# BIOLOGY 3400

CELL BIOLOGY Fall 2012

TEXT: Alberts, *et al.*, Molecular Biology of the Cell, Garland, Pub., Fifth Edition, 2007.


| *INSTRUCTORS* | *Email* | *Office* | *Telephone* |
|---|---|---|---|
| Dr. Marcus Fechheimer | fechheim@uga.edu | 634 Biol Sci | 542-3338 |
| Dr. Karl Lechtreck | lechtrek@uga.edu | 636 Biol Sci | 542-0167 |
| Wei-Chia Tseng | weichiat@uga.edu | 206B Coverdell | 542-1815 |


**MEETING TIME:** Monday, Wednesday, Friday 10:10 – 11:00 Room 404 A Biological Sciences Building.

**PREREQUISITES:** Biochemistry (BCMB/BIOL 3100) is a prerequisite for this course. In addition, Genetics (GENE/BIOL 3200) is a pre- or co-requisite. It is assumed that you have fulfilled these requirements.

**LETTER GRADING:** There will be four quizzes and a final quiz according to the schedule below. Special arrangements must be made in advance and in writing, if a pressing obligation prevents you from taking one of the quizzes. Your grade for the course will be based on the four quizzes (100 points each) and the comprehensive final quiz (200 points). You will also have the opportunity to complete an optional assignment (relative weight 0.03), which is simply added to the average of the quiz grades. The optional assignment is described in the attached materials.

**SUPPLEMENTAL AND OPTIONAL READINGS:** Copies of old quizzes will be posted on eLC. A bonus question appended to the first four quizzes may be answered for 0 to 3 points. Information needed to answer the bonus may be obtained by reading articles assigned for each quiz.

**HONOR'S OPTION**: An opportunity to earn Honor's credit in this class is described at the end of the syllabus.

**DISCUSSION/REVIEW PERIODS:** Weekly discussion sessions with your teaching assistant will be every Monday at 4:40 pm in room 404 A. Review periods for quizzes will be held prior to each quiz with Dr. Fechheimer and Dr. Lechtreck. if possible. Review sessions are scheduled for Sept. 5, Sept. 26, October 19, and November 12 at 4:40 in room 404A.

**OFFICE HOURS:** The instructors in the class want to meet with you as needed to promote your success in this class. Please contact each instructor for appointments as needed. We will make time for you!

**ACADEMIC HONESTY**: It is expected that all students in this course will work in accordance with University guidelines regarding academic honesty, and the Student Honor Code: "I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others." Issues related to academic honesty will be handled *strictly* according to policies and procedures available at: http://www.uga.edu/ovpi/honesty/acadhon.htm . Accessing note cards and/or ANY use of **cell phones** during tests are violations that will be reported. The Honor Code states that students must report cheating by other students in any assignment, quiz, or test in this course.

**COURSE GOALS:** This course will help students to learn about cellular structure and function, cell growth and reproduction, and pathways that regulate these events. We will also discuss diseases that result when cellular systems fail to function properly, and explore experimental methods that are used to study cells. These efforts and activities are designed to enhance development of skills that will be essential for success in future degree programs.

**THOUGHTFUL EVALUATION OF CELL BIOLOGY CONCEPTS:** Students who distinguish themselves with thoughtful and pertinent questions and responses during class will be recognized for their achievements. Critical thinking is treasured in this class.

