PCB3713C Cellular & Systems Physiology, Spring 2026

Syllabus Policy

You are solely responsible for reading and following the instructions, guidelines, and schedules in this syllabus, and for checking the e-Learning site 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 with calculus (PHY 2049 or PHY 2061), all with a minimum grade of C.

Corequisite

None

Course Schedule

- Tuesdays, periods 5-6 (11:45 AM – 1:40 PM) in CSE-E231
- Thursdays, period 5 (11:45 AM – 12:35 PM) in CSE-E231
- Thursdays, period 6 (12:50 PM – 1:40 PM) in CSE-E231

Instructor

- David Julian, Ph.D. (Physiology)
  Associate Professor, Departments of Biology and Physiology & Aging
  Pronouns: he/him
  Contact: via Canvas Inbox

Undergraduate TAs

- TBD

Student Hour

Student hours (office hours) are TBD.

Course Fee

There is no course fee.

Course Objectives

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

- Explain the 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 representative model organisms.
- 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 dynamic models of physiological systems, and then analyze, interpret, and report experimental results.

Course Materials, Software, and Licenses

Course Lessons

All essential course content is provided in ~60 lessons. Each lesson is organized into slides with narration (as a prerecorded video by the instructor available on the Canvas site). All slides for each lesson are available as PDFs.

Each class "lecture" session has 1-3 assigned lessons. Prior to each class session, you will be expected to have reviewed the assigned lessons. The lessons will continue to be available for self-paced review throughout the semester.

The lessons generally follow the content in the course textbook and use figures from the textbook. However, a significant amount of textbook content is skipped. Most of the text in the lessons is “essential” content for this course, but some of the text is “helpful” content that may provide additional background, context, or an example of an application. The “helpful” text is denoted with grey, italic font. (Note that this text may be considered essential in another course.)

Course Textbook

The primary reference textbook for the course content is *Boron & Boulpaep Concise Medical Physiology* (published 2021, ISBN: 9780323655309). This textbook is available as an eTextbook to rent ($21) or purchase ($62) or as a paperback to purchase ($58) (e.g.: **purchase and rental option link**). There is also a full (not "concise") version of this textbook (*Boron & Boulpaep Medical Physiology*) that contains the same information along with more advanced material. This full version is also suitable as a primary reference.

Introductory Videos

Most class sessions are associated with one or more recommended *Crash Course* videos. These are generally very good, concise introductions to the course content and should be viewed before reading the relevant textbook chapter. A transcript for each video is available in a Canvas Files folder.

Key Concepts and Learning Outcomes

A list of key concepts and a table of learning outcomes are both available in Canvas Files. Each key concept is associated with a lesson topic. Each learning outcome is ranked by priority (1 = high priority, 4 = low priority) and is associated with a lesson number, topic number, topic, and lesson slide. You are highly recommended to utilize these when reviewing the course material and when checking your mastery of the course content.

Active Learning System

We will be using iClicker for class participation. You will be able to submit answers to in-class questions online using your computer (and via Apple or Android smartphones and tablets, but these will likely be irrelevant for class activities). To login, go to iclicker.com, sign in as a student, choose the option at the bottom to sign in using the campus portal, click on University of Florida, and then add this course.

Should you require assistance with iClicker at any time you can contact their Support Team directly by email or the in-app support. Specific user information may be required by their technical support team when troubleshooting issues.

Other Content

All other required digital content will be accessible from the course eLearning site.

Activities and Assessments

In addition to instructor lesson videos and textbook reading, course activities will include in-class lessons, in-class problem-based learning (“active learning” questions), and asynchronous (out-of-class) problem-based learning.

Problem-based Learning

During the "lecture" sessions you will participate in problem-based learning (PBL), during which you will be asked to work with your classmates to answer questions and solve problems. You will use Canvas and the iClicker system to submit answers. You must be in attendance *in person* to participate in any in-class activity. Attempting to answer in-class (synchronous) PBL questions remotely may be interpreted as cheating.

Laboratory Sessions

There will be a 1-period laboratory session each Thursday (except on the midterm exam day). These are "dry-lab" sessions in which you will typically use high-fidelity computer models of human physiology to conduct experiments, collect data, and interpret the results. You must be in attendance *in person* to participate in any laboratory activity. Attempting to answer laboratory questions remotely may be interpreted as cheating.

Exams

There will be a midterm exam and a final exam. These will consist of knowledge-check and problem-based questions with a variety of question types: short answer, multiple choice, fill-in-the-blank, ordering, and numeric (calculation). The midterm will cover all course material through session 14 and will be administered during a normal lecture session (115 minutes in duration). It will be worth 100 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 be worth 100 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 may be expected to utilize the physiology simulation software to answer some of the questions.

Portions of each exam will be completed collaboratively. Your total score for each exam will be weighted as 80% from your individual exam score and 20% from your collaborative exam score.

You will complete each exam using a classroom computer (you may not use a personal computer). You will be given access to the on-screen scientific calculator within the Canvas quiz environment, and you will be provided a sheet of scratch paper that you must return at the end of the exam. You must bring your own pen or pencil if you plan to use the scratch paper.

