BIOLOGY (8% of your final grade): You will be required to do online timed quizzes in Mastering Biology (MB Quizzes). These are meant to give you practice for answering questions in a timed situation, more predictive of how you might do on an exam than a typical HW. These will be administered via Mastering Biology. Missed quizzes = 0%.
SAKAI SITE (you will need your onyen to log on)
This site will have postings from my lectures such as outlines, power point slides, old exams, and supplemental material I mention in lecture. I will also post announcements/send emails regarding student concerns on this site. It is your responsibility to check it and your UNC email account regularly.

PARTICIPATION: 7% of your final grade. Most of this 7% will come from Learning Catalytics, but completion of surveys will also be a part of this grade.

Learning Catalytics (LC): Are you required to come to class? Are you required to pay attention? Are you required to discuss biology with your classmates during class? Nope, I cannot make you do any this. This is your education and you want to be a successful UNC student. I enjoy Facebook too, but please put it away and participate in your education! As an incentive, 7% of your grade will come from a program called Learning Catalytics (accessed through Mastering Biology) that you use through your laptop or smartphone/tablet. (The smaller the device the easier it will be for you to maneuver on your very small in-class desk. Note: you must have your device connected to UNC-Wifi—be sure to do this for any devices you might use in class before the first day: http://help.unc.edu/help/connecting-to-the-unc-network-getting-started/ Please do not email me to tell me you were absent, we will have so many opportunities for participation that missing one or two days in the semester will not affect your grade. Don’t forget to review these questions/answers when studying!

SUPPLEMENTAL INSTRUCTION (SI): Your SI sessions will be offered 3-4 times a week. Each session will be scheduled for 1 hour. The times and location of these sessions will be posted on Sakai in the second week of class (rooms cannot be permanently scheduled until two weeks into the semester). You are not required to attend SI, but it is highly recommended, since this is your opportunity to get more “one-on-one” attention for this course. Plus, we have data that suggests students that attend score on average half a grade better than peers who don’t attend. I suggest you fit one into your schedule early in the semester and attend weekly as if it is a required class. Your SI instructors’ contact information is listed above.

WHAT YOU SHOULD BRING TO CLASS EVERY DAY:
1. Outlines from Sakai (either printed or on laptop). Note: educational research shows that students learn more by handwriting notes, despite how convenient we all feel a laptop is!
2. Extra blank paper for drawings, notes, activities etc. (or tablet computer for drawing)
3. 3 x 5 index cards to turn in to me during activities (with or without lines, preferably white).
4. A smart-device: either your laptop/ipad/smartphone enabled for UNC wi-fi access (don’t rely on cellular service)

STUDENT CONCERNS: Many students like to complain that Biol 101 is a “weed out” course. Of course this is not true, but why does it have this reputation? Fact: the average grade in this class is in the C+ range; C+ is not bad--it is average. Yet, many students also earn D’s and F’s in this class. This is absolutely shocking to first year students who have, in the past, received A’s in their high school classes. You are wondering…is there a pre-determined number of students that receive a C, D, or F? Nope. See below to see what grade you need to earn. In theory, if the whole class earns A’s, then the whole class is given A’s. So why don’t all students do as well as they think they will when they walk into class on the first day? My experience tells me that:

1) Some students do not have the active learning and studying skills that they should already have at the college level (It often takes these students an exam or two for them to recognize this.) We can fix this together.
2) Some students do not actually put in the effort that is necessary (even though they may think they are putting in a big effort). You can fix this if you are honest with yourself.
And, this brings me to the goals of my course…

1. This course should prepare you to succeed in future science courses. You should learn how to be an active learner in the lecture hall and you should learn how to actively study. Educational research has shown that students in this course who do reading/homeworks before class, actively participate in class, and review notes regularly can and will succeed. Feeling unprepared because of your background? The course is designed to equalize your readiness before class—while you may take several hours reading and preparing, another student may need less time. Yet when you get to class, your effort will pay off as we practice these concepts together and you gain confidence in your ability! How do you know you are learning? When you make mistakes and identify what you don’t know. Making mistakes is KEY to learning. It makes more sense to make mistakes on homeworks and in-class when the stakes are very low, rather than on an exam, right?

