**BIO. 323 001C MOLECULAR AND CELL BIOLOGY**

**LECTURER: Dr. Bea Holton**

**Spring 2017 – 3 credits – 3, 1hr ‘flipped’ lectures per week**

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**OFFICE HOURS**: M 2-4pm, Tu 10:00-11:30am, or by appointment.

Instructor is SAFE – trained.

**LECTURE HOURS**: 10:20-11:20am MWF in Halsey Science 268.

**TEXT**: Alberts, Bray, Hopkin, Johnson, Lewis, Raff, Roberts, Walter (2014) **Essential Cell Biology**, 4th edition, Garland Science, Taylor and Francis Group, New York & London.

**LEARNING OUTCOMES:** 1) Students should learn concepts that are the foundation for understanding cell biology, physiology, medicine, evolutionary biology and aspects of ecology; 2) Students will improve their ability to write clearly, logically and appropriately for a science-oriented audience; 3) students will improve their critical thinking skills by analyzing figures, graphs and tables and applying the academic principles learned to the interpretation of these data.

**THIS IS A ‘FLIPPED’ CLASS: That means that you should read the book and listen to podcasts BEFORE class periods and come prepared with questions about the material, e.g. concepts that you don’t understand. We will spend class time discussing questions and working problems or case studies that I provide. Look on D2L to find a suggested schedule for listening to podcasts. DO NOT FALL BEHIND!!!!**

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| **Week** | **Topic** | **Chapter** |
| **Jan. 30, Feb.** 1, 3 | Protein structure and function | 4 |
|  6, 8, 10 | Membrane structure | 11 |
|  13, 15, 17, 20 | Membrane transport **Post data for paper #1 Feb. 17. Discuss data on 20th.** | 12 |
| 22, 24, 27 | Signal Transduction (cell communication)  | 16 |
|  Mar. 1, 6, 8, 10 | Intracellular compartments and transport**1st draft Feb. 24, critique papers Mar. 6; Final draft due Mar. 13** | 15 |
| **Mar. 3** | **EXAM #1** | **4, 11, 12, 16** |
| **Mar. 13** | **PAPER #1 DUE** |  |
|  13, 15, 19 | Cytoskeleton  | 17 |
| **18-26** | **NO CLASS – SPRING BREAK** |  |
|  27, 29, 31, **Apr**3rd is Extra Day | Energetics | 14 |
| 5, 10 | Structure of DNA/chromosomes Post data for second paper Apr. 7 | 5 |
| Apr. 7 | EXAM #2 | **15, 17, 14** |
| 12, 14, 17 | DNA replication Discuss data for paper 2 on 10th | 6 |
| 19, 21 | Transcription**1st draft Apr. 17th**  | 7 |
|  24, 26 | Translation Critique papers on 21st, | 7 |
| 28, May 1, 3 | Regulation of Gene Expression Final draft paper 2 on 28th | 8 |
| Apr. 28 | PAPER #2 DUE |  |
| May 5 | EXAM #3 | **5, 6, 7, 8** |
| 8 | Review for Final and Return Exam 3 |  |
| 12 | EXAM #4 THIS WILL BE COMPREHENSIVE! |  |

**GRADING:** 40% of the grade will be based on the first three, in-class exams, 20% on the comprehensive final exam (Exam #4), 30% on two, short, research-style papers and 10% on group participation. 93-100% = A, 90-92 = A-, 87-89 = B+, 83-86 = B, 80-82 = B-, 77-79 = C+, 73-76 = C, 70-72 = C-, 67-69 = D+, 63-66 = D, 60-62 = D-, below 60% = F. Grades will only be “curved”, if necessary. Cheating in any form (including plagiarism, excessive and/or undocumented paraphrasing) will NOT be tolerated. Students caught cheating will receive an F in the course and will be reported to the Dean of Students. Group participation grade will be based on your active work with your group, 1st drafts of papers and other forms of class participation.

**MAKE-UP AND EARLY EXAMS:** If you cannot be present for an exam, it is **your** responsibility to get in touch with me **at least one week** **before** the rest of the class writes the exam. Make-up exams will be available **only** if the student suffers a life-threatening illness and has a medical excuse to support that claim or if you are participating in a university-sponsored event.

**ATTENDANCE POLICY:** I will not take role in lecture. Attending lecture and good note-taking skills will increase your ability to do well in class. I do not publish lecture notes. I do post annotated PowerPoint presentations and pre recorded Podcasts on D2L, but do not deceive yourself into thinking that a Podcast truly substitutes for coming to class! We will spend class time working on problems and case studies that will cause you to USE the material in the podcasts to solve the problems. It is very important that you become proficient in using material that you’ve learned. **Finally, we will be doing a fair amount of group work this semester….your group will need your participation so be there for them!**

**SUGGESTIONS FOR SUCCESS IN THIS CLASS:** We cover a lot of material in this course. I suggest that you 1) spend 6-9 hours per week studying the book, rewriting notes, learning processes covered in class, thinking about how different concepts fit together (I have/will upload to D2L concept maps that may help you with this process.), working problems in the book and completing steps 2 and 3. 2) On a huge piece of paper, draw an enormous cell and begin to fill in parts as we discuss them in class. 3) Practice drawing out (from memory) chemical structures, pathways and processes to make sure that you have learned them…..TEST YOURSELF!

## WRITING ASSIGNMENTS:

### General Instructions

**Papers must be no longer than 1pg, single-spaced or 2pg, double-spaced (point size = 12). Unless stated otherwise, they must be placed in the dropbox in D2L.**

I will provide you with selected data from the literature that are relevant to theories discussed in class. You are to treat the data as though they were your own and as though you wanted to present the data to others in your field as a publishable research paper. Consequently, you must (1) capture the interest of the reader by developing some background and explaining the significance of the hypothesis tested in your paper; (2), explain clearly the results so that the reader understands their meaning and draws the same conclusions as you as the paper is read, and, (3), discuss the meaning of your results. Perhaps propose a model. **Remember, you are writing this paper for someone who understands basic techniques and principles in science BUT has not studied this particular topic. So, the reader might understand a technique like SDS-PAGE or immunohistology but may NOT understand how those techniques will help you test your specific hypothesis….explain your rationale for what you do!** Each paper will have the following sections. LABEL each section:

 - **Introduction** - gives some background information but mostly outlines questions in the field (that will be addressed by your data) and the significance of the work presented, i.e. what makes the study important. A rationale statement is often useful. You don’t have to make the hypothesis’ importance relevant to humans or medical problems. This section is generally short…..a few sentences….because you usually need a lot of space to describe the results.

 - **Results** - explains the data. Explain a bit about the techniques used and the rationale for doing specific experiments. Why were certain controls or experiments done? Describe the results in the graphs/figures/tables AND, as part of your explanation, **give data from the figures/graphs/tables** to back up what you say. Two people can look at the same figure and see different things so you have to tell the reader what YOU see. What do the data show? Give incontrovertible conclusions.

 - **Discussion** section in which a reasonable new hypothesis or model is formulated from the data.

Remember, the maximum page length is **one** page single-spaced (or **two** pages, double-spaced), point size = 12. The key is to think clearly, write concisely and say exactly what you mean…no more, no less.

You may discuss the data (and interpretations of the data) among yourselves. You can also ask me questions, preferably in class where all can profit from the questions and answers, however, you must write your own paper!

**DO NOT TRY TO FIND THE DATA/ANSWERS ONLINE!!! The object of this assignment is to get YOU to practice analyzing data and using YOUR knowledge to interpret the data. The assignment is NOT to see whether you can summarize someone else’s published results….I already know that you can do this.**