

## **Biology 101. Spring 2008**

Marshak J3, Mondays, 9-10:50 AM

Professor Sally Hoskins

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Office Hours: Mondays, 2-3PM, or by appointment

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### **Textbooks:**

For lecture: BIOLOGY, 7<sup>th</sup> Edition, Campbell and Reece, 2005; Pearson/Benjamin Cummings

For lab: Asking About Life, Marni Fylling, Harcourt College Publishers, 2001

You are expected to attend every lecture and every lab. It is extremely difficult to make-up missed labs. Anyone missing two labs without prior arrangement will be dropped from the course.

Monday classes will not be “straight lecture”; I will ask questions of the class, pose problems to be solved in class, and lead some class discussion. The sorts of questions I ask in class are the sorts that will be on the exams. **SOME EXAM QUESTIONS WILL BE BASED ON LECTURE MATERIAL THAT MAY OR MAY NOT BE IN THE BOOK.**

### **Goals of course:**

Provide a basic education in Biology, as a foundation for upper level courses in the Biology major.

Guide students in fundamentals of critical thinking, data analysis, and experimental design

Teach basic study habits for success in Biology.

Present key experiments underlying major findings in Biology

Introduce natural selection and evolution as fundamental concepts for understanding Biology

Familiarize students with graphical representation of data in Biology, use of math for measurements and data analysis, and use of drawing for illustrating biological ideas (e.g. activated enzyme vs inactive enzyme)

### **Major Themes of the course (Course Objectives) are listed here and are posted on Blackboard:**

#### ***This course will help you learn....***

1. That Biology is a science, and that all the concepts introduced in the course are the result of inductive and deductive reasoning, i.e., the scientific method, as well as description and its interpretation.

2. That the core theme, underlying both biology 101 and 102, and, indeed, all biology, is evolution (the course introduces them to the concept- additional details follow in biology 102)

3. That an understanding of basic types of chemical bonds—covalent, hydrogen, ionic, van der Waals is necessary to understand the structure and function of molecules.

4. That hydrogen bonding plays a key role in understanding the properties of water, as well as in understanding DNA structure and protein shape.

5. That carbon-based molecules—sugars, proteins, lipids, nucleic acids, are key components of living things

6. That the macromolecules above are, in the biological hierarchy, combined to form organelles, and the cells containing them

7. The structure and function of the organelles of cells; constructing a prokaryote, plant, and animal cell.

8 Enzymes as key components of cellular function. Why do different proteins have different shapes? What gives enzymes their particular shapes? Experimental approach to looking at 'critical' vs 'noncritical' regions of an enzyme. Interpretation of data on enzyme temperature and pH optima

9. The structure and function of the plasma membrane—regulation of traffic, cell recognition, cell signalling, signal transduction mediated by membrane-associated receptors. Relationship of signal transduction to gene transcription. Second messengers and what they do.

10. The function of cells—energy acquisition, transformation and utilization; Photosynthesis and Cellular Respiration—The major concepts and “big picture” of how respiration and photosynthesis relate to each other.

*11. Experimental approach taken by Mendel. His data and interpretation. Mendel's discovery of “traits”; the logic of genetics. The insights made by Mendel in the absence of any awareness of chromosomes/DNA/the genetic code/the genome. Definition of “allele”. Human alleles, pea alleles, allelic variation in populations. Relationship of gamete development (formerly called meiosis) to differential distribution of alleles in eggs or sperm.*

12. Experiments that led to idea that DNA is the genetic material. Rosalind Franklin's data, Watson and Crick's interpretation DNA structure, how DNA replicates (briefly), and how DNA is transcribed (at length). How DNA controls the synthesis of polypeptides. Anatomy of a gene. Promoters, what they are, what they do, why they matter.

13. The Genetic Code table—how it was figured out through experiment. Why is the Code such strong evidence for evolution?

14. Regulation of gene expression, differential gene expression during development.

15. Evolution at macroscopic/microscopic scale as key theory in biology. What is natural selection? Darwin's ideas in light of subsequent discoveries in molecular biology (e.g. universality of genetic code, sharing of patterning genes across multiple phyla, development of antibiotic resistant bacteria, etc).

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EXAMS in Lecture: Three in-class exams and a final exam during finals Lecture. Each exam counts for 1/3 of your lecture grade. Each is a 1 hour 40 minute exam. The lowest score on one of the three in-class exams will be dropped. The final is REQUIRED. If you miss an exam without prearrangement (and extreme circumstances) you will receive a “zero” score and that will count as your “dropped” exam. The final exam will include some questions that appeared on earlier exams, as well as new questions related to the last two lectures.

EXAMS in Lab: Lab midterm and lab final.

Course GRADE is based 50% on Lecture (Based on three exams) and 50% on Lab.

Your 50 percent Lecture grade is based on your best two of the first three exams (15% each) and the required final exam (20%). Note: you cannot drop the final exam.

Your 50% Lab grade is based on two required lab exams (10% midterm, 15% final), your lab quizzes, notebook and writeups (15%) and participation in class (10%).

**POLICIES of the COURSE:**

NO MAKEUP EXAMS except in extreme circumstances confirmed with me in ADVANCE of the exam. If you cannot take the exams or come to lecture and lab, I suggest that you do not take Bio 101 this semester.

*Every student should read the CUNY Academic Integrity Policy available on the CCNY website. Cheating will not be tolerated. Anyone caught cheating will be asked to withdraw from the class.*

*Plagiarism will not be tolerated. Anyone caught plagiarizing will be asked to withdraw from the class.*

\*\*\*Please do not eat, carry on long conversations with other students, make or receive cellphone calls, walk in and out of class, consistently arrive later, or surf the Internet during class. These activities are distracting to other students.\*\*\*

*YOU NEED A SPIRAL NOTEBOOK TO USE IN LAB (SEE BELOW)*

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**HOW TO SUCCEED IN THIS CLASS**

**In Lecture:**

Read assigned pages in the Campbell and Reece book before class.

