Program: Pharmacology
Course Name: Cellular Pharmacology
Course Number: 541
Credits: 4

Course Director: James L. Daniel, Ph.D. Room 328 OMS 2-4457 jdaniel@temple.edu
Students may communicate by email or phone at any time.
The Course Director is available during the normal work day hours. Other instructors are available on the same terms.

Prerequisites: It is recommended that all students have taken Organic Chemistry, Biology and Biochemistry

Disability Statement: Any student who has a need for accommodation based on a disability should contact the Course Director as soon as possible.

Times: The course is offered in the Fall semester. The course will meet for two hours twice a week. Additional time for student presentations may be required.

Description: The goal of the course is to present the basic mechanisms by which cells are regulated by endogenous ligands. The area to be studied include:

1) Second messengers - their mechanism of action, and measurement
2) Protein phosphorylation
3) Protein kinases – regulation by second messengers and other factors.
4) Receptors – mechanism of action regulation of activity by desensitization.
5) Guanine nucleotide binding proteins
6) Cell Adhesion molecules
7) The regulation of signaling by the ubiquitin pathway
8) Apoptosis

Students are expected to participate in class by contributing to discussion. Students are also expected to discuss seminal papers in the field in a journal club setting. At the end of the course each student with present a 15-minute discussion of an area related to the course but had not been previously discussed.

Textbook & Readings: The Molecular Biology of the Cell. 4th Edition
Alberts , Johnson, Lewis Raff Roberts and Walter, Garland Science Press.
In addition each instructor will provide an outline for his or her lecture.
Exams are indicated on the course schedule. Any exam may also have a take home section which will be completed using reference materials but not with consultation of other students faculty etc.
Class attendance is required. Student absence must be excused or will reflect on a student's grade.
The grade in the course will take into account all exams, class participation and oral presentations. The examinations will weigh the greatest (about 80%).

Syllabus: (subject to change)

Lectures are in Room 311 of the Medical Research Building.

Subject

I Introduction

Introduction
Cell signaling
Cell signaling

II. Second messengers

Biological Control
Cell [Ca^{2+}] and its regulation
Ca2+ regulated signaling Events
Ca^{2+} Measurement techniques
Inositol phosphates
Protein phosphorylation
Kinase Recognition Sites
Diacylglycerol and Protein Kinase C
Metabolism and second messenger function of cyclic nucleotides
Discussion - papers on second messengers
Discussion
Discussion

Exam 1

III. Receptors

Small GTP-binding proteins, Ras, Rac, Rho, Rap etc
G-protein-linked receptors
G-protein-linked receptors
Guanine-nucleotide binding proteins
Guanine-nucleotide binding proteins
RGS proteins
Regulation of receptors - endocytosis and desensitization
Receptor Purification and Binding studies
Receptors that regulate channels (directly & indirectly)
Receptors that regulate channels (directly & indirectly)
Receptors that directly regulate DNA transcription
Tyrosine Kinases
Tyrosine Kinases
ANF and guanylyl cyclase
Regulation and Function of the MAP kinase cascades
Discussion - Receptors
Discussion

Exam II

IV Special Topics
Secretion
Lipid Rafts
Cell Adhesion molecules – integrins, ICAMS, Selectins, etc.
Post-Translation modification by lipids
Apoptosis
The ubiquitin pathway
Final Exam