USCDornsife

## HBIO 420L– Applied Human Physiology

**4 Units**
**Fall 2022 —Tu,Th—2:00 PM - 3:20 PM**

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|---|---|---|
| **Labs:** | **Monday:** | **2:00-4:50 pm** |
| | **Monday:** | **5:00-7:50 pm** |
| | **Tuesday:** | **11:00-1:50 pm** |
| | **Tuesday:** | **5:00-7:50 pm** |
| | **Wednesday:** | **5:00-7:50 pm** |

**Location:** SOS B46

**Instructor: Casey Donovan, Ph.D., Professor**
**Office:** AHF B37
**Office Hours:** Tuesday 3:30 PM - 4:30 PM
**Contact Info:** donovan@usc.edu, (213) 740-2492

**Lab Director: Anh-Khoi Nguyen, PhD**
**Office:** PED 109
**Office Hours:** by appointment
**Contact Info:** agnguyen@usc.edu

**Instructor: Bara Floyd, Master Lecturer**
**Office hours:** TBA
**Contact Info:** gbfloyd@usc.edu
**Location:** PED 109

**Instructor: Joshua Carlos, Lecturer**
**Office hours:** TBA
**Contact Info:** jcarlos6@usc.edu
**Location:** PED 109e

**Instructor: Alexis Camacho, Lecturer**
**Office hours:** TBA
**Contact Info:** ascamach@usc.edu
**Location:** PED 109c

## Course Description

This course explores the physiology (function) of the major organ systems, i.e. respiratory, cardiovascular, renal, musculoskeletal, digestive, and endocrine systems, and their regulation in humans. It further examines the response of these systems to various stressors, e.g. exercise and environmental factors, both in health and disease.

*Prerequisites:* BISC 220Lg or 221Lg and HBIO 301L

## Learning Objectives

The primary objective of HBIO 420L is to ensure that students have a fundamental understanding of how the human body works both at rest and under stress.

- Students should be able to recognize, explain, and provide examples of homeostasis and the mechanisms involved, including the roles of negative and positive feedback.
- Students should be able to identify structural components and explain the functional attributes of the body's organ systems as well as understand and demonstrate the interrelationships within and between them both at rest and under stress.
- Students should be able to model, interpret, explain, and predict the integrated responses of the organ systems to physiological and environmental stressors.
- Students should be able to explain and understand the chronic adaptations of these physiological systems to physiological and environmental stressors.

**Degree Learning Objectives** *(relevant Human Biology BS & BA degree objectives addressed in part by this course)*

- Develop a deeper comprehension of the central and cross-disciplinary concepts of human biology, which include bioenergetics, the interrelationship of human form and function, physiological homeostasis, and biomechanics.
- Develop proficiency in modernmethodologies pertinent to research in biological and medical sciences.
- Think critically, analyze, synthesize, and use information to solve real-world problems.
- Develop sufficient depth of knowledge and skill for graduate study in the health professions or other biology-related disciplines or entry-level employment in a wide variety of health-related fields

## Course Notes

**General Course Outline:**

I. Introduction to cellular metabolism, membrane transport, skeletal muscle metabolism and the resulting physiological responses.
II. Anatomy and physiology of the cardiovascular and respiratory systems
III. Regulation of cardiovascular and respiratory systems at rest and during exercise.
IV. Environmental work physiology: hypobaria (altitude) & hyperbaria (deep sea)
V. Anatomy and physiology of the renal system and electrolyte balance.
VI. Thermoregulation at rest and during exercise: Hyperthermia & hypothermia
VII. Anatomy of the digestive and hepatic systems.
VIII. Regulation of substrate metabolism at rest and during exercise.

## Required Readings

**Human Physiology, 16th Ed., Stuart Fox and Krista Rompolski, McGraw Hill, 2022**. ISBN-10: 1260720462, ISBN-13: 9781260720464; eBook ISBN: 1264398786 / 9781264398782.

*(Available as eBook or Print version, rental or purchase, from the USC Bookstore, McGraw Hill (publisher) or Vital Source. Also, available through Amazon for rent or purchase.)*

**Exercise Physiology: Nutrition, Energy & Human Performance. 8th ed. William D. McArdle, Frank I. Katch and Victor L. Katch. Wolters Kluwer, Philadelphia, PA, 2015**. ISBN 978-1-4511-9155-4.
*Important: a new edition of this book, 9th ed., is scheduled to be released 06/20/22.

(*Available from the USC Bookstore, Wolters Kluwer/LWW (publisher) or Vital Source as an ebook or print version. Also available through Amazon for rent or purchase.*

**Laboratory Manual for Applied Systems Physiology (HBIO 420L). Henige, K., and M. Matveyenko.**

(*Available through USC bookstore w/ possible online access TBA*)

## Grading Breakdown

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|---|---|
| Midterm Exam #1 | 20% |
| Midterm Exam #2 | 25% |
| Final Exam | 30% *(comprehensive exam)* |
| Lab Grade | 25% |

## Additional Exam Policies

**Academic Accommodations:** Where accomodations can be anticipated (e.g. religious holidays, athletic competition, DSP) requests must be made within the first 3 weeks of the semester. In most cases, verification of such requests will be required. Any student requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to the instructor within the first 3 weeks of the semester or 1 week of issuance date if later in the semester. DSP is located in Grace Ford Salvatori (GFS) 120 and is open 8:30AM-5:00PM, Monday –Friday. DSP can be reached at (213) 740-0776 or via email at DSPFrontDesk@usc.edu.