Grading

Assessments

Assessment Type	Quantity	Points	Subtotal	Pct of Total
PBL Sessions	26	5-8	140	35%
Laboratory Sessions	12	5	60	15%
Midterm Exam (Indiv.)	1	80	80	20%
Midterm Exam (Collab.)	1	20	20	5%
Final Exam (Indiv.)	1	80	80	20%
Final Exam (Collab.)	1	20	20	5%
Total			400	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 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 extra credit class assignments for up to 5% of the total points. No extra credit assignments will be provided for individual requests.

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. This course is 4 credits, so you should therefore expect to devote 12-16 hours per week to this course (for a total of 180-240 hours over the semester), of which only 4 hours per week will be spent in class. Therefore, you are responsible for budgeting more than 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 activities and assessments, causing you to receive a lower overall course grade.

Activity	**Minimum Time (Hours)**
In-class lectures and PBL	39
Viewing lessons	50
Laboratory	12
Textbook reading	50
Reviewing notes	25
Midterm exam	2
Final exam	2
Total	180

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

Direct messages to Dr. Julian or the UGTAs should be via **Canvas email** (the Inbox tool). If you use any other email tool (such as UF email), it may be filtered as spam or otherwise not be seen.

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.

Class Participation

Role will not be taken, but all class meetings will include points for in-class PBL and laboratory activities, for which you must be present *in person* to participate.

In-Class Recording

Students may record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or

medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Policy on 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 have an excused absence, course materials will be provided to you and you will be given a reasonable amount of time to complete any make up work. Refer to the above link for more information on the university's attendance policy.
- If you must miss an assignment or exam due to an otherwise 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 unrelated to COVID-19, 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.

Campus Resources

Health and Wellness

- *U Matter, We Care*: If you or someone you know is in distress, please contact **umatter@ufl.edu**, 352-392-1575, or visit **U Matter, We Care website** to refer or report a concern and a team member will reach out to the student in distress.

- *Counseling and Wellness Center*: Visit the **Counseling and Wellness Center** website or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center*: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the **Student Health Care Center** website.
- *University Police Department*: Visit the **UF Police Department** website or call 352-392-1111 (or 9-1-1 for emergencies).
- *UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the **UF Health Emergency Room and Trauma Center**

Academic Resources

- *E-learning technical support*: Contact the **UF Computing Help Desk** at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- ***Career Connections Center***, Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- ***Library Support .***: Various ways to receive assistance with respect to using the libraries or finding resources.
- ***Teaching Center .***: Broward Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring.
- *Writing Studio:* 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- *Student Complaints On-Campus*: visit the **Student Honor Code and Student Conduct Code .** website.
- *On-Line Students Complaints*: view the **Distance Learning Student Complaint Process.**

Accommodations for Students with Disabilities

Students who experience learning barriers and would like to request academic accommodations should connect with the **Disability Resource Center .** (DRC). Once registered with the DRC, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure during the first week of classes or within one week of receiving their accommodation documentation from the DRC, whichever is later.

Course Evaluation Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

1. The email they receive from GatorEvals
2. Their Canvas course menu under GatorEvals
3. The central portal at https://my-ufl.bluera.com

Guidance on how to provide constructive feedback is available athttps://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

Procedure for Conflict Resolution

As per UF policy, any classroom issues, disagreements, or grade disputes should be discussed first between the instructor and the student. If the problem cannot be resolved, please contact the Undergraduate Coordinator or the Department Chair. Be prepared to provide documentation of the problem, as well as all graded materials for the semester. Issues that cannot be resolved departmentally will be referred to the University Ombuds Office (**www.ombuds.ufl.edu .**; 392-1308) or the Dean of Students Office (**www.dso.ufl.edu .**; 392-1261).

Draft Course Schedule: Check Course Canvas Site for Dates and Updates

Session	Pre-Class Content	Laboratory
1	Introduction to course structure	
	General principles and foundations (1) [slides, no video]	
	Homeostasis and Feedback [slides]	
	Introduction to Anatomy & Physiology (CC A&P #1)	
2	Cell structure (2) [slides | video]	Lab 1
	Water (CC Biol #2)	
	Biological Molecules (CC Biol #3)	
	Animal Cells (CC Biol #4)	
	Membranes & Transport (CC Biol #5)	
	ATP & Respiration (CC Biol #7)	
3	Signal transduction (3) [slides | video]	
	Gene expression (4) [slides | video]	
	Transport of solutes and water (5) [slides | video]	
	DNA Transcription & Translation (CC Biol #11)	
4	Membrane potential (6) [slides | video]	Lab 2
	Action potentials (7) [slides | video]	
	The Nervous System, Part 1 (CC A&P #8)	
	The Nervous System, Part 2 - Action Potential (CC A&P #9)	
	Clinical case study terminology (slide)	
5	Synaptic transmission (8) [slides | video]	
	Nervous system organization (10) [slides | video]	
	The Nervous System, Part 3 - Synapses (CC A&P #10)	
6	Neurons (12) [slides | video]	Lab 3
	Neuronal synapses (13) [slides | video]	
	Central Nervous System (CC A&P #11)	
7	Autonomic nervous system (14) [slides | video]	
	Sensory transduction (15) [slides | video]	
	Peripheral Nervous System (CC A&P #12)	
	Autonomic Nervous System (CC A&P #13)	
	Sympathetic Nervous System (CC A&P #14)	
	Parasympathetic Nervous System (CC A&P #15)	
	Taste & Smell (CC A&P #16)	
	Hearing & Balance (CC A&P #17)	

