

PCB 3713C – Cellular and Systems Physiology

Syllabus Policy

You are solely responsible for reading and following the instructions, guidelines and schedules in this syllabus, and for checking the e-Learning announcements at least weekly for announcements regarding any changes. Not having read the information in this syllabus or the announcements will not constitute an excuse for missing an assignment or deadline.

Course Description

How cells, organs, and higher level systems are integrated and coordinated in the functions of humans and other animals. Emphasis will be placed on the use of model organisms, mathematical models and the physical sciences to understand the mechanistic basis of normal physiology and dysfunction. 4 credits.

Prerequisites

One semester of general biology (BSC 2010), and two semesters of general chemistry (CHM 2046 or CHM 2047 or CHM 2051 or CHM 2096) and two semesters of general physics (PHY 2049 or PHY 2054 or PHY 2061), all with a minimum grade of C, or permission of instructor.

Corequisite

None

Course Schedule

Section 004D (BME) and 17EH (non-BME)
Tuesdays and Thursdays, periods 6-7 (12:50 – 2:45 pm) in CSE E231 (CSE Active Learning Center)

Instructors

Course Instructor

David Julian, Ph.D. (Physiology)
Associate Professor, Department of Biology
Student hour: Fridays, period 5 (11:45 am -12:35 pm) in Bartram Hall 123, and by appointment

Course Graduate TA

Joni Wright, M.S.
Ph.D. candidate in Zoology, Department of Biology
Student hour: Tuesdays, periods 3-4 (9:35-11:30 am) in Carr Hall 510, and by appointment

Course Fee

There is no course fee, but you will need to purchase subscriptions for Peerceptiv (\$7.50) and Learning Catalytics (\$12). Instructions for purchasing these subscriptions are below.

Course Objectives

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

- Explain physiological mechanisms of humans and representative model organisms by applying basic principles of physics, chemistry and engineering.
- Describe the fundamental mechanisms underlying normal function of cells, tissues, organs, and organ systems in humans and other animals.
- Explain the basic mechanisms of homeostasis by integrating the functions of cells, tissues, organs, and organ 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.
- Generate hypotheses about physiological processes, design experiments to test these hypotheses using mathematical models of complex physiological systems, and then analyze, interpret and report experimental results.
- Use primary literature readings to understand basic physiological principles and mechanism
- Read and critically evaluate the design, results and conclusions of experiments published in primary physiology literature
- Interpret and knowledgeably discuss primary literature among peers

Required Course Materials, Software, Licenses, and Hardware

Primary Course Textbook

Ganong's Review of Medical Physiology, 25th Edition, by Kim E. Barrett, Susan M. Barman, Scott Boitano, and Heddwen Brooks. LANGE Basic Science, 2016.

There is no need to purchase this book; an online version is available free to UF students via [AccessMedicine](#). To view the online book, you must be on a campus computer or use a VPN (<http://cms.uflib.ufl.edu/offcampus>). Unfortunately, there is no mechanism to download the book to a device.

Classroom Response System

We will use the [Learning Catalytics](#) classroom response system to both aid and assess your understanding of the course material. The subscription is \$12.

To register and subscribe, do the following:

1. Go to <http://www.learningcatalytics.com>
2. Click on the REGISTER icon near the top of the screen

3. Under the "Student" option, select "No, I'm not using Learning Catalytics with a MyLab or Mastering Product"
4. In the Register window, select "No, I would like to buy access"
5. Purchase a 6 month subscription for \$12 (unless you believe you will need it for another course in the next year, in which case the 12-month subscription is a better deal).
6. Follow the remaining instructions to purchase the subscription. If you do not already have a Pearson Education account, use your UF email address as your Login Name.

Peer-Review System

We will use the [Peerceptiv](#) peer-review system for the research report. The subscription is \$7.50. You should have already received an email at your UFL address with instructions for activating your account. The class code is "hard81".

If you attempt to self register without using the instructions in the activation email, you will receive an on-screen message indicating that an account already exists with your email address. In that case, or if you no longer have access to the activation email, use the Forgot Password link to access your account.