Use the online component of the Campbell and Reece book--there are useful tutorials, animations, and self-tests on the CD-ROM that you can use to see how well you are understanding the material.

Attend lecture and participate actively.

Learn how to study for conceptual understanding. That is, while there are some terms whose definitions you will have to memorize (for example, cell, gene, chromosome), your overall approach to studying should **not** be simply to memorize the textbook. You need to make sure you understand concepts, understand how to read graphs and charts, understand how to interpret data, and understand how to come up with hypotheses and design experiments to test them. We will work on these ideas in class.

**In Lab:**

Attend every lab and arrive on time for every lab.

Take lab notes in a lab notebook (see next page)

Get a spiral notebook and use it to take notes in lab. This should contain the following:

- a) your pre-lab flowchart outlining what will happen in the lab session (you can do this based on reading the lab material BEFORE the lab)
- b) your notes taken during the pre-lab 20-30 minute introduction/review by your lab instructor
- c) Your notes taken during the lab including questions you have, data collected, graphs drawn etc (draw them on graph paper and paste them in)
- d) Your list of the 5 key scientific vocabulary words relevant to the lab, and their definitions. Include a sketch if possible.
- e) Your list of the key concepts learned from or illustrated by the lab. You should have at least 4 for every lab.

These notebooks will be reviewed by your TA during the lab midterm and during the lab final. Your TA will also note during lab whether you have prepared appropriately, brought your notebook etc. So there is no point in doing the whole notebook the night before the exams.

**YOU NEED THIS NOTEBOOK BY LAB 2**

**When you get this notebook you should put in your notes from the first lab (the notes you took on colored paper handed out in class)**

Prepare for lab by reading the handout in advance.

If there are any pre or post-lab writing assignments, be sure you complete them on time.

During lab, be sure you understand the principles underlying the experiments. If you do not, ask questions.

When working in small groups, consider yourself part of a team. Listen to each group member. If the group is making a presentation, don't do all the work yourself, and don't let someone else do all the work. Collaborate.

Think about how lab activities relate to lecture material.

Lecture 1: Monday Jan 28 Intro to course, Chapter 1, Chapter 2, 2.1 and 2.3; Chapter 3.1, Chapter 4

*LAB: Lab math, graphing data, experimental design.*

Lecture 2: Monday, Feb 4 Chapter 4 (Macromolecules) 5 (The Cell), 26 (Tree of Life)

*LAB: Biomolecules (Asking about Life, lab 2)*

Lecture 3: Monday, Feb 11 **EXAM 1** This early exam will help you see whether you are studying appropriately

*LAB: Intro to cells and microscopy (Asking about Life, lab 3)*

--no class Mon Feb 18 (President's Day Holiday)--

*LAB: Osmosis and diffusion (Asking about Life, lab 4)*

Lecture 4: Monday, Feb 25 Chapter 7 (Membranes) and 8 (Intro to Metabolism—enzymes)

*LAB: Enzymes (Asking about Life, lab 5)*

Lecture 5: Monday, March 3 Chapter 9 (Cellular Respiration)

*LAB: Cellular Respiration (Asking about Life, Lab 6)*

Lecture 6: Monday, March 10 Catch up

*LAB: Midterm (Lab week 7)*

Lecture 7: Monday, March 17, Chapter 10; Photosynthesis

*LAB: Photosynthesis (Asking about Life, Lab 7)*

--no lecture Monday March 24, college closed--

Lecture 8: WEDNESDAY, March 26, **EXAM 2**

*LAB: Bacteria/Epidemiology (Asking about Life, Lab 12)*

Lecture 9: Monday, March 31, Chapter 13 (Meiosis), 14 (Mendel)

*LAB: Genetics (Asking about Life, Lab 9)*

Lecture 10: Monday, April 7, Chapter 15 (Chromosomal basis...) 16 (Molecular Basis of Inheritance)

*LAB: DNA (Lab 10)*

Lecture 11: Monday, April 14, Chapter 22 (Darwinian view of life)

*LAB: EVOLUTION (to be handed out)*

Spring Break April 19-27

Lecture 12: Monday, April 28, **EXAM 3**

*LAB: REVIEW all concepts for final*

Lecture 13: Monday, May 5, Chapter 25 (Phylogeny and Systematics), Chapter 26 (Tree of Life) review for final lecture exam.

*LAB: Lab final*

Lecture 14: Monday May 12, Catch up, review for final exam

FINAL EXAM during finals week

## **Academic Integrity**

The CUNY Policy on plagiarism says the following about plagiarism (the CUNY Policy can be found in Appendix B.3 of the CCNY Undergraduate Bulletin 2007 -2009):

“Plagiarism is the act of presenting another person’s ideas, research or writings as your own. The following are some examples of plagiarism, but by no means is it an exhaustive list:

1. Copying another person’s actual words without the use of quotation marks and footnotes attributing the words to their source.
2. Presenting another person’s ideas or theories in your own words without acknowledging the source.
3. Using information that is not common knowledge without acknowledging the source.
4. Failing to acknowledge collaborators on homework and laboratory assignments.
5. Internet plagiarism includes submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, and “cutting and pasting” from various sources without proper attribution.

The City College Faculty Senate has approved a procedure for addressing violations of academic integrity, which can also be found in Appendix B.3 of the CCNY Undergraduate Bulletin.”

Be aware that if we suspect plagiarism **we will follow this procedure, no exceptions made**; i.e. we will report you to the Academic Integrity Official. Disciplinary sanctions range from failing the class to expulsion from the college