

PCB4723C - Physiology and Molecular Biology of Animals

Syllabus Awareness

You are solely responsible for reading and following the instructions, guidelines and schedules in this syllabus. Not having read the information in this syllabus will not constitute as an excuse.

Course Description

This course will cover fundamental principles of animal physiology at the molecular, cellular, tissue, systemic, and organismal levels. The course will utilize reading assignments, lectures, videos, primary scientific literature, discussions, group projects, student-led presentations and interactive laboratory exercises to facilitate learning of physiological principles.

Student Learning Outcomes

At the end of the course, students should be able to:

- Utilize critical thinking skills and apply physiological concepts and principles at the basic and applied science levels
- Describe the fundamental mechanisms underlying normal function of cells, tissues, organs, and organ systems in animals
- Explain the basic mechanisms of homeostasis by integrating the functions of cells, tissues, organs, and organ systems
- Understand important physiological challenges animals face, how those challenges vary in relation to the animal's environment, and the processes by which animals deal with those challenges
- Understand the role of evolutionary processes in driving the organization of physiological systems
- Effectively solve basic problems in physiology, working independently and in groups
- Apply knowledge of functional mechanisms and their regulation to explain the pathophysiology underlying common diseases
- Successfully acquire primary literature articles through database searches
- Use primary literature readings to understand basic physiological principles and mechanisms
- Read and critically evaluate the design, results and conclusions of experiments published in primary physiology literature
- Interpret and knowledgeably discuss primary literature among peers

Prerequisites

Two semesters each of general biology (BSC 2010 & 2100), general chemistry (CHM 2046/2046L), and general physics (either PHY 2048/2048L or PHY 2053/2053L) are required with a grade of at least 'C'. Genetics and biochemistry are recommended but not required.

Credits

5

Course Schedule

Tuesdays and Thursdays, periods 2-3 (8:30-10:25am) in CSE A101

Time Commitment

The UF College of Liberal Arts and Sciences assumes that you will devote 3-4 hours per week per credit-hour to each course. Because PCB4723C is **five credits**, you should therefore expect to devote **15-20 hours per week**

to this course, of which only 7 hours per week will be spent in class. If you find yourself spending more than 20 hours per week on average, discuss this with your course instructor or teaching assistant (TA) to see if you can refine your study habits. If you find yourself spending less than 10 hours per week on average, you should recognize that you may have difficulty fully learning and comprehending the material in this time, which will likely be reflected in poor performance on the various assessments causing you to receive a lower overall course grade.

Attendance, Participation and Absences

Come to class and participate. If you do not attend class, you will not do well in this course. Seniors have failed or withdrawn from this course and had to repeat it. Some of them had GPA's above 3.5 and were already conditionally accepted to medical or dental programs. They decided they would miss class and get through the course by cramming for exams. They were wrong and it cost them. You will need to participate in the class and work hard to do well.

If you must miss an exam due to an allowable scheduled absence (for example, to participate in a sanctioned university function), you must notify the instructor as soon as the event is scheduled or during the first week of classes. If you miss an assignment or exam due to an allowable but unscheduled absence (e.g., illness), you must contact the instructor as soon as possible. In the case of illness, you must provide a signed note from a health care provider. Requirements for class attendance and make-up exams, assignments, and other work in this course are otherwise consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Instructor Information

MAIN INSTRUCTOR

Joni E. Wright, M.S.

Ph.D. Candidate in Zoology, Department of Biology

Office Hours: Wednesdays 5:00-6:00 PM and by appointment

GRADUATE TEACHING ASSISTANTS

Ellen Humbel, Dave Anderson, and Philip Shirk

Ph.D. students in Zoology, Department of Biology

Office Hours: TBD and by appointment

Counseling and Wellness Center

For counseling and mental health concerns, contact the UF Counseling and Wellness center at <http://www.counseling.ufl.edu> or 392-1575, or the University Police Department at 392-1111 or 911 for emergencies.

Communication

COMMUNICATING WITH THE INSTRUCTOR AND GRADUATE TEACHING ASSISTANTS

You must use the **Inbox** icon on the course Canvas site to communicate with the instructor and TA's about this course through Canvas messaging. We will make every effort to respond to conversation messages within 48 hours on business days (i.e. Monday through Friday excluding holidays). Do not send email directly to the instructor or TA's UF email accounts to contact them.