Physiology Simulation System

We will use the web application JustPhysiology to conduct physiology experiments. JustPhysiology is a web application based on the HumMod simulation engine, which utilizes over 10,000 physiological variables. The model was initially developed at the University of Mississippi Medical Center. You will be provided a free license. To register and access the lessons, go to <http://www.justphysiology.com> and register with your UF email address and the access code "sRoTaGfU".

Digital Lessons

All non-textbook course readings and lessons will be accessible from the Canvas website (<https://elearning.ufl.edu>).

Computer Requirement

To complete the "Synapses" lesson outside of class, you must have a computer that runs the Windows operating system. All other lessons are web-based and should work with any computer running a web browser (although they may not work with a mobile OS).

The course instructor will not provide any computer support. You may be able to get assistance from the UF Computing Help Desk, but in the past, most students have gotten the best support from other students in the course via discussion posts.

Simulation Software

All of the simulation software packages used in the course are publicly available for your use or will be accessible to you with a free access code.

- 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/>.
- 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>.
- SWIMMY: A simulation of a complex neural network in a fish. The software was developed at UCLA, based on NEURON software developed primarily at Duke University. The software can be downloaded from <http://mdcune.psych.ucla.edu/modules/swimmy>.
- JustPhysiology: A web application based on the HumMod simulation engine. More information is provided above.

Activities and Assessments

The class content will include textbook reading, in-class lessons, in-class problem-based learning (“active learning” questions), experiments using physiological simulations, and writing and peer-review of research reports.

Problem-based Learning

During most “lecture” sessions you will be asked to work with your classmates to answer questions and solve problems. You will use a classroom response system to provide your answers.

Online Lessons

You will complete 10 online lessons that use computerized mathematical simulations to explore systems physiology. These lessons have embedded questions that gauge and reinforce your comprehension of key physiology concepts. Each lesson will typically require 2-4 hours to complete.

Research Report and Peer Review

You will individually complete a research report during the term. For this report, you will be provided with a research problem about a physiological phenomenon. You will typically do the following:

1. Develop a hypothesis for the assigned problem.
2. Design and conduct an experiment to test your hypothesis using the physiology simulation software.
3. Collect and analyze the data.
4. Craft a clear, well-supported first-draft report.
5. Submit your first-draft report for peer review.
6. Participate in peer reviews of other student first-draft reports.
7. Back-evaluate your reviewer feedback.
8. Revise your first-draft report based on reviewer feedback (this may involve designing and running new experiments).
9. Submit your second-draft report for peer review.

10. Participate in peer reviews of other student second-draft reports.
11. Back-evaluate your reviewer feedback.
12. Revise your second-draft report based on reviewer feedback (this may involve designing and running new experiments).
13. Submit your final report for peer review.
14. Participate in peer reviews of other student final reports.
15. Back-evaluate the reviewer feedback you received on your final report.

Your report must be formatted according to the detailed instructions provided for each report, which will be posted on the course home page. Reports that are not formatted correctly will receive a score of zero. You are welcome to work on your report with other students in the course, but the final product must represent your own work. Completion of each research report, including the peer review process, will typically require 12 hours. The total grade will be determined from the following criteria:

- **Review Grade** - a combination of the Accuracy and Helpfulness grades, which are then curved, after which any Reviewing Late Penalties are subtracted.
- **Accuracy** - correlation of your own ratings to mean ratings by others on same documents.
- **Helpfulness** - how helpful the author thought your comments were via back evaluation.
- **Writing Grade** - average score given by reviewers which is then curved, and then any Writing Late Penalties are subtracted.
- **Task Grade** - accounts for the percentage of assigned reviews and back-evaluations that were done. It represents only your reviewing activities, which is then curved.
- **Weighting** – How each category is weighted. The breakdown is 40% reviewing, 40% writing, and 20% task.
- **Overall** - The sum of all of the weighted grades

Exams

There will be a midterm exam and a final exam. These will consist mostly of problem-based, multiple choice, fill-in-the-blank, ordering and numeric (calculation) questions. The midterm will cover all course material through week 7, will consist of approximately 50 questions, will be administered during a normal lecture session (115 minutes in duration), and will be worth 250 points. The final exam will cover all course material from the entire term but will focus primarily on the last half of the course. It will also consist of approximately 50 questions and will be worth 250 points, but it will be administered during the final exam period (2 hours duration). Both exams will be closed-book and you will not be allowed to use notes, but you will be expected to utilize the physiology simulation software to answer some of the questions. The exams will be administered in the computer lab, so you will use a university computer.