And what if you don’t plan to take any more science classes? Active learning and studying are skills needed for any discipline. You can achieve these goals through practice. Most students enter college very skilled at remembering and understanding (Regurgitating memorized information.) True learning will take place, when you are challenged to apply, analyze, evaluate, and synthesize. I will challenge you to do this. You might find this difficult and uncomfortable, but you will be learning!

2. This course should provide you with the basic language and common themes within the field of biology. For those of you continuing in biology, this is just the tip of the iceberg. For others, this might be your one and only biology course! Our goal will be to touch upon many topics, finding common themes in the chapters we cover, such as how the theory of evolution applies to chapters not specifically about evolution. Thoroughly learning the principles is about making connections between material learned at the beginning, middle, and end of the semester! Practice is key to building a foundation of knowledge (and that is why you do Guided Reading notes, Mastering Biology, in-class activities, quizzes, SI, etc.).

Specifically, by the end of the semester you should be able to:

• Evaluate a scientific study and determine if its design is sound.
• Describe the properties of life.
• Describe the new properties that emerge at each level of hierarchy of life (from small organic molecules through ecosystems and some ways these systems are kept in balance (homeostasis)).
• Explain what “food” is and compare and contrast animals and plants in how they obtain and transform the matter and energy.
• Describe the flow of genetic information: how genes relate to proteins and how genetic information is copied and inherited.
• Explain how life on earth evolved and how adaptations relate to survival, reproduction, and intra- and inter-specific interactions.
• Detail examples of adaptations in the animal body in which “structure fits function” at the cellular and whole body level.

3. This course should excite you about biology. Throughout the semester I hope you will ask yourself and me, why is this relevant to me? Some lessons will be more obvious as they relate to health and medicine. I hope that the biology that we learn this semester will cause you to ask more questions. You might even leave with more questions than answers! I’ll continually encourage you to read about biological issues and advances in the popular media. If I succeed in getting you to read some articles on your own, I will be a happy professor!
**EXAMS (75% of final grade):** There will be three exams given during the regular semester and a final exam. The format will be multiple choice, so bring two #2 pencils to the exam. Only the final exam is cumulative. Each semester exam will only cover the material specified on the course schedule. For all exams, you will need your PID number as identification on your exam sheet. Additionally, you may be asked to verify your identity, so it is required that you bring your one-card to each exam. Failure to produce a One-Card if asked may result in a zero on that exam. Test material to study: GRQs, class outlines, Learning Catalytics questions (log in and review), and Power Point slides. Therefore, to succeed in this class, it behooves you to take each reading/homework seriously and actively engage in all class discussions. Also, see the last page of this syllabus.

**NO MAKE-UP EXAMS! NO EXAMS GIVEN EARLY!**
(Your grade will be adjusted based on how many exams you take (see below how grade is determined)

**HOW IS YOUR GRADE DETERMINED?** *(Note: there will be no changes to HOW your final average is calculated at the end of the semester...so please don’t ask!)* Your final average is calculated:

If you take all three semester examinations:

- The lowest examination grade is dropped and the total for the semester =
  
  \[
  (0.25 \times \text{exam}) + (0.25 \times \text{exam}) + (0.25 \times \text{final exam}) + (0.10 \times \text{homework average}) + (0.07 \times \text{participation score}) + (0.08 \times \text{quiz score})
  \]

If you take any two semester examinations:

- Both the exams you took will count and the total for the semester =
  
  \[
  (0.25 \times \text{exam}) + (0.25 \times \text{exam}) + (0.25 \times \text{final exam}) + (0.10 \times \text{homework average}) + (0.07 \times \text{participation score}) + (0.08 \times \text{quiz score})
  \]

If you take one semester examination: *(This rarely results in a passing grade, you must contact me to have permission to take the final exam.)*

- The total for the semester =
  
  \[
  (0.25 \times \text{exam}) + (0.50 \times \text{final exam}) + (0.10 \times \text{homework average}) + (0.07 \times \text{participation score}) + (0.08 \times \text{quiz score})
  \]

**Here are the guidelines as to how I will convert your average to a letter grade:**

- A = or greater than: 93
- A- = or greater than: 90
- B+ = or greater than: 86
- B = or greater than: 83
- B- = or greater than: 79
- C+ = or greater than: 74
- C = or greater than: 69
- C- = or greater than: 60
- D = or greater than: 55
- F is less than: 55

