

Syllabus PSIO/BME 511 - Physiology for Biomedical Engineering, Spring 2023

Course coordinator: Erika Eggers, Ph.D., eeeggers@arizona.edu, 626-7137 AHSC 4109

Course meeting time and location: Monday, Wednesday and Friday Lectures: 9 – 9:50 AM, Skaggs 325

Course Description:

This course in human physiology contains an extended discussion of the Nervous System, Cardiovascular, Renal, Respiratory, Endocrine and Gastrointestinal Physiology presented at the systems level but building on cell and molecular physiology and leading to an integrated view of the function of the human organism. The lectures are designed to introduce individual elements and concepts that constitute physiology, and to integrate these basic principles into a picture of the complete system.

Course Notes & Text:

Handouts for each lecture are provided on the class website on D2L and indicate readings in the required text **Medical Physiology**, by Walter Boron and Emile Boulpaep, Saunders Elsevier Publishing. Each student is expected to come to class having read and completed the assigned material. The 2017 version of the Boron textbook is available through the library website: <https://www-clinicalkey-com.ezproxy2.library.arizona.edu/#!/browse/book/3-s2.0-C20110061677?indexOverride=GLOBAL>

If that does not work, you can search for Medical Physiology in the library catalog.

Teaching:

Primary lecturers, email, phone, office location

Dr. Shaowen Bao	sbao@arizona.edu	621-5680	AHSC 4122
Dr. Erika Eggers	eeeggers@arizona.edu	626-7137	AHSC 4109
Dr. Ralph Fregosi	fregosi@arizona.edu	621-2203	AHSC 4226A
Dr. John Konhilas	konhilas@arizona.edu	626-6578	MRB 320
Dr. Sam Harris	samharris@arizona.edu	621-0291	MRB 310
Dr. Meredith Hay	mhay@arizona.edu	626-7384	LSN 357
Dr. Sean Limesand	limesand@ag.arizona.edu	626-8903	Shantz 231
Dr. Ron Lynch	rlynch@arizona.edu	626-2472	MRB 111
Dr. Paulo Pires	ppires@arizona.edu	626-8632	AHSC 4121A
Dr. Randi Weinstein	randiw@arizona.edu	626-8338	Gittings 110

MRB: Medical Research Building; SHC: Sarver Heart Center, AHSC: Arizona Health Sciences Center, LSN: Life Sciences North

Course website: Handouts and information for this course can be accessed through D2L website (<http://d2l.arizona.edu>). When you log into the site using your UA NetID, the course

should be available on your homepage. If you do not see the BME/PSIO 511 information please contact Dr. Eggers at egggers@arizona.edu.

Exams and Grades

The final grade will be based on 6 exams. The exams are typically in short answer, multiple choice, and fill-in-the-blank format. If there are any scheduling problems with the exam dates, please contact Dr. Eggers in advance. The percent weight for each exam relates roughly to the number of lectures/sessions for each respective topic.

Exam Date	Time	Section & Exam Weight/ Class total	Room
February 1	9-9:50 AM	Cardiovascular – Konhilas/Pires – 20.5%	Skaggs 325
February 20	9-9:50 AM	Neurophysiology - Hay/Eggers/Bao 18%	Skaggs 325
March 15	9-9:50 AM	Gastrointestinal – Lynch 15.5%	Skaggs 325
April 3	9-9:50 AM	Respiratory – Fregosi 15.5%	Skaggs 325
April 14	9-9:50 AM	Renal – Harris 10%	Skaggs 325
May 11	10:30-11:20 AM	Endocrine – Limesand/Weinstein 20.5%	Skaggs 325

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu/>) to establish reasonable accommodations.

All work and course requirements are subject to change at the discretion of the instructor with proper notice to students. Per University of Arizona COVID-19 regulations, masks are required in the classroom.

