

## **CHEMISTRY 416, MECHANISMS OF DRUG ACTION**

Fall, 2006 - TTH 9:30-10:45 A.M.

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Office hours – TBA

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Text: Brody's Human Pharmacology, 4<sup>th</sup> edition

**COUSE DESCRIPTION:** This course provides an introduction to Pharmacology which is the study of chemicals that produce change in function of biological systems and the mechanisms by which these chemicals act. We will focus on the main classes of drugs and how they affect their target systems. We will also survey some of the more popular contemporary drugs. The course is designed to provide students who plan to pursue medical, health professional, or biomedical research careers a foundation for their professional or graduate coursework and research. However, it is appropriate for any student who has an interest in the subject matter.

**PREREQUISITES:** Chemistry 221-221L, Chemistry 212-212L, Biology 130-131 and Biology 140-141

### **OBJECTIVES**

During the course of the semester you should focus on improving in the following areas:

1. Learning terminology, classifications, and methods used in the study of Pharmacology
2. Learning the names and mechanisms of action of drugs of different classes
3. Developing the ability to understand, interpret and critique scientific data
4. Learning the skills and points of view of professionals in this field

**EVALUATION:** During the semester, there will be three exams. The third exam, the final exam, will be comprehensive and will cover the entire semester's work. Half of the final will be a traditional in-class exam that will be given during the scheduled exam period. For the other half, you will write a paper that will track the evolution of a drug of your choice from the basic research stage through the use of that drug clinically. The paper should be of the quality expected of a student graduating with a degree in the sciences including references for literature consulted. Quizzes will be given throughout the semester. Each student will also give a 10 minute presentation on a "hot topic" in Pharmacology. Topics can include but are not limited to new drugs that are on the market or undergoing clinical trial, new experimental techniques or current research that can be used to design new drugs. The presentations will count as one quiz grade.

The course grade will be arrived at according to the following scale:

A --- 90%,

B --- 80%,

C --- 70%,

D --- 60%,

F --- below 60%,

of the total number of points available.

Plus and minus assignments will be made within these ranges.

**POLICIES:** Extra credit will be awarded for attending Chemistry Departmental Seminars and pertinent seminars sponsored by other departments. All bonus points (extra credit) will be added to your semester point total when final grades are calculated.

I am very interested in helping you make a success of your work in this course. Therefore, office visits outside of the regularly scheduled office hours may be accommodated by appointment.

In this course you are governed by the honor code.

Your attendance at every class meeting is expected and is important to your ultimate success in the class. **YOU MAY MISS THREE CLASS PERIODS DURING THE SEMESTER FOR ANY REASON. AFTER THE THIRD ABSENCE YOUR FINAL GRADE WILL BE REDUCED BY A HALF LETTER GRADE WITH EACH ADDITIONAL ABSENCE.** A missed assignment may be made up only in the instance of an excused absence. I will determine the validity of an excuse. Quizzes may not be made up unless arrangements are made for them to be completed before the scheduled in-class time. Your lowest quiz grade will not be included when final grades are calculated. A missed quiz will count as your one quiz that will be dropped.

You are expected to complete all homework assignments. Although they are not usually graded, they are essential to your success in this course. I encourage you to form study groups to complete and discuss the homework assignments.

### **SCHEDULE:**

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|-----------|--|
| August 24 | Introduction: general principles and definitions <ul style="list-style-type: none"><li>• Drug nomenclature</li><li>• How a drug becomes available on the market</li></ul>  |
| August 29 | Gene based therapy <ul style="list-style-type: none"><li>• Survey of gene transfer technologies</li></ul> <b>Novel molecular approaches to cystic fibrosis gene therapy</b><br>Tim W. R. Lee, David A. Matthews, and G. Eric Blair<br>Biochemical Journal 2005 April 1; 387(Pt 1): 1–15.   |
| August 31 | Pharmacokinetics <ul style="list-style-type: none"><li>• Review of eukaryotic cell structure</li><li>• Mechanisms of drug absorption and factors that influence absorption distribution</li><li>• Routes of administration</li><li>• Biotransformation and excretion</li></ul> <b>Grapefruit juice–drug interactions</b><br>David G. Bailey, J. Malcom, O. Arnold, and J. David Spence |

British Journal of Clinical Pharmacology 1998 46:101-110.

- September 5                      Pharmacodynamics
- Physiological receptors: structural and functional families
  - Quantification of drug-receptor interactions
  - Receptor regulation
  - Actions of drugs not mediated by receptors
- September 7, 12 and 14      Drug therapy of inflammation
- Histamine, Bradykinin and their antagonists
  - Lipid-derived Autocoids: Eicosanoids and Platelet-Activating Factor
  - Analgesic-antipyretic and anti-inflammatory agents
  - Drugs used in the treatment of Asthma
- September 19                      Drugs affecting Gastrointestinal function
- Agents for control of gastric acidity and treatment of peptic ulcers
  - Agents affecting gastric motility
- SEPTEMBER 21                      EXAM 1**
- September 26, 28  
and October 3, 5, 10          Drugs affecting renal and cardiovascular function
- Diuretics
  - Other agents that affect conservation of water
  - Drugs used for the treatment of Myocardial Ischemia
  - Antihypertensive agents
  - Treatment of heart failure
  - Antiarrhythmic drugs
  - Treatment of hyperlipoproteinemias
- October 19, 24, 26              Hormones and hormone antagonists
- Insulin and Oral hyperglycemic agents
  - Thyroid and antithyroid drugs
  - Estrogens, Progestins and Androgens
  - Adrenocorticotrophic Hormone
- OCTOBER 31                      EXAM 2**
- November 2, 7, 9, 14          Chemotherapy of Microbial Disease
- Bacterial infections
- Definitions and classifications
  - Mechanisms of resistance
  - Mechanisms of action of different classes

November 16, 21,  
28, 30, Dec. 5

Antifungal agents  
Antiviral agents

Antineoplastic agents

- Overview of mechanisms and sites of action
- Relationship between cell cycle and drug action

Mechanisms of different classes

- Alkylating agents
- Antimetabolites
- Natural products
- Others (including hormones, platinum complexes...)

Please mark the exam dates on your calendar and make your plans appropriately.