BIO 223 Human Anatomy and Physiology for Biology Majors

Jeffrey A. Walker

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Professor Information

I'm a Professor of Biology. My Ph.D. is in Anatomy and my previous research was in biomechanics, evolutionary morphology, and exercise physiology of swimming and flying, mostly fish. My current research is metascience (the science of science) of statistical practice in experimental bench biology (the kinds of experiments that discover the information in human physiology textbooks)

Student hours I'm happy to stay after class to answer questions about the lecture or the textbook. I also welcome students to chat about the A&P content of this class or your career goals via scheduled Zoom sessions – to schedule, see me before or after class, or e-mail me.

E-mail: walker@maine.edu

Course Information

Room Payson-Smith 41

Class meetings are Mondays and Wednesdays, 2:00 PM – 3:15 PM

Prerequisite(s) BIO 105 or permission of instructor.

Credit Hours: 3

About the course

This course is the second of a two-semester sequence that introduces how the human body functions from the sub-cellular to the whole-individual level. The content and presentation is designed for Biology majors and students wanting to enter graduate programs in medicine or physiology (Note that this course is not a sequel or "follow-up" of BIO 111/113. In this course, we will frequently apply elementary principles of physics and chemistry to understand function. The focus will be on the regulation of the different physiological systems to maintain health and performance with only limited attention to disease, which is the focus of BIO 345 Pathophysiology. The course will emphasize the vocabulary and "language'' of physiology, which is necessary for any kind of professional communication including reading from the literature or discussion of a case-history. The course will emphasize principles instead of factual detail. The knowledge of principles can be applied to many different systems. While incredibly important for understanding the any one system, knowledge of specific facts are limited to that system. Finally, the course will emphasize the nature of scientific knowledge and what is good science. This will allow you to address the many misconceptions on human health and performance both in the lay public and in the professional community.

Learning goals

At the completion of this course, students will be able to:

1. Explain physiological mechanisms using the language of physiology and principles of chemistry and physics
2. Explain the goals and limits of science, especially applied to human health, performance, and disease
3. Recognize reliable sources of information relevant to human physiology, health, performance, and disease
4. Apply the principles learned to correct misconceptions that are common in both the lay public and the professional community

Course Details

Why lectures are important

My lectures are one, long, story that integrates the themes, concepts, and information in human physiology that I think are important for becoming an expert in the field. A textbook – any textbook – supports this story with written material. **The textbook should be viewed as a reference**, kind of like a dictionary, or an encylopedia, or wikipedia. As a reference, the textbook will have information that is not part of the story that I teach at the level of this class. And, it will fail to have some of the information in my story. A good example of information that is in my story but missing from the textbook is physiological genetics (wait what? physiological genetics is hugely important to human health and performance!). I provide reading material for the missing bits but I cannot chop out the extra information in your textbook. I wouldn't anyway... all this information is great, even if its not part of the story that I teach. Regardless, this is why lectures are important – when it comes to evaluating your learning with tests, the evaluations are based *mostly on* (but not limited to) concepts and information from my lectures.

Textbook

A textbook of some sort is critical for learning intro Biology, including Intro human physiology. This textbook *could* be wikipedia (see below) but I would highly, highly, highly recommend that you purchase a textbook. If you think there is some chance that you will apply for medical/dental/vet/physician assistant school or apply to a masters/phd program, you will almost certainly have to take a standardized test that will cover the material in human physiology. You will want to use a textbook to re-study all of this material.

Recommended textbook

Vander's Human Physiology: The Mechanisms of Body Function}. 14th Edition.

Author(s): Widmaier, Raff, and Strang; ISBN-13: 978-1259294099

Notes about reading

I do not assign mandatory homework from the textbook but I do refer to pages or figures. Note that if you choose to use another textbook it will be up to you to figure out the relevant readings. This is a good skill to acquire anyway.

