

Physiology of Cells and Organisms

BIO 101
Fall 2007
Syllabus

MWF 8:00-9:05; Bailey 201
Instructor: Steven Rice
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Course materials posted on BlackBoard
Office Hours: M&Tu 300-4:00 and by appointment

Text: We are using Biological Science, 2nd edition by Scott Freeman (2005). I suggest the following approach to the reading assignments: Before class, read the assigned material briefly so that you familiarize yourself with the content. Attend lecture, leaving plenty of spaces and gaps in your notes for supplemental writing. After lecture, read the assignment more carefully and take notes in a different color pen directly into your lecture notebook. You will find that the author's voice and my own are different and that you will benefit from two discussions of the same material

Lab: This course has a mandatory lab that begins during the second week. Labs meet in SWSE room 105. Be sure you know when your lab section meets before the first day of lab. Arrive on the first day with the lab manual that is available in the bookstore. Older versions of the lab manual cannot be used.

Grading: Grades will be assigned on a straight scale (≥ 93 A, ≥ 90 A-, ≥ 87 B+, etc....) and are derived from the following:

30% Lab (see your lab instructor for the grade breakdown)
70% Lecture final 20%*
3 exams: 14% lowest, 18% two highest

Lecture tests and quizzes may include material from the labs. Unexcused absence from a test will result in a zero mark; when necessary, make-up tests will be given during final exam week. All grading mistakes on tests must be discussed before the day of the next test. Laboratory attendance is mandatory; missing more than one lab may result in failure in the course.

Weekly Review Sessions: These will be held in the laboratory one afternoon per week at a time and day to be announced. Review sessions will not be held the weeks following tests.

**The final exam is only given on the scheduled date. Make your fall break plans accordingly.*

BIO 101**Topic Outline:**

Date	Topic	Required Reading	Lab
Sept. 5	Introduction: <i>When Metabolism Goes Wrong</i>	Ch 1,2	<i>No Lab</i>
7	Diabetes: homeostasis and feedback control	Ch 41 945-46 Ch 43 993-95	
10	Insulin: structure and synthesis	Ch 3	Jumping
12	Membranes	Ch 6	
14	Secretion of insulin	Ch 7	
17	Hormones and cell-cell communication	Ch 8	Cell Fractionation
19	Glucose uptake and use	Ch 5, 9	
21	Cellular Respiration	Ch 9	
24	Engineering an artificial pancreas: design and constraints		Respiration
26	Test I <i>Building a Better Plant</i>		
28	Agriculture and environmental change	Ch 54 1254-62	
Oct. 1	Plant form and function	Ch 35	Photosynthesis
3	Photosynthesis I	Ch 10	
5	Photosynthesis II	Ch 10	
8	Water transport in plants	Ch 36	
10	The water—carbon compromise	Ch 36	Animal Anatomy I
12	Biotechnology and GM plants	Ch 19 420-423	
15	Constraints on productivity in dryland ecosystems		
17	Test II <i>Pushing the Limits</i>		Animal Anatomy II
19	Human Exploration		
	Animal Form and Function	Ch 41 934-945	
22	Thermoregulation	Ch 41 946-953	
24	Aquatic Osmoregulation	Ch 42 955-962	Practical Exam
26	Terrestrial Osmoregulation	Ch 42 965-975	
29	Respiration and Blood	Ch 44 1000-1012	
31	Circulatory System	Ch 44 1013-1023	
Nov. 2	Test III		
5	Are Athletes Born or Made? Neural Anatomy	Ch 45 1026-1032	
7	Action Potential	Ch 45 1032-1044	
9	Muscle Structure and Function	Ch 46 1066-1073	
12	Exercise Physiology: Integrating Organ Systems		
	COMPREHENSIVE FINAL EXAM		

BIO 101 Tests and Levels of Understanding

In BIO 101 you are expected to understand and apply the concepts presented in lectures. This requires skills other than merely being able to recall the information presented. Educational researchers have identified different levels of cognitive ability (referred to as Bloom's Taxonomy) that range from simple memorization to the ability to develop and defend opinions. Without ever knowing it, you are likely thinking in these different levels already. As you study and learn the material presented in class, it may be helpful to test yourself at all the levels presented below. With each level is a list of words that are often used to construct questions that address that level. The levels are listed from simplest to most complex.

1. **Knowledge**—identify and recall information. Define, distinguish, identify, recall, recognize.
2. **Comprehension**—organize and select facts and ideas. Conclude, demonstrate, differentiate, draw, explain, give in your own words, illustrate, interpret, predict, rearrange, reorder, rephrase, represent, restate, transfer, translate.
3. **Application**—use facts to explain concepts. Apply, classify, develop, employ, generalize, organize, relate, restructure, transfer, use.
4. **Analysis**—separate whole into component parts. Analyze, categorize, compare, contrast, deduce, detect.
5. **Synthesis**—combine ideas to form a new whole. Combine, constitute, derive, document, formulate, modify, organize, originate, produce, relate, specify, synthesize, tell, transmit, write.
6. **Evaluation**—develop and defend opinions. Appraise, argue, assess, decide, evaluate, judge, standardize, validate.

In BIO 101, you will not be tested on the level of evaluation. However, you will need to prepare for all other levels of understanding. Oftentimes, higher level questions require you to recall knowledge as well as perform higher level thinking.

Some Differences Between High School and College Biology

Issue/Topic	High School	College
in class hours per semester	>90	30
percent of material reviewed or reinforced in class	90-100	10-20
student reliance on textbook as source of information and/or explanation	little	heavy
number of hours per week outside of class for reading and/or review	2-4	8-12
percentage of test questions at knowledge level of understanding	60-90%	40-60%
number of distractors in test question responses	1-3 out of 5	0-1 out of 5
note taking	important notes presented on board	important notes presented verbally
attendance	mandated by state	expected, but not enforced

Sample multiple choice test questions:

High school:

Mitochondria are often called the powerhouse of the cell because they _____
 A) are the site of cellular respiration, B) contain chromosomal DNA,
 C) function in making proteins, D) perform exocytosis

College:

The energy of electron transport serves to move (translocate) protons to the outer mitochondrial compartment. How does this help the mitochondrion to produce energy?

- A. The hydrogen ions (protons) are transferred to oxygen in an energy-releasing reaction.
- B. The translocation of protons sets up the electrochemical gradient that drives ATP synthesis in the mitochondria.
- C. The protons pick up electrons from the electron transport chain on their way through the inner mitochondrial membrane.
- D. The protons receive electrons from the NAD⁺ and FAD that are accepted by electrons in glycolysis and the Krebs cycle.

BIO 101 Lab Schedule
Fall 2007

Week	Dates	Lab Activity
1	9/10-9/14	Jumping: Energetics and Scale
2	9/17-9/21	Cell Fractionation: Isolation of Mitochondria
3	9/24-9/28	Gas Exchange: Respiration
4	10/1-10/5	Gas Exchange: Photosynthesis
5	10/8-10/12	Animal Anatomy I.
6	10/15-10/19	Animal Anatomy II.
7	10/22-10/26	Lab Exam