Grading

Assessments

Assessment Type	Quantity	Points	Subtotal	Pct of Total
Problem-based Learning	~100	2-4	300	30%
Online Lessons	10	10	100	10%
Research Report	1	100	100	10%
Midterm Exam	1	250	250	25%
Final Exam	1	250	250	25%
<i>Total</i>			1000	100%

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+
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 by 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. This means there is no upper limit to the number of "A" grades that can be assigned.

A "C-" is not be a qualifying grade for critical tracking courses at UF. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). A "C-" average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. More information on grades and grading policies is here: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Extra Credit

There will be no opportunities for extra credit.

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 during the regular fall and spring semesters. Because this course is 4 credits, you should therefore expect to devote 12-16 hours per week to this course, of which only 4 hours per week will be spent in class. Therefore, you are responsible for budgeting about 2/3 of the time you will spend on this course. If you find yourself spending more than 16 hours per week on average, discuss this with your course instructor to see if you can refine your work and study habits. If you find yourself spending less than 12 hours per week on average, you should recognize that you may have difficulty fully learning and comprehending the material in this time, which will probably be reflected in poor performance on the various assessments, causing you to receive a lower overall course grade.

Activity	Time (hours)
Lectures/Problem-based Learning	60
Textbook Readings and Reviewing Notes	90
Online Lessons	20
Research Report	20
Midterm Exam	2
Final Exam	2
<i>Total</i>	<i>194</i>

Communication

Updates and changes to the course schedule, this syllabus, and any other aspects of the class content and structure will be communicated to you via announcements on the course e-Learning site. You are responsible for checking this site regularly for announcements.

Communicating electronically with the Instructor and Graduate Teaching Assistant

There are two primary modes of electronic communication for this class -- the discussion forum and Canvas mail. To ensure that your questions are answered as promptly as possible, please follow the communications guidelines below:

Discussion Forum: This course is participatory. Use the discussion forum on the course website for questions/answers about the course content, structure, assignments and activities. You are strongly encouraged to respond to your peers if you know the answer or can provide guidance. The course Graduate TA will monitor this area, but the TA may not be able to read every posting and therefore this should **not** be used to communicate with the instructors.

Direct Canvas Mail to the Instructors: Direct email to Dr. Julian or to your TA should be used only for messages that are **private** in nature or that have been posted to the Discussion Forum but were not solved. Use the Mail tool in Canvas for all such

direct email. If you use any other email tool, it may be filtered as spam or otherwise not be seen by your instructors.

Course Policies

Academic Honesty

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The [Honor Code](#) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Policy related to absences and make-up work

Requirements for class attendance and make-up exams, assignments, and other work are consistent with [university attendance policies](#).

If you must miss an assignment or 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 and unpredictable 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 your primary care provider indicating that you were unable to complete the assignment or take the exam on the day(s) in question.

Late Work

Late work will not be accepted unless it is the direct result of an allowable but unscheduled and unpredictable absence (e.g., illness), as defined above, at the discretion of the instructor.

Using Electronic Devices in Class

You are welcome to make audio recordings of the lectures for your personal use, but you may not make video recordings. You may not distribute or upload any recorded material from this class to sites other than the course Canvas site (much of the course material is copyrighted).

The class will meet in a computer classroom and you will have access to the UF computers for all in-class activities, including the classroom response system. Therefore, you are not expected to bring a computer to the lectures to utilize the classroom. You may not use the classroom computers for activities unrelated to the class. If you fail to follow this policy, or if you use a personal computer in the classroom for activities that are a distraction to any other members of the class, you will be warned that you are being disruptive. Multiple disruptions will be considered grounds for the assignment of a failing grade.

Campus Resources:

Health and Wellness

U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS): Student Health Care Center, 392-1161.