**DIGITAL ETIQUETTE**

This course will require you to use your laptop and/or cell phone during class time. While I recognize that you are an excellent multi-tasker, research suggest that your peers are not. Please be respectful of your classmates and restrict your use of digital devices to course content. If we see that you or your peers are distracted, we will ask you to put your devices away and you may forfeit your ability to earn participation points that day. There will be times when you have completed your work or answered a poll question, but your peers have not. We ask that you assist your peers when appropriate or use the time to review your notes while you wait. I understand that your devices connect you to your friends and family (a wonderful thing!) but the classroom should be a place apart, however briefly (even if it seems like an eternity to you), from the outside world and distractions. You will learn more if you concentrate on the course while you are here and your classmates will thank you for not impeding their ability to learn.
Course Schedule/Topics for Discussion

For each assignment, you have a “Guided Reading Assignment” with the same title that you should do before doing Mastering Homework. (See your GRQs for the reading assignments). The idea is that Mastering will reinforce what you have independently learned from the reading. If you simply hunt and peck through the text to find the answers without doing the reading, you are missing a large chunk of information I expect you to be familiar with. You are ultimately responsible for information in “Guided Reading” as if these are lectures. Not doing these = missing at least a third or one-half of the course content. Due dates are subject to change (such as with weather) but it is VERY unlikely exam dates would ever change. 

Homework assignments are shown in red. Late homework assignments = 0%

CLASS MEETING SCHEDULE and ASSIGNMENTS

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Objectives</th>
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</thead>
<tbody>
<tr>
<td>W 8/20</td>
<td>Introduction and Pre-test</td>
<td>Describe course components and make introductions. (Bring a #2 pencil and scantron—purchase at student stores)</td>
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<tr>
<td></td>
<td></td>
<td>Due Thursday 8/21 by 11:55 PM: Guided Reading Qs (GRQs) + Two Mastering assignments: 1) Introduction to Mastering and 2) Exploring Life and the Process of Science</td>
</tr>
<tr>
<td>F 8/22</td>
<td>The process of Science</td>
<td>Distinguish science from unjustified claims and explain how science is iterative. Describe elements of research design and how they impact scientific findings/conclusions (e.g. identify strengths and weaknesses in research related to bias, sample size, randomization, experimental control) Formulate a testable hypothesis and design a controlled experiment.</td>
</tr>
</tbody>
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|        |                              | *Don’t forget to bring your Class Outlines

--UNIT 1 CELL BIOLOGY--

Due Sunday 8/24 (by 11:55 PM): GRQs + Macromolecules (on Mastering)

<table>
<thead>
<tr>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>M 8/25</td>
<td>Macromolecules</td>
<td>Classify polysaccharides based on their structure/function in plants and animals and describe how monomers join to form them. Define lipids and explain their functions and properties in polar or non-polar solvents. Draw protein structure and depict the consequence of mutations on normal structure and function. Explain the molecular forces that hold protein structure together and how they can be disrupted.</td>
</tr>
<tr>
<td>W 8/27</td>
<td>Macromolecules</td>
<td>Identify how the human body uses macromolecules from food. Identify macromolecules in food labels and make calculations about these macromolecules relative to the label. Explain the effects of varying the amounts of the different macromolecules in your diet (such as saturated fats, proteins, simple/complex carbohydrates).</td>
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|        |                        | Due Thursday 8/28: GRQs + A tour of the Cell (on Mastering)
| F 8/29 | A Tour of the cell     | Predict structures of the prokaryotic cell that would be antibiotic targets. Describe how a protein is synthesized and exported from a cell how disease can be caused when this process goes awry. Explain how insulin-producing cells are like dysfunctional factories when a person is diabetic. |
Due Sunday 8/31 HW: **MB Quiz 1 (timed)** and then **GRQS + Structure and Function of Membranes**

M 9/1 NO CLASS

**T 9/2**

FYS drop date (Drop deadline for first year UGs to drop)

W 9/3 Cell cont. & Membranes

Interpret experiments about protein production and make conclusions about why protein production is impaired in cystic fibrosis.

Categorize molecules that cross membranes freely and those that do not.

Discriminate between passive transport, active transport, and bulk transport of molecules across a membrane.