**Make-up Exams:** Make-up exams will not be given unless preapproved by the instructor or written/ verifiable evidence of a medical emergency is provided. In general, make-up exams will not be preapproved unless University policy provides for such accommodations (e.g. religious holidays, athletic competition, etc.) or extenuating circumstances are involved. **Note:** While covering the same material, make-up exams may be distinct from the main exam in content and format.

## Communication Policies

Students are *strongly* encouraged to contact the instructor in regard to all matters involving course content or policy during Zoom office hours. Should you have a question about specific course content and cannot attend office hours, students are encouraged to submit their question to the course blog. Should you need to communicate with the instructor outside of class or office hours about a question other than course content, please email the instructor from

your USC email account *making sure to include in the subject line the course number and your full name* (expect significant delays or no response if this information is omitted). Simple questions will be answered by email but, for more complex discussions, students may be instructed to visit office hours. Best attempts will be made to answer all emails within 48 hours, 72 hours over a weekend and the work day following a holiday. Note that the instructor may not respond to non-emergency emails 24 hours preceding an exam and may not respond to emails sent from non-USC accounts.
To promote independence and critical thinking, students are encouraged to work through the following process for obtaining answers to course-related questions before contacting the instructor. First, consult the course syllabus. If you cannot find the answer you need, next consult a classmate. If you still cannot find a satisfactory answer, email the instructor using your USC email *making sure to include the course number and your full name in the subject line* (expect significant delays or no response if this information is omitted). In your email, please indicate the steps you have gone through to seek the answer for your question. Use your USC email account for all correspondence with the instructor

**Proprietary Course Materials Policy**
USC has a strict policy (SCampus Section 11.12[B]) that prohibits sharing of *any* synchronous and asynchronous course content outside of the learning environment. Any student who violates this policy will be prosecuted to the maximum extent allowable by the USC Student Conduct Code, including failure of the course and suspension from the University.

*Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).*

**Tentative Course Schedule: A Weekly Breakdown**

| Date | Lecture Topic | Readings/Chapters | |
|---|---|---|---|
| | | Fox | McArdle |
| Aug. 23 | Introduction/Overview & Homeostasis | **Ch. 1 & 2** | |
| Aug. 25 | Cellular Metabolism | **Ch. 4 & 5** | Ch. 5-7 |
| Aug. 30 | Cell Membrane & Membrane Transport | **Ch. 3 & 6** | |
| Sept. 1 | Skeletal Muscle Metabolism & Metabolic Rate | **Ch. 12** | Ch. 8,9 & 18 |
| Sept. 6 | Respiratory System I | **Ch. 16** | Ch. 12 |
| Sept. 8 | Respiratory System II | **Ch. 16** | Ch. 14 |
| Sept. 13 | Cardiovascular System I | **Ch. 13** | Ch. 15 |
| Sept. 15 | Cardiovascular System II | **Ch. 14** | Ch. 15 |
| Sept. 20 | Oxygen Transport & Exchange I | **Ch. 16** | Ch. 13 |
| Sept. 22 | Midbrain, Hindbrain & ANS | **Ch. 7 & 9** | Ch. 13 |
| **Sept. 27** | **MIDTERM 1** | | |
| Sept. 29 | Regulation of the Pulmonary System | **Ch. 16** | Ch. 14 |
| Oct. 4 | Regulation of the Cardiovascular System I | **Ch. 14** | Ch. 16 |
| Oct. 6 | Regulation of the Cardiovascular System II | **Ch. 14** | Ch. 16 |
| Oct. 11 | CV & Pulmonary Responses to Exercise I | | **Ch. 14 & 17** |
| *Oct. 13* | ***No Class - Fall recess*** | | |
| Oct. 18 | CV & Pulmonary Responses to Exercise II | | **Ch. 17** |
| Oct. 20 | CV & Pulmonary Adaptations to Exercise | | **Ch. 21** |
| Oct. 25 | Environmental Physiology: Hypobaria | | **Ch. 24** |
| Oct. 27 | Environmental Physiology: Hyperbaria | | **Ch. 26** |
| **Nov. 1** | **MIDTERM 2** | | |
| Nov. 3 | Renal Anatomy & Physiology I | **Ch. 17** | |
| Nov. 8 | Renal Anatomy & Physiology II | **Ch. 17** | |
| Nov. 10 | Environmental Physiology: Hyperthermia | | **Ch. 25** |
| Nov. 15 | Environmental Physiology: Hypothermia | | **Ch. 25** |
| Nov. 17 | Digestion & Hepatic Physiology I | **Ch. 18** | |
| Nov. 22 | Digestion & Hepatic Physiology II | **Ch. 18** | |
| *Nov. 24* | ***No class - Thanksgiving break*** | | |
| Nov. 29 | Endocrine Regulation of Metabolism | **Ch. 11 & 19** | |
| Dec. 1 | Substrate Metabolism in Exercise | | **Ch. 1, 4 & 10** |
| | | | |
| Dec. 8 | **FINAL EXAM – 2:00 – 4:00 PM** | | |

*(Chapters indicated in bold are the primary readings for the specified Lecture Topic)*

## Statement on Academic Conduct and Support Systems

**Academic Conduct:**

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

**Support Systems:**

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*
studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call*
studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298*
equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

*Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298*
usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

*The Office of Disability Services and Programs - (213) 740-0776*
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*USC Campus Support and Intervention - (213) 821-4710*
campussupport.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity at USC - (213) 740-2101*
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

*USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

*USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*
dps.usc.edu
Non-emergency assistance or information.