A note on Wikipedia. Wikipedia contains all of the information that you need for this class. It is not perfect, but is very reliable, despite a few mistakes (probably from students entering information as parts of poorly edited projects). But textbooks also contain mistakes. Professionals in many fields use Wikipedia to rapidly find reliable information. While Wikipedia is an excellent supplementary resource, I would not

Work	Percent
Exam 1	20%
Exam 2	20%
Exam 3	20%
Exam 4	20%
Exam 5	20%

recommend it as your sole resource. There is too much detail. It takes skill to scan through wikipedia and focus on the relevant material and to not click your way down a path of irrelevancies. But I highly *strongly* recommend using Wikipedia as a supplementary study source.

How to study from a textbook

1. A textbook is not a novel, don't read it like one.
2. Before the lecture
    a. Read the section headings of the relevant chapter and think about what these headings mean and creating a scaffold in your brain for organizing these concepts.
    b. Look at each figure and understand what the figure is communicating.
    c. Find all the bold face terms and say these out loud, to your cat, your potted plant, or your roommate. Write down the bold face terms on one side of an index card and the meaning of the term on the opposite side
3. Immediately after the lecture
    a. Mark in your lecture notes the locations (page/column/paragraph, figure number, table number) in the chapters that cover this. Note I wrote locations and chapters – the information could be in multiple locations and yes, multiple chapters. Use the index to help with this.
    b. Mark in your textbook sections that I emphasized in lecture.
    c. Use your notebook to draw figures from lecture and figures from your textbook. At this stage, these can be copies.
    d. Read the text in the sections relevant to the figure. Add additional information.
    e. Mark sections in your textbook that were not covered in the lecture. This doesn't mean I won't ask you question about information in these sections (its an open book test!). These are sections that I find less useful for lecture for a variety of reasons including 1) maybe there is too much detail for rote memory, 2) it might be very straightforward and you don't need me to explain it, or 3) maybe I just find it less exciting or important.
    f. Look at the study questions after sections and after the chapter. Write down the question and answer in your notebook. Check your answer. Write down the correct answer.
4. After completion of #3
    a. Use your notebook to draw figures from lecture and figures from your textbook **from memory and from your understanding**. Do **NOT** use lecture/textbook figures to guide you. Label the figure or number the steps in a process. After you're done, compare with the lecture/textbook figure and identify what you know and what you don't know.
    b. Test vocabulary with your index cards
    c. Look at the study questions after sections and after the chapter. Write down the question and answer in your notebook. Check your answer. Write down the correct answer. If your answer was wrong, write down why your answer was wrong.
5. The schedule contains specific sections and skips some sections, do I need to read the missing sections? See item 3d above!

Work Involved

Exams

The TL;DR

There are five, online exams that will be taken using Brightspace. Each exam is

1. Open resource (lecture notes, textbook, wikipedia), other than asking for or sharing answers.
2. Untimed, but there is a three day window to submit.
3. Three attempts. The highest attempt will be your score.
4. Feedback. Immediately following submission, you will get feedback on which questions were answered correctly and which incorrectly, BUT you will not be given the correct answers to the questions answered incorrectly.
5. Questions drawn from lectures and textbook. Most questions will have been thoroughly discussed in lecture. Some will not have been in lecture at all.
6. Cumulative. A small fraction of questions from content in previous units (including BIO 221) will be included.

About the exams

1. Exams will have between 25 and 50 multiple choice questions
2. Each attempt will be unique.

– Most questions will have multiple versions of the same fundamental question and the version that you see will be random. When you retake another attempt, you will see different combinations of these versions.

– Some questions will have multiple versions that evaluate knowledge in a specific area but the different versions will be fundamentally different questions.

Why this type of exam?

1. Untimed, open resource exams emphasize the ability to recognize reliable answers and reliable sources, which are critical skills in all modern careers in human health and performance
2. Untimed, open resource exams emphasize reading comprehension over rote memory
3. Multiple attempts encourages students to engage with sources and review specific concepts multiple times, which is a kind of retrieval practice
4. Cumulative testing encourages retrieval practice

Exams are tools to self-assess learning

The goal of exams is to **self-assess** learning. The exams have questions at multiple levels of learning – from questions that assess recall of common and important physiology vocabulary to questions that require integration of concepts. Some of the questions are challenging, in the sense that 1) all answers may seem plausible if you are not well prepared, or 2), the answer requires integrating information from multiple places in the textbook, which means you cannot open to a page and point to the answer.

