

# Autonomic Physiology

## Tentative Syllabus

NRSC 2269-910, Summer 2023

**Course Instructor:**

Dr. Jennifer Heerding (heerding@sas.upenn.edu)

**Hybrid format:** For the Summer of 2023, this class will be held in a hybrid format. One meeting each week will be held on campus, on Mondays, and one meeting will be held online, on Wednesdays. Students will prepare for the synchronous online meetings by viewing lecture videos for each topic to be covered. In the online meeting, the information presented in the videos will be discussed and additional information will be provided to extend students' knowledge of the topics covered in the videos.

Monday on campus meetings: 12pm-3:50pm (with breaks)

Wednesday synchronous online meetings: 12pm-1:45pm

<u>DATE</u>	<u>TOPICS</u>	<u>READINGS</u>
5/22	LECTURE 1- Classroom Session Overview of Course Drug Administration Basic Principles in Pharmacology	Feldman, Chp. 1  Rhoades, Chp. 12 (p.396-404)
5/24	LECTURE 2- Online Session Neurotransmitter Receptor Function I: Acetylcholine II: Catecholamines: Norepinephrine and Epinephrine	
QUIZ 1 Due 5/24		
5/29	Memorial Day holiday	
5/31	LECTURE 3- Online Session Autonomic Nervous System I: Overview and Anatomy II: Sympathetic Nervous System "Fight or Flight" Response III: Parasympathetic Nervous System "Rest and Digest" Response	Rhoades, Chp. 10 Rhoades, Chp. 10
QUIZ 2 Due 5/31		
6/5	LECTURE 4- Classroom Session Autonomic Nervous System Functions I: ANS Reflexes Urination Defecation II: ANS Regulation Cardiovascular System	Rhoades, Chp. 10

6/7	LECTURE 5- Online Session Autonomic Nervous System Functions II: ANS Regulation Respiratory System Thermoregulation	Rhoades, Chp. 10
	Pituitary Function and Neuroendocrinology I: Anterior Pituitary Hormones Adrenal Hormones	Rhoades, Chp. 13
QUIZ 3 Due 6/7		
6/12	MIDTERM EXAM covering Lectures 1-5	
6/14	LECTURE 6- Online Session Regulation of Body Fluids- Thirst I: Vasopressin II: Angiotensin II III: Mineralocorticoids	Fluharty (Chp. 8) Daniels paper
QUIZ 4 Due 6/14		
6/19	Juneteenth holiday	
6/21	LECTURE 7- Online Session Regulation of Ingestive Behaviors Feeding Behavior	Cummings paper
QUIZ 5 Due 6/21		
6/26	LECTURE 8- Classroom Session Enteric Nervous System I: Basic Anatomy and Physiology II: Function and Regulation by Higher Brain Centers	Janig, Chp. 5
6/28	FINAL EXAM ONLINE	

## **Course Description:**

Autonomic Physiology is lecture course is designed to introduce the student to the functioning of the autonomic nervous system (ANS), which is critically involved in the maintenance of body homeostasis through regulation of behavior and physiology. The course will begin with a review the basic anatomy and physiology of the ANS including the sympathetic, parasympathetic and enteric divisions. The mechanisms by which the ANS regulates peripheral tissues will be discussed, including reflex and regulatory functions, as will the effect of drugs that modulate ANS activity. The role of the ANS in regulating behavior will be addressed in the context of thirst, salt appetite and food intake. This course utilizes the Canvas website.

## **Learning Activities:**

You are expected to fully participate in all the course activities described here. Learning activities for this course include the following:

1. Watch the lecture videos
2. Review the study materials
3. Read web-based announcements and postings assigned during the course
4. Complete the module quizzes, midterm exam, and final exam

## **Exams:**

Quizzes must be completed **before the start** of each online course meeting. Refer to the Canvas site for all due dates and times. You may take each quiz only once and have a set period of time to complete each quiz. If you miss a quiz, you will be allotted 0 for that quiz and there is no make-up quiz. Students may refer to lecture notes and assigned chapters while taking each quiz.

The midterm and final exams will consist of multiple choice and open-ended questions designed to assess basic knowledge of the concepts discussed in class as well as the ability to integrate information from different lectures.

No make-up midterm exams will be given. If a student misses a midterm exam, the relative weight of the final exam will go from 40% to 80% for that student. If a student misses the final exam, a grade of zero will be assigned and the student cannot pass the class. If a student wishes to submit an exam for a re-grade, it must be done in writing within *one week* of receiving the graded exam. If a student submits an exam for a re-grade, the entire exam will be re-graded and your resulting score may higher or lower than the original grade. If an exam is determined to have been altered before submission for re-grading, the student will be reported to the Office for Student Conduct.

## **Grades:**

Course grades will be based on completion of online quizzes (20%), one midterm exam (40%) and one final exam (40%).

Your letter grade in the course will be determined according to absolute standards of performance, which hopefully relate to your acquisition of knowledge and understanding of the material. You will not be competing against fellow students in the sense that letter grades are not forced to conform to a predetermined distribution. If everyone does extremely well, everyone could receive an "A" grade. If everyone does poorly (highly unlikely), then everyone could get a low grade. Rather than devoting energy to worrying about where grade cut-offs are, if you are truly interested in this subject and in getting the most from this class, you should take the material seriously from the beginning, do the readings, and really make an effort to learn the material. Your efforts will be rewarded with deep knowledge and understanding and a good grade will be a side effect of those efforts.

**Cheating:**

A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating on a quiz or exam will also be reported to the Office for Student Conduct. Exams are to be completed without the assistance of other people, and without reference to websites. The expectation is that you will be honest in the taking of exams and you will be required to certify that this is the case.

**Reading Assignments:**

Readings will be available through the course Canvas website and will include chapters from the following sources:

Principles of Neuropsychopharmacology by Feldman, et al. (Sinauer, 1997)

Basic Neurochemistry: Molecular, Cellular and Medical Aspects, 8<sup>th</sup> edition / Editor-in-chief George J. Siegel; editors R. Wayne Albers, Scott T. Brady, Donald L. Price (Elsevier, 2012).

The Integrative Action of the Autonomic Nervous System by Wilfrid Janig (Cambridge University Press, 2006).

Human Physiology, 4<sup>th</sup> edition, by Rhoades & Pflanzner (Thomson/Brooks Cole, 2003).

Hormones, Brain and Behavior, Volume 1, Chapter 8, Neuroendocrinology of Body Fluid Homeostasis, by Steven J. Fluharty, Elsevier Science (USA) 2002.

Daniels, Derek, and Steven J Fluharty. *Physiology & Behavior* 81.2 (2004):319-37.