**Due Thursday 9/4: GRQs+ Cell signaling via hormones**

F 9/5 Membranes & Hormones

Predict how water will move via osmosis and explain why this is critical to your cells.

Describe how the two types of chemical signaling mechanisms affecting target cells differently.

Apply the two mechanisms of chemical signaling to insulin signaling and sex hormone signaling.

**Sunday 9/7 HW: GRQs+ 1) Energy and Enzymes 2) Cellular Respiration**

M 9/8 Hormones & Energy /Enzymes

Apply the two mechanisms of chemical signaling to insulin signaling and sex hormone signaling.

Explain the importance of enzymes in metabolism and how they are inhibited.

Explain how ATP does work.

W 9/10 Cellular Respiration

Diagram the major stages of aerobic respiration, noting the location in the cell and the inputs and outputs of each stage.

Explain how coenzymes are reduced during respiration and how this contributes to ATP formation.

**Due Thursday 9/11: MB Quiz 2 (timed)**

F 9/12 Cellular Respiration

Explain how a H+ gradient and oxygen are both necessary for oxidative phosphorylation.

Describe anaerobic respiration pathways and differentiate them from aerobic pathways.

**Due Sunday 9/14 HW: GRQs +Photosynthesis**

M 9/15 Photosynthesis

Describe the two parts of photosynthesis and the inputs and outputs of both parts.

Explain what kind of sunlight is used by the plant and why sunlight is necessary.

Explain photophosphorylation in the light reactions of photosynthesis, and describe how photophosphorylation is similar and different from the oxidative phosphorylation in aerobic respiration.

Explain how trees are carbon sinks.

Describe where the mass of a tree comes from and explain how the “mass” is made.

**W 9/17 EXAM 1 All material from Unit 1**

---UNIT 2 GENETICS---

**Due Thursday 9/18: GRQs + Cell division, Development, and cancer**

F 9/19 Cell division, Dev. & Cancer

Recognize/draw the stages of mitosis, contrasting animal and plant cells and explain the consequences of specific stages of mitosis failing.

Describe how cell division plays a role in development.
Explain how cells know when it is time to divide.
Explain how cancer cells disobey the rules that normal cells follow in the cell cycle and in cell growth.

Due Sunday 9/21: GRQs + Meiosis
M 9/22 Cancer cont./Meiosis

Due Sunday 9/21: GRQs + Meiosis
M 9/22 Cancer cont./Meiosis

Due Thursday 9/25: MB Quiz 3 (timed) and then GRQs + Patterns in Inheritance
F 9/26 Inheritance

Due Thursday 9/25: MB Quiz 3 (timed) and then GRQs + Patterns in Inheritance
F 9/26 Inheritance

Due Sunday 9/28: GRQs + Nondisjunction
M 9/29 Inheritance cont.

Due Sunday 9/28: GRQs + Nondisjunction
M 9/29 Inheritance cont.

Due Thursday 10/2: GRQs + Flow of Genetic Information
F 10/3 Flow of Genetic Information

Due Thursday 10/2: GRQs + Flow of Genetic Information
F 10/3 Flow of Genetic Information

Due Sunday 10/5: MB Quiz 4 (timed) and then Genetic Testing GRQs
M 10/6 Flow of Genetic Information

Due Sunday 10/5: MB Quiz 4 (timed) and then Genetic Testing GRQs
M 10/6 Flow of Genetic Information

W 10/8 Genetic Testing PBS NOVA video

Discuss what it means when we say a gene is “actionable”.
Describe any advantages/disadvantages of genetic testing in embryos, in children or adults with and without disease, and of cancer genomes.
No HW! Be sure to do the “practice exam” on Sakai to see a REAL Dr. Hogan exam! Study powerpoints, GRQs, class notes and all your LC questions to study!