- The goal of writing an exam in which most or all choices for some questions seem plausible is to assess the level of understanding – which students have understood the content well enough to recognize subtle differences in context or meaning. The goal is not to "trick" students. Professors aren't evil... we have very good pedagogical reasons for designing exams the way we do.

- the goal of writing an exam that requires integration of information is again, to assess the level of understanding – which students can go beyond memorization of vocabulary and steps in a pathway by integrating concepts.
- the goal of an untimed exam is to allow you to evaluate your learning given full access to information and with a reasonable time to do this. This is actually how the modern world works. Everyone in every profession "googles" information and then uses their own prior learning to 1) evaluate the reliability of the googled information and) integrate the googled information with prior knowledge to construct an answer.

Exam score to grade map

The "map" from a numeric score to a letter grade is:

Scores	Grades
90-100	A
87-89	A-
84-86	B+
80-83	B
77-79	B-
74-76	C+
70-73	C
67-69	C-
60-66	D
< 60	F

Final course grade

The final course grade will be mapped from the average of the five exam scores.

Course Policies

class attendance. I do not take attendance. That said, class is fun (ha ha, sure) and you meet lots of other students who are potential study partners and friends. People that succeed surround themselves by people that succeed. Success is infectious.

University Policies and Resources

ACADEMIC INTEGRITY / PLAGIARISM

Everyone associated with the University of Southern Maine is expected to adhere to the principles of academic integrity central to the academic function of the University. Any breach of academic integrity represents a serious offense. Each student has a responsibility to know the standards of conduct and expectations of academic integrity that apply to academic tasks. Violations of academic integrity include any actions that attempt to promote or enhance the academic standing of any student by dishonest means. Cheating on an examination, stealing the words or ideas of another (i.e., plagiarism), making statements known to be false or misleading, falsifying the results of one's research, improperly using library materials or computer files, or altering or forging academic records are examples of violations of this policy which are contrary to the academic purposes for which the University exists. Acts that violate academic integrity disrupt the educational process and are not acceptable.

Evidence of a violation of the academic integrity policy will normally result in disciplinary action. A copy of the complete policy may be obtained from the office of Community Standards and Mediation, online at https://usm.maine.edu/community-standards-mediation/academic-integrity or by calling and requesting a copy at (207) 780-5242.

FINAL EXAMINATIONS/FINAL PROJECT It is a USM academic policy that no tests or exams may be scheduled during the last week of classes.

DISABILITY ACCOMMODATIONS

The university is committed to providing students with documented disabilities equal access to all university programs and services. If you think you have a disability and would like to request accommodations, you must register with the Disability Services Center. Timely notification is essential. The Disability Services Center can be reached by calling 207-780-4706 or by email dscusm@maine.edu. If you have already received a faculty accommodation letter from the Disability Services Center, please provide me with that information as soon as possible. Please make a private appointment so that we can review your accommodations.

TUTORING AND WRITING ASSISTANCE

Tutoring at USM is for all students, not just those who are struggling. Tutoring provides active feedback and practice, and is available for writing, math, and many more subjects.

Walk-in tutoring is available at the Glickman Library in Portland, the Gorham Library, and the LAC Writing Center. For best service, we recommend making an appointment at https://usm.maine.edu/learningcommons/schedule-tutoring-appointment. Questions about tutoring should be directed to Naamah Jarnot at 207-780-4554. Interested in becoming a more effective, efficient learner? Check out https://usm.maine.edu/agile!

COUNSELING

Counseling is available at USM. The best way to schedule an appointment is to email usm.health@maine.edu. More information is available at https://usm.maine.edu/uhcs.