	Vision (CC A&P #18)	
8	Muscle cells (9) [slides | video]	Lab 4
	Central nervous system circuits (16) [slides | video]	
	Muscles, Part 1 - Muscle Cells (CC A&P #21)	
	Muscles, Part 2 - Organismal Level (CC A&P #22)	
9	Respiratory system organization (26) [slides | video]	
	Mechanics of ventilation (27) [slides | video]	
	Respiratory System, Part 1 (CC A&P #31)	
	Respiratory System, Part 2 (CC A&P #32)	
10	Respiratory acid-base regulation (28) [slides | video]	Lab 5
	Oxygen and carbon dioxide transport (29) [slides | video]	
11	Gas exchange (30) [slides | video]	
12	Lung ventilation and perfusion (31) [slides | video]	Lab 6
	Control of ventilation (32) [slides | video]	
13	Blood (18) [slides | video]	
	The Heart, Part 1 - Under Pressure (CC A&P #25)	
	The Heart, Part 2 - Heart Throbs (CC A&P #26)	
	Blood, Part 1 - True Blood (CC A&P #29)	
	Blood, Part 2 - There Will Be Blood (CC A&P #30)	
14	Midterm exam	
15	Cardiovascular system organization (17) [slides | video]	
	Arteries and veins (19) [slides | video]	
	Microcirculation (20) [slides | video]	
	Blood Vessels, Part 1 - Form and Function (CC A&P #27)	
	Blood Vessels, Part 2 (CC A&P #28)	
	Lymphatic System (CC A&P #44)	
16	Cardiac electrophysiology (21) [slides | video]	Lab 7
17	The heart as a pump (22) [slides | video]	
	Regulation of MAP and cardiac output (23) [slides | video]	
18	Integrated control of the cardiovascular system (25) [slides | video]	Lab 8

	Spring Break	
	Spring Break	
19	Urinary system organization (33) [slides | video]	
	GFR and RBF (34) [slides | video]	
	Urinary System, Part 1 (CC A&P #38)	
	Urinary System, Part 2 (CC A&P #39)	
20	Renal sodium and chloride transport (35) [slides | video]	Lab 9
	Renal potassium transport (37) [slides | video]	
	Renal urea and organic molecule transport (36) [slides | video]	
21	Urine concentration and dilution (38) [slides | video]	
	Renal acid and base transport (39) [slides | video]	
	Integration of salt and water balance (40) [slides | video]	
22	Endocrine system organization and control (47) [slides | video]	Lab 10
	Endocrine System, Part 1 - Glands & Hormones (CC A&P #23)	
	Endocrine System, Part 2 - Hormone Cascades (CC A&P #24)	
23	Endocrine regulation of growth and body mass (48) [slides | video]	
	Thyroid gland (49) [slides | video]	
24	Adrenal gland (50) [slides | video]	Lab 11
	Endocrine pancreas (51) [slides | video]	
	Parathyroid glands and vitamin D (52) [slides | video]	
	The Skeletal System, Part 1 - Bones (CC A&P #19)	
	The Skeletal System, Part 2 - Joints (CC A&P #20)	
25	Intestinal fluid and electrolyte movement (44) [slides | video]	
	Nutrient digestion and absorption (45) [slides | video]	
	Hepatobiliary function (46) [slides | video]	
	Metabolism & Nutrition, Part 1 - Anabolism (CC A&P #36)	
	Metabolism & Nutrition, Part 2 - Catabolism (CC A&P #37)	
26	Sexual Differentiation [slides | video]	Lab 12
	Menstruation and Ovulation [slides | video]	
	Fertilization and Pregnancy [slides | video]	
	Reproductive System, Part 1 - Female Reproductive System (CC A&P #40)	
	Reproductive System, Part 2 - Male Reproductive System (CC A&P 41)	

	Reproductive System, Part 3 - Sex & Fertilization (CC A&P #42)	
	Reproductive System, Part 4 - Pregnancy & Development (CC A&P #43)	
27	Immune system [slides]	
	Integration	
	Immune System, Part 1 - Innate Defenses (CC A&P #45)	
	Immune System, Part 2 - Adaptive Defenses (CC A&P #46)	
	Immune System, Part 3 - Cell Mediated Defense (CC A&P #47)	
28	Reading Day (no class meeting)	
	Final Exam (University Final Exam Schedule)	