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Notes</th>
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<tbody>
<tr>
<td>F 10/10</td>
<td>EXAM 2</td>
<td>All material from Unit 2</td>
</tr>
</tbody>
</table>

**--UNIT 3 EVOLUTION & ECOLOGY--**

*Due Sunday 10/12: GRQs + How Populations Evolve*

| M 10/13    | Introduction to Evolution    | Distinguish components of the theory of natural selection that are true vs. common misconceptions.  
Distinguish creationist, theistic, and naturalistic views.  
Explain what science is and why the study of evolution is a science.  
Define how microevolution is measured. |
|------------|------------------------------|----------------------------------------------------------------------|
| W 10/15    | How Populations Evolve      | Explain the conditions that must be met for non-evolution.         
Perform Hardy Weinberg calculations. |
| F 10/17    | Fall BREAK - NO CLASS       |                                                                       |

*Due Sunday 10/19: GRQs + Origin of Species*

| M 10/20    | How Populations Evolve      | Explain how genetic drift, mutation, gene flow and natural selection affect allele frequency in a population.  
Recognize what form of microevolutionary force is a driving force in examples of evolution. |
|------------|------------------------------|----------------------------------------------------------------------|
| W 10/22    | Origin of Species           | Explain the uses for the biological species concept of species and its limitations.  
Define the conditions that lead to speciation.  
Distinguish various reproductive barriers that keep species separate. |

*Due Thursday 10/23: MB Quiz 5 (timed) and then GRQs + Common Ancestors*

| F 10/24    | Common ancestors            | Sequence the order of adaptations in a phylogenetic tree.          
Draw a phylogenetic tree when given a list of organisms and traits. |

*Due Sunday 10/26: GRQs + Adaptations and Population Ecology*

| M 10/27    | Adaptations                 | Describe the most necessary adaptations for vertebrates to transition from water to land with regards to reproduction, support, thermoregulation, preventing dehydration.  
State a hypothesis as to why humans are hairless, unlike other mammals.  
Make educated guesses about what certain wacky animal structures or behaviors are adapted for. |
|------------|------------------------------|----------------------------------------------------------------------|
| W 10/29    | Population Ecology          | Explain how scientists estimate population size and perform a calculation to estimate student population in our classroom.  
Use the exponential growth model to calculate population growth.  
Compare and contrast logistic and exponential models of growth. |

*Due Thursday 10/30: GRQs + Interactions within Communities*

| F 10/31    | Populations & Communities   | Describe what happens to population size, death rates, and birth rates as countries become developed.  
Compare ecological footprints and age structure charts between different countries.  
Distinguish levels of hierarchy in ecology and which levels include abiotic interactions with organisms.  
Name examples of resource partitioning, mutualism, predation, parasitism, and competition and the consequences for each species involved. |

*Due Sunday 11/2: MB Quiz 6 (timed) and then GRQs + The Microbiome*
The microbiome

Compare/contrast the digestive and metabolic characteristics of germ free and conventionally raised mice. Explain why the community of microbes that live in our intestines can be considered a second metabolic “organ” for the human host. Explain how the structure of the community of gut microbes may affect its function. Using the concept of natural selection and ecological niches, explain why changes in diet may alter the composition and function of the gut microbial community.

--UNIT 4 ANATOMY & PHYSIOLOGY (A & P)--

W 11/5 Homeostasis
Define homeostasis and explain how homeostasis is maintained. Give examples of homeostasis in the body and the consequences of imbalance.

Due Thursday 11/6: GRQs and Homeostasis and Reproduction part I
F 11/7 Reproduction
Draw spermatogenesis and oogenesis in a diploid cell and compare and contrast the two processes. Draw the structure of a sperm and relate it to its function and journey.

Due Sunday 11/9 GRQs and Reproduction part II
M 11/10 Reproduction
Illustrate how the hormones and anatomy of the reproductive age female change over a month-- with and without pregnancy. Explain the purpose of the HPV vaccine.

W 11/12 Reproduction
Explain how the pill prevents pregnancy.

Due Thursday 11/13 MB Quiz 7 (timed) and GRQs and Blood
F 11/14 Blood
Describe the components and functions of blood. Determine compatibility of donors and recipients. Compare whole blood vs. apheresis donations.

No HW! Study powerpoints, GRQs, class notes and all your LC questions.

M 11/17 EXAM 3
All material from UNIT 3 and UNIT 4 (including blood).

W 11/19 Immunity
Describe the body’s innate defenses and how they differ from adaptive defenses.

Due Thursday 11/20 GRQs and Immunity
F 11/21 Immunity
Compare and contrast humoral and cell-mediated immunity. Explain how the adaptive system’s “memory” and “specificity” relate to how flu vaccines work and why someone can’t have the chicken pox twice.

