Texas A&M University-Corpus Christi
CHEM 4490: Drugs, Toxins and Natural Products Chemistry
Spring 2006 TR 2-3:15 p.m., CS 101

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Course Description: This course will examine the chemistry and biological activity of pharmaceuticals, toxins and the biochemical pathways from which they are derived. The major classes of biologically active compounds, their effects and molecular constituents will also be examined in depth.

Learning Outcomes. Successful completion of this course will provide the student with the ability to:

1. Understand how small and large molecules interact with the major biochemical targets of enzymes, nucleic acids, lipid membranes and cellular receptors.

2. Identify the chemical and physical features that contribute to a molecule's activity at a particular biological target.

3. Determine how a particular molecular structure could be modified to increase or decrease biological activity.

4. Describe the drug design and development process, as it occurs at major medicinal chemisty research laboratories.

5. Classify a compound based on its effect and mode of action as a member of one of the major classes of pharmaceuticals, including but not limited to: antibiotics, chemotherapeutic agents, cholinergic agonists or antagonists, adrenergic agonists or antagonists, central nervous system stimulants or depressants, hallucinogens, analgesics, anti-inflammation compounds or steroids.

6. Describe the major biochemical pathways found in plants, microbes and even animals that yield the precursors for many of our most important pharmaceuticals.

Course Prerequisites. This class will cover a number of organic and biochemical structures, pathways, functions and mechanisms. Two semesters of organic chemistry and 1 semester of biochemistry are required.

Texts
***An Introduction to Medicinal Chemistry* (3rd Ed.)**
Graham L. Patrick, Oxford University Press (2005)

***Lippincott's Illustrated Reviews: Pharmacology* (2nd Ed)**
Myceck, Harvey and Champe. Lippincott, Williams and Winkins.

CHEM 4490 Study Guide
Patrick Larkin. Available at Campus Book Store.

Grading
There will be two regular semester examinations and a final examination, which will **NOT** be comprehensive. Examinations may include multiple choice, short answer, brief calculations, structure drawing or brief essay questions. We will not "drop" any of the examinations in the calculation of the final grade.

Exam I	100 pts
Exam II	100 pts
Final Exam	100 pts
Total	300 pts

The approximate grading scale will be:
A: 90-100 %
B: 80-90%
C: 70-80%
D: 60-70%
F: < 60%

Exams will take place during regular class time. If you have a university-approved excuse, please let me know ahead of time to make alternate arrangements. Only university-approved excuses will be valid for missing an exam.

Class format
This course will be taught using a peer-centered format, which requires participation on the part of the students. Briefly stated, the lecture period will be broken up into mini-sections covering fairly specific topics. At the end of a topic, example problems are posed and the class surveyed for the correct answer. If it appears that the concept still requires clarification, students are asked to work with one another for approximately one minute to consider the reasoning for their answer. To facilitate this type of interaction, we will be utilizing a set of answer cards (A,B,C,D) that are included as part of the study guide packet. PLEASE BRING THESE CARDS TO EACH CLASS. While no one receives a grade for their in-class answers, participation is required. Past experience with this format has generated a very positive response from students.

Class Attendance
Attendance is not mandatory. However, up to 1% of your grade may depend upon your participation in the peer-centered learning format.

Class Decorum
The best way to encourage learning is to provide an environment conducive to listening, concentration and discussion. Therefore, students are expected to maintain the highest standards

of decorum throughout the semester. All students are expected to conform to college-level standards of ethics, behavior and academic integrity. Please refer to the section on academic policies and regulations in the university catalog for description of these expectations.

Tentative Schedule

Date		**Topic**	**Reading**
Jan	12	Drugs & Toxins: Introduction	Med Chem CH 1,2
Jan	17	Protein & Enzyme structure & function	Med Chem CH 3,4
Jan	19	Protein & Enzyme structure & function	Med Chem CH3,4
Jan	24	Biological receptors	Med Chem CH5,6
Jan	26	Biological receptors	Med Chem CH5,6
Jan	31	Drugs & Nucleic Acids	Med Chem CH7
Feb	2	Drug Discovery, Design & Development	Med Chem CH8-12
Feb	7	Drug Discovery, Design & Development	Med Chem CH8-12
Feb	9	Drug Discovery, Design & Development	Med Chem CH8-12
Feb	14	Drug Discovery, Design & Development	Med Chem CH8-12
Feb	**16**	**Exam I**	
Feb	21	Antibiotics (bacterial)	Med Chem CH16, Pharmacology CH28-38
Feb	23	Antibiotics (bacterial, viral)	Med Chem CH17, Pharmacology CH28-38
Feb	28	Antibiotics (viral)	Med Chem CH17, Pharmacology CH28-38
Mar	2	Chemotherapy (Cancer-fighting drugs)	Med Chem CH18, Pharmacology CH3-5
Mar	7	Compounds affecting the Cholinergic System	Med Chem CH19, Pharmacology CH3-5
Mar	9	Compounds affecting the Cholinergic System	Med Chem CH19, Pharmacology CH3-5
Mar	14	Spring Break	
Mar	16	Spring Break	
Mar	21	Drugs affecting the Adrenergic System	Med Chem CH20, Pharmacology CH6-7
Mar	23	Drugs affecting the Adrenergic System	Med Chem CH20, Pharmacology CH6-7
Mar	**28**	**Exam II**	
Mar	30	Drugs affecting the Central Nervous System	Pharmacology CH8-13
Apr	4	Drugs affecting the Central Nervous System	Pharmacology CH8-13
Apr	6	Opium Analgesics	Med Chem CH21, Pharmacology CH14
Apr	11	Opium Analgesics	Med Chem CH21, Pharmacology CH14
Apr	13	Analgesics & Anti-inflammatory agents	Pharmacology CH39-40
Apr	18	Analgesics & Anti-inflammatory agents	Pharmacology CH39-40
Apr	20	Steroids	Pharmacology CH27
Apr	25	Steroids	Pharmacology CH27
Apr	27	Natural Products Chemistry	Reserve Material
May	2	Natural Products Chemistry	Reserve Material
May	4	**Final Exam: 2-4:30 pm**	