Course Content

The course material is comprised of textbook reading assignments, lectures, laboratory lessons and discussions, and supplementary reading assignments including primary research articles. The lectures synthesize, refine, and

PCB4723C, Spring 2018

rev: 1/3/2018

sometimes elaborate on the material in the textbook. The laboratory exercises will help you learn physiology with lessons and interactive simulations. Discussions on primary research articles will reinforce physiological principles and help you learn to effectively communicate scientific information. Once during the semester, you will work in a team to present a primary research article and lead a discussion among your peers.

Required Course Materials

REQUIRED TEXTBOOK

Required Textbook: Animal Physiology, 4th edition, by Hill, Wyse and Anderson (Sinauer Associates), 2016©. ISBN: 9781605354712

ADDITIONAL REQUIRED MATERIALS

A **calculator** should be brought to class and exams. Any scientific calculator should be sufficient. Graphing calculators or calculators with extensive memory functions will **NOT** be allowed for exams.

ADDITIONAL OPTIONAL MATERIALS

Occasionally, we will use the Kahoot! response system for in-class active learning questions. No points will be associated with these questions; however, your participation will allow me to gauge your understanding of material presented in class and provide students with an indication of exam question format. Kahoot! is a free learning platform that can be accessed on any **device with internet access**. To participate, bring a device to access Kahoot! sessions during lecture. For more information visit <https://kahoot.com/>.

Activities and Assessments

EXAMS

There will be two exams (a midterm and a final exam). Exams will test your understanding and application of concepts presented in lecture and a portion of each exam will be related to the articles that you discuss in laboratory meetings. Most exam questions can be classified as higher-order cognitive questions ([see Bloom's taxonomy](#)). Very few exam questions are based on simply memorizing information.

The exams will consist mostly of problem-based questions in the format of 50-70 multiple choice, fill-in-the-blank, ordering and numeric (calculation) questions. The exams will be closed-book and you may **not** use notes. The midterm exam will cover all course material through week 8 and the final exam will cover all course material from the entire term, **but will primarily focus on the last half of the course** keeping in mind that an understanding of the material from the first half of the course is necessary for a full understanding of material covered later in the course. Because concepts in physiology build on each other, the final exam is considered cumulative. For example, you cannot understand how the kidney functions without a solid understanding of transport mechanisms of solutes and water.

CHAPTER QUIZZES

You are expected to read assigned textbook chapters. There will be quizzes covering information from each chapter reading assignment. Quizzes for each chapter will be available at the textbook's companion website published by Sinauer Associates (<https://animalphys4e.sinauer.com/quiz/>). You must create an account (**using your GatorLink username and UF email**) and register for the quizzes using the instructor's email address (jwright1855@ufl.edu) to access the "Spring2018_PCB4723C" course material.

CANVAS QUIZZES

Four quizzes during the semester will be available in an effort to help students review material and prepare for exams.

The score you receive on your first attempt will be recorded in the Canvas gradebook; however, you may take the chapter and canvas quizzes an unlimited number of times to ensure that you understand material. You must complete your first quiz attempt by the deadline indicated in Canvas to receive credit for the quiz. Chapter quiz scores will not be automatically populated in the Canvas gradebook. Please allow time for manual transfer of grades from the textbook companion site to Canvas. **Use of emails other than your UF email will result in a grade of zero being entered into the Canvas gradebook.**

Discussions & Laboratory

Engaging in discussion is an important tool to help students recognize their level of understanding of physiological concepts and fundamental principles. If you cannot effectively explain a concept to someone else, you likely do not understand it yourself. Research shows that learning through discussion allows 50% retention of information compared with 5% and 10% through reading and lecture, respectively. Discussion also engages students in active, rather than passive, learning contributing to the development of critical thinking skills necessary for future career success. Each student will be assigned to an Article Group during the first laboratory meeting. Groups will be assigned primary physiology research articles. Reading and discussing the articles will help to reinforce the physiological concepts you learn this semester.

PRIMARY RESEARCH ARTICLE DISCUSSION

Seven primary research articles will be assigned for you to read during the semester. These articles will serve as the basis for the discussions during laboratory meetings. The articles expand on lecture and lab material. All students are required to read the articles and complete homework associated with the articles **BEFORE** the first section meets to discuss it. For each article, a team of three to four students will serve as discussion leaders. Once during the semester, you will be a **discussion leader**. During the other article discussions, you will be a **discussion participant**. As implied in the name, participants should actively participate in the discussion, especially by asking questions and/or providing answers to questions raised by the discussion leaders, the other participants, or the TA. **A portion of the exams will be devoted to articles discussed during lab meetings.** Each article will be released 3 weeks prior to its scheduled discussion giving article groups time to prepare a presentation and discussion that summarizes the article, teaches associated physiological concepts, and successfully engages discussion participants.