No assignment Due Sunday 11/23
M 11/24 Immunity cont.
W 11/26 NO CLASS: Thanksgiving
F 11/28 NO CLASS: Thanksgiving

Due Sunday 11/30 GRQs and Obesity
M 12/1 The process of science: Obesity
Describe how leptin is involved in fat homeostasis. Predict phenotypes of mice when levels of leptin, PYY, and ghrelin are altered. Distinguish basic science from applied science.

W 12/3 Practice Final Exam
Sat 12/6 REAL final exam
Final Exam (Cumulative); In GSB 100 (8AM-11AM)
Hints for doing well in this class:

- Read the textbook for each corresponding homework. Take your time and be an active reader.
- How to be an active reader? Fill out the “Guided Reading Qs” and add your own notes to them.
- Practice, Practice, Practice. Review your course material multiple times in multiple ways! The more times you review biology, the better it will stick. 1) read it in the book 2) hear it in class 3) review your notes 4) review all powerpoints 5) make flashcards 6) rewrite outlines 7) teach a friend or 8) explain it to the wall! 9) make up quizzes for yourself or a friend that you can do later.
- **REVIEW YOUR NOTES AFTER EACH CLASS!** How long will this take? Set aside 15 minutes and make this a HABIT!! I guarantee that this will pay off.
- **Attend each lecture, and pay attention.**
- Find a classmate or a group of classmates to study with. Talking about material will significantly enhance your learning, and it is a good way to be sure you took comprehensive notes. Don’t rely on your group…you need to study alone before meeting with them!
- “Reading over your notes” is NOT studying. You need to “quiz” yourself in some way to see what you are retaining from your “reading”. Have you tried drawing the illustrations? Have you constructed flow charts or concept maps? Have you tried explaining the concept aloud? Have you made paper cut-outs and tried acting out the process? Have you compared and contrasted major concepts/processes that you have learned? Have you used the book’s website for quiz questions?
- **Attend SI at least once a week.** One hour will not cut into your social life that much and it will reinforce the material in a way that we don’t always have time for in lecture. Your SI instructor is really creative and has all kinds of tricks and tips. Check it out every week (even if you don’t have any questions!) Our own research at UNC tells us that the average of students that go to SI perform a half a grade better than the average of students that don’t attend SI.
- Take your Mastering assignments as serious, independent work. Mastering is for you to “master” the material. You only cheat yourself if you do the assignments hunting and pecking for the answers in the book. Read the book and then try to answer from what you know.
- Take old semester exams as practice for each exam. These are posted on Sakai. Be prepared to take it in a quiet place for 50 minutes. Score it and see how well prepared you are. Then, go through it carefully to understand each question and answer choice. Why is each choice correct or NOT correct?
- Discuss material and concerns with me (Dr. Kelly Hogan) during office hours, after class, or by email. I am a really nice person…nobody to be scared of!! But…you need to come see me well in advance of an exam. Come see me after the first exam if you did not do well. What suggestions can I have for you if you wait until you did poorly on all three exams?
- Uphold the honor code. Observing the Honor Code means that during exams, you may not look at another person’s exam; talk to anyone, either in person or by cell phone or email; or use the Internet, another person’s calculator, or any other text or notes. Please report any violations that you observe.
- **http://magazine.ucla.edu/depts/lifesigns/remember-it-well-how-to-learn-better/**
- Get plenty of sleep before an exam! If you have followed my advice, you should be reviewing notes and relaxing the night before an exam.
- Free peer tutoring is available at the Learning Center by appointment or at Dey Hall on Tues and Wed evenings from 6-9 PM (no appointment needed). There are not usually too many people at Dey Hall and you can often get one-on-one attention. [http://www.unc.edu/depts/lcweb/](http://www.unc.edu/depts/lcweb/)
- If you feel you need scheduled tutoring and one-on-one attention with a fulltime tutor, don’t wait too long. See Robin Blanton at the Learning Center. She is the biology specialist and is wonderful. Schedule appointments through [http://learningcenter.unc.edu](http://learningcenter.unc.edu) However, her time fills up fast because she is popular! She does group sessions wonderfully too. Bring a friend!
### Bloom's Taxonomy Action Verbs

What level are we working at in homework, in class, on exams? When studying, try drawing, contrasting, arranging, etc.

