

HBIO 420L– Applied Human Physiology

4 Units

Fall 2020—Tu,Th—2:00 PM - 3:20 PM

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

Location: Online

Instructor: Casey Donovan, Ph.D., Professor

Office: AHF B37 or online via Zoom

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 109Lab

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: AHF B37

Instructor: Alexis Camacho, Lecturer

Office hours: TBA

Contact Info: ascamach@usc.edu

Location: AHF B37

For Fall 2020, the lectures and labs for this course will be taught online.

Learning Objectives

The primary objective of HBIO 420 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*)

- *To develop a deeper understanding of the central and cross-disciplinary concepts of human biology*
- *To identify, locate, and describe the structure/function of cells, tissues, organs, and organ systems of the human body.*
- *To apply cross-disciplinary scientific principles to explain how humans operate, adapt or evolve.*

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, Stuart Fox and Krista Rompolski, McGraw Hill, 2019. ISBN: 1259864626, ISBN-13: 9781259864629; eBook ISBN:1260912302 / 9781260912302. *Available as eBook or Print version, rental or purchase, from the 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. (The 7th ed. is acceptable) *Available from the 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

| | |
|-------------------|-----------------------------------|
| Midterm Exam #1 | 20% |
| Midterm Exam #2 | 25% |
| Lab Grade | 25% |
| Final Exam | 30% (<i>comprehensive exam</i>) |

Additional Policies

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 (*exceptions to this rule will be made for any Covid-19 related illnesses*). 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. Where accommodations can be anticipated (e.g. religious holidays, athletic competition) requests must be made within the first 3 weeks of the semester. In most cases, verification of such requests will be required. **Note:** While covering the same material, make-up exams may be distinct from the main exam in content and format.

Tentative Course Schedule: A Weekly Breakdown

| Date | Lecture Topic | Readings/Chapters | |
|----------|--|-------------------|--------------|
| | | Fox | McArdle |
| Aug. 18 | Introduction/Overview & Homeostasis | Ch. 1 & 2 | |
| Aug. 20 | Cellular Metabolism | Ch. 4 & 5 | Ch. 5-7 |
| | Cell Membrane & Membrane Transport | Ch. 3 & 6 | |
| Aug. 25 | Skeletal Muscle Metabolism & Metabolic Rate | Ch. 12 | Ch. 8,9 & 18 |
| Aug. 27 | Respiratory System I: Anatomy & Physiology | Ch. 16 | Ch. 12 |
| Sept. 1 | Respiratory System II: Physiology | Ch. 16 | Ch. 14 |
| Sept. 3 | Cardiovascular System I: Anatomy & Physiology | Ch. 13 | Ch. 15 |
| Sept. 8 | Cardiovascular System II: Anatomy & Physiology | Ch. 14 | Ch. 15 |
| Sept. 10 | Oxygen Transport & Exchange | Ch. 16 | Ch. 13 |
| Sept. 15 | MIDTERM 1 | | |
| Sept. 17 | Midbrain, Hindbrain & ANS | Ch. 7 & 9 | |
| Sept. 22 | Regulation of the Cardiovascular System | Ch. 14 | Ch. 16 |
| Sept. 24 | CV & Pulmonary Responses to Exercise I | | Ch. 17 |
| Sept. 29 | CV & Pulmonary Responses to Exercise II | | Ch. 21 |
| Oct. 1 | Environmental Physiology: Hypobaric | | Ch. 24 |
| Oct. 6 | Environmental Physiology: Hyperbaric | | Ch. 26 |
| Oct. 8 | Renal Anatomy & Physiology I | Ch. 17 | |
| Oct. 13 | Renal Anatomy & Physiology II | Ch. 17 | |
| Oct. 15 | MIDTERM 2 | | |
| Oct. 20 | Electrolyte & Acid-Base Balance | Ch. 17 | |
| Oct. 22 | Thermoregulation and the Renal System | | Ch. 25 |
| Oct. 27 | Environmental Physiology: Hyperthermia | | Ch. 25 |
| Oct. 29 | Environmental Physiology: Hypothermia | | Ch. 25 |
| Nov. 3 | Digestion & Hepatic Physiology I | Ch. 18 | |
| Nov. 5 | Digestion & Hepatic Physiology II | Ch. 18 | |
| Nov. 10 | Endocrine Regulation of Metabolism | Ch. 11 & 19 | |
| Nov. 12 | Substrate Metabolism in Exercise | | Ch. 1,4 & 10 |
| | | | |
| Nov. 17 | FINAL EXAM – 2:00 – 4:00 PM | | |

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:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call

engemannshc.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) 740-4900 – 24/7 on call

engemannshc.usc.edu/rsvp

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086

equity.usc.edu, titleix.usc.edu

Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421

studentaffairs.usc.edu/bias-assessment-response-support

Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation 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 Support and Advocacy - (213) 821-4710

studentaffairs.usc.edu/ssu

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.