Spring 2023: BME/PSIO 511**M/W/F 1 hr lectures****9:00 – 9:50 AM****Skaggs 325****Section 1 Cardiovascular Physiology**

Date	Instructor	Lecture Topic
Jan 11 (W)	Konhilas	The Cardiovascular System
Jan 13 (F)	Konhilas	Cardiac Cycle
Jan 16 (M)		MLK holiday
Jan 18 (W)	Konhilas	Cardiac Electrophysiology - ECG
Jan 20 (F)	Konhilas	Contractile Function
Jan 23 (M)	Pires	The Peripheral Circulation and Regulation of Organ Blood Flow
Jan 25 (W)	Pires	Regulation of Organ Blood Flow and Blood Pressure
Jan 27 (F)	Pires	Microcirculation
Jan 30 (M)	Pires	The Lymphatic Circulation
<u>Feb 1 (W)</u>	<u>EXAM #1</u>	<u>CARDIOVASCULAR EXAM</u>

Section 2 Neurophysiology

Date	Instructor	Lecture Topic
Feb 3 (F)	Hay	Overview of the Nervous system
Feb 6 (M)	Hay	Sympathetic Nervous System Neurotransmission: Anatomy, Neurotransmitters, End Organ Regulation
Feb 8 (W)	Hay	Sympathetic Nervous System: Adrenergic Neurophysiology and Neuropharmacology
Feb 10 (F)	Hay	Parasympathetic Nervous System Current Literature: Disease and Clinical Case Study
Feb 13 (M)	Bao	Sensory transduction
Feb 15 (W)	Eggers	Sensory processing in the central nervous system

Feb 17 (F)	Eggers	Neural Circuits
<u>Feb 20 (M)</u>	<u>EXAM #2</u>	<u>NEUROPHYSIOLOGY EXAM</u>

Section 3 GI Physiology

Date	Instructor	Lecture Topic
Feb 22 (W)	Lynch	Introduction to GI Physiology
Feb 24 (F)	Lynch	Secretion: Salivary and Stomach
Feb 27 (M)	Lynch	GI Smooth Muscle Motility
Mar 1 (W)	Lynch	Secretion: Pancreatic and Biliary
Mar 3 (F)	Lynch	Digestion and Absorption
Mar 6-10		Spring Break
Mar 13 (M)	Lynch	pH and Acid Base Regulation
<u>Mar 15 (W)</u>	<u>EXAM #3</u>	<u>GI EXAM</u>

Section 4 Respiratory Physiology

Date	Instructor	Lecture Topic
Mar 17 (F)	Fregosi	Pulmonary: basic physical principles & anatomy; lung microstructure
Mar 20 (M)	Fregosi	Mechanics of the lung and chest wall
Mar 22 (W)	Fregosi	Gas diffusion from lung to blood
Mar 24 (F)	Fregosi	O ₂ and CO ₂ transport
Mar 27 (M)	Fregosi	Pulmonary blood flow
Mar 29 (W)	Fregosi	Pulmonary regulation of acid-base balance
Mar 31 (F)		STUDY DAY

<u>Apr 3 (M)</u>	<u>EXAM #4</u>	<u>RESP EXAM</u>
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Section 5 Renal Physiology

Date	Instructor	Lecture Topic
Apr 5 (W)	Harris	Introduction to the Renal System
Apr 7 (F)	Harris	Tubular Transport
Apr 10 (M)	Harris	Osmoregulation and Vasopressin
Apr 12 (W)	Harris	Renin-Angiotensin-Aldosterone System
<u>Apr 14 (F)</u>	<u>EXAM #5</u>	<u>RENAL EXAM</u>

Section 6 Endocrine/Reproductive Physiology

Date	Instructor	Lecture Topic
Apr 17 (M)	Limesand	Basic Concepts in Endocrinology
Apr 19 (W)	Limesand	Neuroendocrinology
Apr 21 (F)	Limesand	Glucose Homeostasis
Apr 24 (M)	Limesand	Thyroid
Apr 26 (W)	Limesand	Calcium Homeostasis
Apr 28 (F)	Limesand	Adrenal Gland Physiology
May 1 (M)	Weinstein	Female Reproduction
May 3 (W)	Weinstein	Male Reproduction
<u>May 11 (Th)</u>	<u>EXAM #6</u>	<u>ENDO/REPRO EXAM - Note different day and time, Thursday at 10:30 AM.</u>