University Police Department: 392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>

Academic Resources

E-learning technical support: 352-392-4357 (select option 2) or e-mail to Learningsupport@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center: Reitz Union, 392-1601. Career assistance and counseling. <http://www.crc.ufl.edu/>.

Library Support: <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Accommodations for Students with Disabilities

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. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation Process

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/>.

Course Schedule (subject to change)

Assignments are due at 11:59 p.m. on the date indicated on the course e-Learning site schedule

Wk #	Week of	Lecture Topic	Online Lessons	Research Report
1	Jan 02	Course Introduction Sect I: Cellular & Molec Basis for Medical Physiol: Intro Ch 1: Gen Princ & Energy Production in Medical Physiol Ch 2: Overview of Cellular Physiol in Medical Physiol		
2	Jan 9	Ch 4: Excitable Tissue: Nerve Ch 5: Excitable Tissue: Muscle Ch 6: Synaptic & Junctional Transmission Ch 7: Neurotransmitters & Neuromodulators	Membrane Potential	
3	Jan 16 ¹	Sect II: Central & Peripheral Neurophysiology: Intro Ch 8: Somatosensory Neurotrans: Touch, Pain, & Temp Ch 9: Vision Ch 10: Hearing & Equilibrium Ch 11: Smell & Taste Ch 12: Reflex & Voluntary Control of Posture & Mvmt	Synapses	
4	Jan 23	Ch 13: Autonomic Nervous System Ch 14: Elec Activ of the Brain, Sleep-Wake, Circad Rhyth Ch 15: Learning, Memory, Language, & Speech	Introduction to Homeostasis	
5	Jan 30	Sect III: Endocrine & Repro Physiol: Intro Ch 16: Basic Concepts of Endocrine Reg Ch 17: Hypothalamic Reg of Hormonal Functions	Endocrine Control of Glucose	
6	Feb 06	Ch 18: The Pituitary Gland Ch 19: The Thyroid Gland Ch 20: The Adrenal Medulla & Adrenal Cortex Ch 21: Horm Ctrl of Ca & Phos Metab & Bone Physiol	Internal Receptors	
7	Feb 13	Ch 22: Repro Dev & Functn of the Female Repro System Ch 23: Function of the Male Repro System Ch 24: Endocrine Functns of Pancreas & Carb Metab Ch 3: Immunity, Infection, & Inflammation		Draft 1
8	Feb 20	Sect V: Cardiovascular Physiol: Intro Ch 29: Origin of the Heartbeat & Elec Activ of the Heart Ch 30: The Heart as a Pump	Control of Blood Flow	Draft 1 Reviews
9	Feb 27	Review Midterm on weeks 1-7 (Thurs, Mar 2, during class time)		Draft 1 Back Evals
10	Mar 5	Spring Break March 4 – 11		
11	Mar 13	Ch 31: Blood as a Circulatory Fluid, Blood & Lymph Flow Ch 32: Cardiovasc Reg Mechanisms Ch 33: Circulation Through Special Regions		Draft 2
12	Mar 20	Sect VI: Respiratory Physiol: Intro Ch 34: Intro to Pulmonary Structure & Mechanics Ch 35: Gas Transport & pH	Control of Ventilation	Draft 2 Reviews
13	Mar 27	Ch 36: Regulation of Respiration Sect VII: Renal Physiology: Introduction Ch 37: Renal Function & Micturition	Gas Exchange and Blood	Draft 2 Back Evals
14	Apr 03	Ch 38: Reg of Extracellular Fluid Composition & Volume Ch 39: Acidification of the Urine & Bicarb Excretion	Renal Function	Final Report

15	Apr 10	Sect IV: Gastrointestinal Physiol: Intro Ch 25: Overview of Gastrointestinal Functn & Reg Ch 26: Digestion, Absorption, & Nutritional Principles Ch 27: Gastrointestinal Motility	Physiological Integration	Final Report Reviews
16	Apr 17 ¹	Ch 28: Transport & Metabolic Functions of the Liver Review		Back Evals
Final exam²: Friday, April 28, 12:30-2:30 p.m. (in regular classroom space)				

1. January 16 is a holiday (Martin Luther King Jr. Day).
2. Last class meeting is April 18, Reading Days are April 20-21.
3. Final exam schedule code 28C.