ARTICLE DISCUSSION LEADER PRESENTATION PROJECTS

Once during the semester, a group of students will work together to prepare a presentation based on one of the physiology article assigned readings. During the first week of laboratory meetings, students will sign up for an Article Group. The group members will lead a discussion on the assigned article with their laboratory sections. A rubric will be posted for the discussion leader assignment in Canvas to communicate the expectations for the assignment. Be sure to read the rubric ahead of time so that you may maximize the points you earn as a discussion leader. In general, discussion leaders will be expected to summarize the article including pertinent background information, *brief* methodology, results, and conclusions, use the article to teach related physiological principles to peers, and lead and facilitate a discussion among peer. Discussion leaders are required to meet with their TA 2 weeks prior to their presentation date. Time has been set aside during laboratory/discussion meetings for these required pre-discussion meetings. The article discussion leader rubric will indicate expectations for these meetings. Students must read the article and rubric **PRIOR** to their pre-discussion meeting and be prepared to summarize major points of the article and ask questions to clarify their understanding of the article. Failure to meet with your TA for this **required** pre-discussion meeting will cause you to forfeit your discussion opportunity and all points associated with the discussion leader project.

SIMULATION SOFTWARE AND LABORATORY LESSONS

You will complete some laboratory exercises using simulation software in which you will perform experiments and complete lessons using computerized mathematical simulation software to investigate physiological principles. All simulation software packages used in the course are publicly available for your use. A series of background information and instructions provided on Canvas will guide you through physiology simulations. You will be assessed by a series of multiple choice questions that test your understanding of the principles and simulations, as well as by generating graphs to present and interpret the data. Unless noted otherwise, assessments and assignments will be due by the end of your scheduled lab meeting time.

We encourage you to use your book to help with the assessments. We expect and encourage you to discuss general concepts related to the assessments with your classmates during a lab session; however, you must ultimately derive your own conclusions and avoid exchanging answers. It is also essential that you do not discuss specifics about the assessments with students in other lab sections until all sections have met. This would provide an unfair advantage to those that meet later in the week. Given that there is a potential for the final grading scale/distribution to be adjusted, it is in your best interest not to tip-off students in other sections. Doing so will be treated as a violation of the academic honesty policy.

SOFTWARE

- Nernst-Goldman Simulator

A simple simulation of resting membrane potential and action potentials in neurons using the Hodgkin-Huxley model: <http://www.nernstgoldman.physiology.arizona.edu/>. This simulator requires installation of Adobe Flash Player 8 plug-in.

- Nerve

A web-based simulation of nerve action potentials and action potential propagation (with a squid model): <http://nerve.bsd.uchicago.edu/nervejs/MAP.html>.
(non-java version: <http://nerve.bsd.uchicago.edu/nervejs/MAP.html>)

- HumMod

HumMod Modeler is a detailed, customizable simulation of human physiology that utilizes over 5,000 physiological variables. The software was initially developed at the University of Mississippi Medical Center. The project is <http://hummod.org/>. HumMod may also be available on UF Apps.

ATTENDANCE AND SWITCHING LABS

Laboratory attendance is mandatory. If the student has three or more unexcused absences, the instructor may prohibit further attendance and subsequently assign a failing grade.

Students should attend the section for which he/she is registered. If a student desires to switch laboratory sections, whether for one laboratory meeting or for the entire semester, the student is required to obtain written permission from both laboratory section TA's. Additionally, the students may be required to find a student from the other laboratory section willing to exchange places with him/her. Students will NOT be allowed to attend an alternate laboratory section if doing so creates a hardship on either laboratory section class.

You may attend a different lab section only to make-up an excused scheduled absence (e.g. interview for professional school, university sanctioned activity) or unscheduled illness. In either case, you must: 1. Provide documentation authenticating the reason for your absence, 2. Obtain permission from both TA's (i.e. the TA from the lab section for which you are registered and the TA from the lab section that you wish to attend in order to make-up your excused absence), and 3. You may be required to bring your own laptop computer.

