

SYLLABUS
BIEN 115
Quantitative Physiology
Spring 2018

Course Time

Lecture: MWF 4:10 – 5:00 pm (Winston Chung 138)

Discussion M 8:10-9 am (MS&E 104)

Prerequisites

BIEN110; or consent of instructor

Course Description

Analyzes engineering aspects of physiological systems of respiratory, renal, and endocrine systems.

Instructor

Dr. Joshua Morgan

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Office hour: Tues 4-6 pm or by appointment

TAs

Basil Baddour

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Course Textbook

Quantitative Human Physiology: An Introduction, 2nd Ed

Joseph Feher

Academic Press

ISBN 978-0-12-800883-6

Learning Objectives

1. Students will be able to understand physiology, and acquire the capability to apply advanced mathematics (including differential equations and statistics), science, and engineering to solve the problems at the interface of engineering and biology.
2. Students will be able to make physiological models on and interpret data from living systems, addressing the problems associated with the interaction between living and non-living materials and systems.

Course Goals

1. Understand the flow/flux laws and diffusion equation to describe physiological systems
2. Understand properties of cell membrane and transport mechanisms across the membrane to describe the membrane potential and action potential propagation in the nervous system
3. Understand driving forces for gas exchange in the respiratory system
4. Understand mass transport across membranes to describe filtration in the renal system
5. Understand the three fundamental steps in vision
6. Understand feedback mechanisms to describe homeostatic functions of the endocrine system

Evaluation and Grading

Evaluation of Student Performance

Midterm 1 In-Class Exam	25%
Midterm 2 In-Class Exam	25%
Midterm 3 In-Class Exam	25%
Homework	25%
Total	100%

Course Policies

Homework will be assigned Wednesday and due Wednesday. Late submission of assignments will not be accepted. However, the lowest score will be dropped.

Discussion of homework problems and laboratories with other students in the class is acceptable and encouraged **but direct copying of complete or part of an assignment is not allowed.**

Make-up exams for midterms and final can only be requested prior to the exam date with valid proof of excuse (doctor's note, etc).

Cheating on exams and/or plagiarism in homework will result in an F grade for the course.

Course Outline

Week	Topics	Reading
1	Course introduction and backgrounds	Chap 1
2	Diffusion and electrochemical potential	Chap 1
3	Membranes and transport	Chap 2
4/23/18	Midterm 1	
4	Physiology of cells (action potential and motor control)	Chap 3
5	Respiratory system	Chap 6
6-7	Renal system	Chap 7
5/16/18	Midterm 2	
8	Visual System	Chap 4.8
5/28/18	No Lecture, Memorial Day	
9-10	Endocrine system	Chap 9
6/8/18	Midterm 3	