

Biology 226: Animal Physiology I.

Fall 2005

MWF 8:30-9:30

N5

Instructor.

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Office Hours: M: 5:00-6:30, W: 9:30-12:30 or by appointment. I will also answer questions if they are sent to me by email.

Course Scope.

This course is designed to provide an introduction to basic physiological concepts. Some of the concepts will be applicable to plants and animals; however, examples will be confined to the animal kingdom. The physiology of mammals, especially humans, is the best-understood and will form the foundation of the course.

Tentative Topics.**1. Cell Physiology**

- A. Introduction. VERY brief review of cellular organelles, cytoskeleton, cell-cell interactions.
- B. Fluid and electrolyte balance.
- C. Acid-base balance.

2. Tissues and systems

- A. Levels of organization
- B. Homeostasis and Cellular Communication
- C. Organization of cells in tissues

3. Nerve, Muscle, Synapse.

- A. Physical Basis of Neuronal Function.
- B. Communication Between Neurons.
- C. Muscle Physiology: Striated and Smooth Muscle.

4. Circulatory System.

- A. Constituents of Blood.
- B. The Heart. Mechanics of Contraction.
- C. The Vascular System.
- D. Regulation of Blood Pressure.

5. (Respiratory System)**Evaluation.**

5% Participation

25% Mid-term #1
 30% Mid-term #2
 40% Final Exam

Exams will be a mix of short-answer, long-answer and case studies. Old exams have been saved on the "R" drive (under BIO 226). Exams will be held on Fridays in J320, so that you have more than 50 minutes to complete the exam.

Course Resources.

Textbook: Hole's essentials of human anatomy and physiology (0-07-253962-3). I recommend that you read the appropriate sections before the lecture AND after, so that you clarify and enlarge your notes. You will find summary outlines and review exercises at the end of each chapter

Course Directory: The Powerpoint presentations, the course outline, and practice exams for Animal Physiology I are found on the R drive under BIO226 (read). I would strongly recommend that you print out the figures before the lecture as 3 slides/page, so that you have room to take notes.

Web Site: www.mhhe.com/shierss9 (online learning center for your textbook) An access code is packaged with your textbook. This site offers quizzes and additional information.

Plagiarism

According to the university calendar (p. 21)

"Plagiarism includes but is not limited to the following practices:

- Using another's work without acknowledgement
- Copying material without quotation marks
- Paraphrasing too closely the exact words of the originating author
- Submitting as one's own work written in whole or in part by another individual.

The following practices related to plagiarism are also prohibited:

- Helping another student plagiarize
- Submitting in whole or in part work for which the student has received credit in another course, unless the permission of the instructor is obtained
- Submitting any statement of fact known to be false or providing a fabricated reference to a source"

The university-determined penalties for plagiarism are quite severe, ranging from a 0 for the assignment to expulsion from the university. It is thus important that you acquaint yourself with the above regulations.

How to Succeed in Biology 226

The information in this course is very cumulative. The cardiovascular unit requires you to understand all of the prior material about cells, nerves and muscles. If you are

having problems with early sections it is CRITICAL that you deal with them – come and see me or phone/email to set up an appointment.

Your mark in physiology will largely reflect your ability to APPLY the principles that you learn. Application requires more than familiarity – it requires a deep understanding of the basic concepts. You cannot predict all of the different forms that the application could take. Your experience of learning physiology will be most enjoyable and productive if you go beyond rote learning.

You will already have some beliefs and understandings about physiology that will influence how you learn the information in this course. Many of your beliefs and understandings are correct and we will build on them, whereas some of your ideas are probably incorrect or too simplistic. However, these beliefs and understandings may be very deeply ingrained, persistent, and sometimes unconsciously held and they may be very difficult to change. It can be very difficult to replace simplistic explanations we learned in school with more complex information at the university level. Learning physiology – or any other subject – therefore involves:

1. **Construction:** Adding and enhancing your previous store of ideas.
2. **Reconstruction:** replacing prior views and ideas with more plausible, in-depth, or useful ones.
3. **Self-monitoring.** Construction and reconstruction require that you also monitor your personal understanding of a particular topic and consciously formulate links between what you are learning and what you have previously learned. Rote learning is not a very effective way to learn physiology (or almost anything else, for that matter). Metacognition is monitoring your own understanding. Metacognition is very effective if it takes the form of self-questioning during the lectures. Try to ask yourself questions during lectures such as “What is the prof trying to show here?” “What do these numbers really mean?” or “How does this stuff relate to the stuff we covered yesterday?” Self-questioning will help you create links between concepts, and learning these links is critical to a good performance in this course. In other words, try to be an **active learner** during the lectures. Familiarity with the material is not enough – you will have to internalize it and apply it in order to succeed. Your ability to be an active learner during lectures will be greatly enhanced by reading the appropriate sections of the textbook before the lecture.

In addition, each field in biology has its own language. This language is not designed to make your life difficult – the terms often represent complex concepts that ARE the subject. Terms such as “signal transduction” or “membrane potential” actually represent complex concepts. Rote learning of definitions is not going to help you learn. Indeed, since biological terms often have different meanings in everyday conversation, you probably have some definitions that are misleading and must be “deconstructed.” We learn a new language not by reading about it but by using it. We will be employing a number of learning techniques to help you become comfortable with the language of physiology.

Learning Techniques

1. MINI-PRESENTATIONS

I may ask you to make a brief 1-2 minute presentation in a small group regarding a particular topic. For instance, you could present a short section of the textbook or discuss a particular figure and its relevance to other topics. The goal of this exercise is to practice using the language of physiology.

2. CONCEPT MAPPING

Although your text is divided into separate systems (nervous, muscular, cardiovascular, etc), these different systems cannot be considered in isolation. It is thus extremely important to understand the links between information you learn within and between the different units of the course. A way to understand the links between concepts is CONCEPT MAPPING.

How to Make a Concept Map

Linkage maps chart relationships between different terms. They can be particularly effective for understanding the links between different levels of physiology (for instance, molecular, cellular, systemic).

1. Select the concepts to map (6-10 is a good number). Try to use a mixture of nouns, verbs, and processes.
2. If one exists, place the most general, important, or over-riding concept at the top or in the center and arrange the other terms around it.
3. Draw lines between concepts that are related. Use a propositional statement to define the relationship. Putting precise words to the relationship can be a difficult task. You may feel that you understand it but cannot put it into words. The action of putting it into words can help you "deconstruct" incorrect presuppositions and "construct" the correct ones. Label as many relationships as possible, even if they seem ridiculously remote.
4. Your concept map should be understandable to another person. It can be a useful learning tool to exchange concept maps with a study partner. Maps can be works-in-progress.
5. There is not a single correct concept map. Each concept map is individual. The process of constructing a concept map IS the learning process.

3. PAIRED PROBLEM SOLVING: METACOGNITION

Students will pair up. One student will be the **problem-solver**. His/her task is to try to solve the problem while explaining aloud the logical steps and thought processes he/she is going through. He/she begins by reading the problem out loud, and then proceeds to piece the solution together. The other student is the **responder**. His/her task is to ensure that the problem-solver clearly identifies the steps he/she is following in a logical manner. The responder should ask questions to clarify what is being said and why, by asking questions such as "Why did you say that?", "How can you conclude that?", or "What principle are you applying here?" The responder can also

keep the problem-solver on track, but he/she must not take over the role of problem-solver. It is fine if the problem-solver gets stuck – at this point, try to clearly identify the problem. This method will help you to identify weaknesses in your understanding of physiology that would otherwise reveal themselves as a poor mark on an exam.

4. MODELS AND MIMICS

I will model a physiological process or problem on the board, describing the rationale for each step. My approach will be one of many possible approaches. Each student will prepare to “mimic” my presentation by listening carefully and taking notes. After I finish the presentation, I will give you a few minutes to organize your thoughts. Then, I will ask one student to repeat my presentation on the board without using any notes, including all intermediate steps. The student can “pass the chalk” to a different student whenever he/she gets stuck.