If you know you are going to miss a class, it is in your best interest to notify TA ahead of time in-person or via Canvas mail. If you are going to be absent from a discussion session/laboratory meeting, you should provide the TA with advanced notice. University policy dictates that absences from class for court-imposed legal obligations (e.g., jury duty, subpoena) must be excused. Other reasons may be approved at the discretion of the instructor and/or TA. Students may be required to provide appropriate documentation support his/her absence(s); however, an excused absence from a class meeting does **NOT** excuse a student from fulfilling class requirements.

Grading

Assessment Type	Quantity	Point Value	Subtotal	Percentage
Lecture Assignments				65.0%
Exam I (Midterm)	1	200	200	20.0%
Exam II (Cumulative Final*)	1	250	250	25.0%
Online Quizzes: Textbook Companion Website & Canvas	25	8	200	20.0%
Laboratory Assignments				35.0%
Lessons/Simulations & Activities	6	20	120	12.0%
Article Discussion Participation	6	10	60	6.0%
Article Discussion Leader Presentation Project	1	100	100	10.0%
Article Discussion Homework	5	10	50	5.0%
Tutorial Quizzes	2	10	20	2.0%
Total			1000	100.00%

*Concepts in physiology build on each other. For example, you cannot understand how the kidney functions without a solid understanding of transport mechanisms of solutes and water; however, **the final exam will primarily focus on the last half of the course** keeping in mind that an understanding of the material from the first half of the course is necessary for a full understanding of material covered later in the course.

GRADE DISTRIBUTION

Point Range (%)	Letter Grade
93.33 or higher	A
90-93.32	A-
86.66-89.99	B+
83.33-86.65	B
80-83.32	B-
76.66-79.99	C+

Point Range (%)	Letter Grade
73.33-76.65	C
70-73.32	C-
66.66-69.99	D+
63.33-66.65	D
60-63.32	D-
< 60	E

Grades will not be assigned to a curve, but the grade cutoffs may be adjusted downward. In other words, if your final point accumulation is 93.33%, then you are guaranteed to receive an A.

Note that a C- is not considered passing for most majors. More information about the UF grading policy is available at <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

GRADING DISCREPANCIES

Concerns regarding the accuracy of graded assignments (lecture and laboratory/discussion) will only be taken into consideration if the respective instructor or TA has been notified in writing through Canvas messaging

within three working days after the assignment grade has been posted in the Canvas gradebook. Keep a copy of all assignments and assignment grades in case a problem is encountered.

EXTRA CREDIT

There are no planned opportunities for extra credit in this course.

Additional Policies

ACADEMIC HONESTY & PLAGIARISM

Giving or receiving any unauthorized assistance during assessments will be treated as a deliberate violation of the UF Academic Honesty policy. This will result in a failing grade.

If you are aware of a climate that promotes academic dishonesty, please notify the instructor or contact the Student Honor Court (392-1631) or the Cheating Hotline (392-6999).

Students must abide by the Student Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>). Violations may result in sanctions ranging from reprimand to expulsion. (See the section on Student Conduct Code Sanctions for a full list.)

STUDENTS WITH SPECIAL NEEDS

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. This should be done by the second week of classes. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed.

COURSE EVALUATION

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

TENTATIVE COURSE SCHEDULE

The schedule is subject to change.