<table>
<thead>
<tr>
<th>Type (Level)</th>
<th>Knowledge (1)</th>
<th>Comprehension (1)</th>
<th>Application (2)</th>
<th>Analysis (3)</th>
<th>Synthesis (3)</th>
<th>Evaluation (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bloom’s Definition</strong></td>
<td>Remember previously learned information.</td>
<td>Demonstrate an understanding of the facts.</td>
<td>Apply knowledge to actual situations.</td>
<td>Break down objects or ideas into simpler parts and find evidence to support generalizations.</td>
<td>Compile component ideas into a new whole or propose alternative solutions.</td>
<td>Make and defend judgments based on internal evidence or external criteria.</td>
</tr>
<tr>
<td><strong>Verbs</strong></td>
<td></td>
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<tr>
<td>• Arrange</td>
<td>• Classify</td>
<td>• Apply</td>
<td>• Analyze</td>
<td>• Arrange</td>
<td>• Appraise</td>
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<tr>
<td>• Define</td>
<td>• Convert</td>
<td>• Change</td>
<td>• Appraise</td>
<td>• Assemble</td>
<td>• Argue</td>
<td>• Assess</td>
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<tr>
<td>• Describe</td>
<td>• Defend</td>
<td>• Choose</td>
<td>• Breakdown</td>
<td>• Collect</td>
<td>• Assess</td>
<td>• Attach</td>
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<tr>
<td>• Duplicate</td>
<td>• Describe</td>
<td>• Compute</td>
<td>• Calculate</td>
<td>• Combine</td>
<td>• Choose</td>
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<td>• Identify</td>
<td>• Discuss</td>
<td>• Demonstrate</td>
<td>• Categorize</td>
<td>• Comply</td>
<td>• Compare</td>
<td>• Compare</td>
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<tr>
<td>• Label</td>
<td>• Distinguish</td>
<td>• Discover</td>
<td>• Compare</td>
<td>• Compose</td>
<td>• Describe</td>
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<td>• List</td>
<td>• Estimate</td>
<td>• Dramatize</td>
<td>• Contrast</td>
<td>• Construct</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<tr>
<td>• Match</td>
<td>• Explain</td>
<td>• Employ</td>
<td>• Criticize</td>
<td>• Create</td>
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<td>• Discriminate</td>
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<tr>
<td>• Memorize</td>
<td>• Express</td>
<td>• Illustrate</td>
<td>• Diagram</td>
<td>• Develop</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<tr>
<td>• Name</td>
<td>• Extend</td>
<td>• Interpret</td>
<td>• Differentiate</td>
<td>• Design</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<tr>
<td>• Order</td>
<td>• Generalized</td>
<td>• Manipulate</td>
<td>• Discriminate</td>
<td>• Describe</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<tr>
<td>• Outline</td>
<td>• Give example(s)</td>
<td>• Modify</td>
<td>• Distinguish</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<tr>
<td>• Recognize</td>
<td>• Identify</td>
<td>• Operate</td>
<td>• Examine</td>
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<td>• Relate</td>
<td>• Indicate</td>
<td>• Practice</td>
<td>• Experiment</td>
<td>• Evaluate</td>
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<tr>
<td>• Recall</td>
<td>• Infer</td>
<td>• Predict</td>
<td>• Identify</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<tr>
<td>• Repeat</td>
<td>• Infer</td>
<td>• Prepare</td>
<td>• Illustrate</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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<td>• Reproduce</td>
<td>• Paraphrase</td>
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<td>• Infer</td>
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<tr>
<td>• Select</td>
<td>• Predict</td>
<td>• Relate</td>
<td>• Model</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
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<td>• State</td>
<td>• Recognize</td>
<td>• Schedule</td>
<td>• Outline</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
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<td></td>
<td>• Rewrite</td>
<td>• Show</td>
<td>• Point out</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
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<td>• Review</td>
<td>• Sketch</td>
<td>• Question</td>
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<td>• Select</td>
<td>• Solve</td>
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<td>• Evaluate</td>
<td>• Discriminate</td>
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<td>• Summarize</td>
<td>• Use</td>
<td>• Use</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
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<tr>
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<td>• Translate</td>
<td>• Write</td>
<td>• Write</td>
<td>• Evaluate</td>
<td>• Discriminate</td>
<td>• Discriminate</td>
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