| DATE | TOPIC | READING |
|---|---|---|
| Mon Aug 13 | Eucaryotes, eubacteria, and archae (MF) | Chapters 1, 2, 3, 8, 9 |
| Wed Aug 15 | Protein structure/binding interactions (MF) | Chapter 3 |
| Fri Aug 17 | Lipids and biological membranes (MF) | Chapter 10 |
| Mon Aug 20 | Permeability and transport (MF) | Chapter 11 |
| Wed Aug 22 | Channels/membrane potential (MF) | Chapter 11 |
| Fri Aug 24 | Receptors as channels (MF) | Chapter 11, 15 |
| Mon Aug 27 | G protein coupled receptors (MF) | Chapter 15 |
| Wed Aug 29 | Receptor tyrosine kinases (MF) | Chapter 15 |
| Fri Aug 31 | Phosphoinositides (MF) | Chapter 15 |
| Mon Sept 3 | Holiday (Labor Day) | |
| Wed Sept. 5 | The Endomembrane system (KL) | Chapter 13 |
| Fri Sept. 7 | **First Quiz (Topics Aug. 13 – Aug. 31) (MF)** | |
| Mon Sept. 10 | Endoplasmatic reticulum: protein import (KL) | Chapter 12 |
| Wed Sept. 12 | Endoplasmatic reticulum: protein folding (KL) | Chapter 12, 13 |
| Fri Sept. 14 | Intracellular vesicle transport (KL) | Chapter 12, 13 |
| Mon Sept. 17 | The Golgi (KL) | Chapter 13 |
| Wed Sept. 19 | Endocytosis and Lysosomes (KL) | Chapter 13 |
| Fri Sept. 21 | Exocytosis (KL) | Chapter 13 |
| Mon Sept. 24 | Extracellular matrix (KL) | Chapter 13 |
| Wed Sept. 26 | The Cytoskeleton (KL) | Chapter 13 |
| Fri Sept. 28 | **Second Quiz (Topics Sept. 5 – Sept. 24) (KL)** | |
| Mon Oct. 1 | Microtubules, Microfilaments, Intermediate filaments (KL) | Chapter 16 |
| Wed Oct. 3 | Actin-myosin systems(KL) | Chapter 16 |
| Fri Oct. 5 | Microtubular Motors (KL) | Chapter 16 |
| Mon Oct. 8 | Mitosis (KL) | Chapter 16, 17 |
| Wed Oct. 10 | Mitosis and Cytokinesis (KL) | Chapter 16 |
| Fri Oct. 12 | Cilia (KL) | Chapter 16 |
| Mon Oct. 15 | Mitochondria I: Structure, Genome, Origins (MF) | Chapter 12, 14 |
| Wed Oct. 17 | Mitochondria II: Protein import (MF) | Chapter 12 |
| Fri Oct. 19 | The Nucleus: structure and organization (MF) | Chapter 12 |
| Mon Oct. 22 | **Quiz 3 (Sept. 26 – Oct. 17) (**KL and MF) | |
| Wed Oct. 24 | Nucleocytoplasmic Transport (KL) | Chapter 12 |
| Fri Oct. 26 | Fall Break | |
| Mon Oct. 29 | Chromatin and Genome Organization (MF) | Chapter 12 |
| Wed Oct. 31 | Eukaryotic Transcription (MF) | Chapter 4, 7 |
| Fri Nov. 2 | mRNA processing I: capping and polyadenylation (MF) | Chapter 7 |
| Mon Nov. 5 | mRNA processing II: mRNA splicing (MF) | Chapter 6 |
| Wed Nov. 7 | Protein Synthesis I: Initiation (MF) | Chapter 6 |
| Fri Nov. 9 | Protein synthesis II: Elongation, Termination (MF) | Chapter 6 |
| Mon Nov. 12 | DNA replication I: Principles and Machinery (MF) | Chapter 5 |
| Wed Nov. 14 | **Quiz 4 (Lectures Oct. 19 – Nov. 9)** (MF) | |
| Fri Nov. 16 | DNA replication II: Cellular Regulation (MF) | Chapter 5 |
| Mon Nov. 19 | Turkey | |
| Wed Nov. 21 | Turkey | |
| Fri Nov. 23 | More Turkey | |

| | | |
|---|---|---|
| Mon Nov. 26 | Cell Cycle: Experimental Systems (MF) | Chapter 17 |
| Wed Nov. 28 | Cell Cycle: M phase entry and Exit (MF) | Chapter 17 |
| Fri Nov. 30 | Cell Cycle: S phase entry and Checkpoints (MF) | Chapter 17 |
| | | |
| Mon Dec. 3 | Cancer (MF) | Chapter 20 |
| Tu Dec. 4 | Cancer (MF) | Chapter 20 |
| | | |
| Fri Dec. 7 | Final Exam 8 – 11 am | Entire Course |

## *Honor's Option*

Students may sign up for an Honor's option in this class. Forms are available at the Honor's office. The assignment is to write three papers of the type described for extra credit (see below). These three papers will be for Honor's credit and an additional paper may be prepared for extra credit if so desired. The deadlines for receipt of the three Honor's papers are at the beginning of class on Sept. 14, Oct. 5, and Nov. 2. Late papers will not be accepted.

## OPTIONAL ASSIGNMENT FOR EXTRA CREDIT

Critical appraisal of primary literature plays a fundamental role in scientific inquiry. Experimental techniques and interpretation of experimental results are discussed both in the text and in the lectures. You have the opportunity to begin the development of your own analytical skills by reviewing an original report from the scientific literature.
Select any paper meeting the following criteria:

1) published in *Journal of Cell Biology, Nature Cell Biology, or Molecular Cell* in 2011 or 2012. Papers from other journals will not be accepted.
2) not a review; the paper must report original research results.

Write a **one page** report (8.5 x 11 inch paper) in a font no smaller than 12 point. Attach a printed copy of the complete paper to your report.
Your report should state:

1) the title, authors, and source of the paper;
2) the main questions or hypotheses addressed in the paper;
3) specific sub-questions, the experimental approach(es) utilized, and the results;
4) repeat #3 as needed to cover different parts of the study;
5) the major conclusions of the paper;
6) significant criticism(s) of the experimental design, and conclusions.

Clear reasoning, concise writing, and your own judgments are required. The following questions may guide your thinking:

Why is the problem addressed in the study significant?
Are the approaches suited to answering the question posed?
Are important control experiments performed?
Do the results of the paper support the conclusions stated?

Your report will be scored from 0 to 3 points. This score will be added to the weighted average of your regular quiz and final quiz grades calculated as described above.
Papers must be submitted by the *beginning* of class on Nov. 16. Late papers will not be accepted.