NONDISCRIMINATION POLICY

The University of Southern Maine is an EEO/AA employer, and does not discriminate on the grounds of race, color, religion, sex, sexual orientation, transgender status, gender expression, national origin, citizenship status, age, disability, genetic information or veteran's status in employment, education, and all other programs and activities. The following person has been designated to handle inquiries regarding non-discrimination policies: Sarah E. Harebo, Director of Equal Opportunity, 101 North Stevens Hall, University of Maine, Orono, ME 04469-5754, 207.581.1226, TTY 711 (Maine Relay System).

STATEMENT ON RELIGIOUS OBSERVANCE FOR USM STUDENTS

Absence for Religious Holy Days: The University of Southern Maine respects the religious beliefs of all members of the community, affirms their rights to observe significant religious holy days, and will make reasonable accommodations, upon request, for such observances. If a student's religious observance is in conflict with the academic experience, they should inform their instructor(s) of the class or other school functions that will be affected. It is the student's responsibility to make the necessary arrangements mutually agreed upon with the instructor(s).

TITLE IX STATEMENT

The University of Southern Maine is committed to making our campuses safer places for students. **Because of this commitment, and our federal obligations, faculty and other employees are considered mandated reporters when it comes to experiences of interpersonal violence (sexual assault, sexual harassment, dating or domestic violence, and stalking).** Disclosures of interpersonal violence must be passed along to the University's Deputy Title IX Coordinator who can help provide support and academic remedies for students who have been impacted. More information can be found online at https://usm.maine.edu/campus-safety-project or by contacting Sarah E. Holmes at sarah.e.holmes1@maine.edu or 207-780-5767.

If students want to speak with someone confidentially, the following resources are available on and off campus: University Counseling Services (207-780-4050); 24 Hour Sexual Assault Hotline (1-800-871-7741); 24 Hour Domestic Violence Hotline (1-866-834-4357).

Date	Content	Reference
Mon Jan 17	No class (MLK holiday)	
Wed Jan 19	Lymph and Immune I	12.1, 12.23-25, 12.12, 18.1
Mon Jan 24	Immune II	18.1-18.3
Wed Jan 26	Immune III	18.1-18.3
Mon Jan 31	ANS	6.18
Wed Feb 2	Endocrine	11A
Mon Feb 7	Test 1 (Online Sun-Tue)	
Wed Feb 9	Heart I	12.1, 12.3-12.7
Mon Feb 14	Heart II	12.3-12.7
Wed Feb 16	Vessels	12.2, 12.8-12.10, 12D
Mon Feb 21	No class (presidents day)	
Wed Feb 23	Respiratory I	13.1-13.3
Mon Feb 28	Respiratory II	13.4-13.7
Wed Mar 2	Test 2 (Online Mon-Wed)	
Mon Mar 7	Renal I	14.1-14.4
Wed Mar 9	Renal II	14.1-14.4
Mon Mar 14	No class (spring break)	
Wed Mar 16	No class (spring break)	
Mon Mar 21	Fluid & Ion Balance	14.6-14.19
Wed Mar 23	Fluid & Ion Balance	14.6-14.19
Mon Mar 28	Test 3 (Online Sun-Tue)	
Wed Mar 30	Nutrition I - nutrients	2.4
Mon Apr 4	Nutrition II - digestion, absorption, fate	15.1-15.5, 16.1
Wed Apr 6	Energy metabolism I (ATP synthesis)	3.14-3.16
Mon Apr 11	Energy metabolism II (-genesis and -lysis)	16.1-16.2
Wed Apr 13	Nutrition and Energy homeostasis	16.2-16.3
Mon Apr 18	Test 4 (Online Sun-Tue)	
Wed Apr 20	Physiol Genetics I	see links below
Mon Apr 25	Physiol Genetics II	
Wed Apr 27	Physiol Genetics III	
	Test 5 (Online Mon-Wed)	

Schedule

Links

1. Human Physiology/Genetics and inheritance
2. What Is Cystic Fibrosis? (youtube video)
3. The role of CFTR in Cystic Fibrosis (youtube video)
4. Cystic Fibrosis Mechanism and Treatment | HHMI BioInteractive Video