Week (Dates)	Chapter. Topic	Reading	Laboratory Assignment
1 <i>Jan 9 & 11</i>	1. Animals & Environments 2. Molecules & Cells in Animal Physiology 3. Approaches to Physiology	Chapters 1-3	No Labs – Week 1
2 <i>Jan 16 & 18</i>	5. Transport of Solutes & Water 7. Energy Metabolism	Chapters 5 & 7	No Labs - MLK
3 <i>Jan 23 & 25</i>	8. Aerobic & Anaerobic Forms of Metabolism 12. Neurons	Chapters 8 & 12	Intro to Online Databases, Excel and HumMod (presentation sign-up)
4 <i>Jan 30 & Feb 1</i>	12. Neurons 13. Synapses	Chapter 13	Paper 1 – TA led Discussion Groups 2 and 3 meetings
5 <i>Feb 6 & 8</i>	13. Synapses 14. Sensory Processes	Chapter 14	Simulation: Nernst Goldman & Nerve Group 4 meetings
6 <i>Feb 13 & 15</i>	15. Nervous System Organization & Biological Clocks 16. Endocrine & Neuroendocrine Physiology	Chapters 15-16	Papers 2 and 3 Presentations
7 <i>Feb 20 & 22</i>	20. Muscle Physiology 19. Control of Movement	Chapters 20 & 19	Paper 4 Presentations
8 <i>Feb 27</i>	Review		No Labs – Exam Week
<i>Mar 1</i>	Midterm Exam During Class		
<i>Mar 6 & 8</i>	Spring Break – No Class		
9 <i>Mar 13 & 15</i>	22. Introduction to Oxygen & Carbon Dioxide Physiology 24. Transport of Oxygen & Carbon Dioxide in Body Fluids	Chapters 22 & 24	Simulation: Control of Ventilation Group 5 meetings
10 <i>Mar 20 & 22</i>	24. Transport of Oxygen & Carbon Dioxide in Body Fluids 25. Circulation	Chapter 25	Simulation: Gas Exchange Groups 6 and 7 meetings
11 <i>Mar 27 & 29</i>	9. The Energetics of Aerobic Activity 23. External Respiration	Chapters 9 & 23	Paper 5 Presentations; BP Activity Data Collection
12 <i>Apr 3 & 5</i>	27. Water & Salt Physiology 28. Water & Salt Physiology of Animals in Their Environments	Chapters 27 & 28	Papers 6 and 7 Presentations
13 <i>Apr 10 & 12</i>	29. Kidneys & Excretion	Chapter 29	Simulation: Salt & Water Balance
14 <i>Apr 17</i>	Review		No Labs – Exam Week
14.5 <i>Apr 19</i>	Final Exam During Class		

TENTATIVE LABORATORY/DISCUSSION MEETING SCHEDULE

The schedule is subject to change.

Mon	Tues	Wed	Lab #	Pre-lab Homework (HW)	Topic	Format
Jan 8	Jan 9	Jan 10	None	na	No Lab Meetings during the first week of class.	
Jan 15	Jan 16	Jan 17	None	na	No Lab Meetings – MLK holiday	
Jan 22	Jan 23	Jan 24	1	Online Database Tutorial and Quiz; Excel Tutorial and Quiz	Intro: Online Databases*, Excel* and HumMod; (Sign-up for presentations)	Presentations & Discussion, Simulation & Graph
Jan 29	Jan 30	Jan 31	2	Read Article 1; Complete HW 1	Intro to Scientific Articles*	Discussion
Feb 5	Feb 6	Feb 7	3	none	Nernst & Nerve	Simulation
Feb 12	Feb 13	Feb 14	4	Read Articles 2 and 3; Complete HW 2	Neurophysiology*	Presentations & Discussion
Feb 19	Feb 20	Feb 21	5	Read Article 4; Complete HW 3	Muscle physiology*	Presentations & Discussion
Feb 26	Feb 27	Feb 28	None	na	No lab meetings – Exam Week	
Mar 5	Mar 6	Mar 7	None	na	No lab meetings – Spring Break	
Mar 12	Mar 13	Mar 14	6	none	Control of Ventilation	Simulation
Mar 19	Mar 20	Mar 21	7	none	Gas Exchange	Simulation
Mar 26	Mar 27	Mar 28	8	Read Article 5; Complete HW 4	Cardiac physiology*	Presentations, Discussion & Activity
Apr 2	Apr 3	Apr 4	9	Read Articles 6 and 7; Complete HW 5	Renal Physiology*	Presentations & Discussion
Apr 9	Apr 10	Apr 11	10	none	Renal Physiology	Simulation
Apr 16	Apr 17	Apr 18	None	na	No lab meetings – Exam Week	

*Indicates Pre-lab/discussion homework assignment to be completed by the student before lab meeting.

SECTION SCHEDULE

TA	Section	Day(s)	Period(s)	Time	Bldg	Room
Philip Shirk	6959	Monday	3-5	9:35am-12:35pm	Weil	408A
Ellen Humbel	4468	Monday	5-7	11:45am-2:45pm	Weil	408D
Philip Shirk	4466	Monday	7-9	1:55-4:55pm	Weil	408A
Dave Anderson	6960	Tuesday	4-6	10:40am-1:40pm	Weil	408D
Ellen Humbel	6968	Tuesday	5-7	11:45am-2:45pm	Weil	408E
Dave Anderson	6446	Wednesday	7-9	1:55-4:55pm	Weil	408A