Course syllabus for Chemistry 162B / 262B

Drug Design (Spring 2009)

Class meets: Mon, Wed, Fri **12:00 – 12:50 P**M **Phelps 1444**

Instructor: Professor *Kalju Kahn*, Office: PSB-N 2623
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Office Hours: Tue 3:30–3:30 and Thu 3:30-4:30 or by appointment
Course website: http://www.chem.ucsb.edu/~kalju/chem162

Lecture Textbook: Richard B. Silverman, The Organic Chemistry of Drug Design and Drug Action, 2nd edition

***The Course*:** In Chem 162, students learn principles that govern the process of modern drug discovery and development. Students will follow a path similar to that taken by real-life drug developers by learning important elements of the drug design process in a logical order. Some topics that we focus more extensively in 162B are:

- Principles of molecular recognition
- Mechanism of enzymes and enzyme inhibition
- Structure based drug design
- Drug metabolism and prodrugs

Expectations of Students:

- Attendance and taking good lecture notes is expected. Submitting completed assignments in time is required.
- The textbook provides some necessary background material. Furthermore, students are expected to read modern drug design-related research literature. Required literature will be available on the course website.
- Honesty and academic integrity must be always preserved. While discussing your ideas with others is encouraged outside the classroom, you must answer the assignment questions individually. No supplemental material should be used during an exam.
- Your grade in the course is based on points you collect from the weekly assignments (10 points each), the mid-term (40 points), the final exam (50 points), and the written research proposal (50 points). This is a small class in which participating students historically have earned grades between A+ and B-.
- The course requires that you have a solid understanding of organic chemistry; good background in biochemistry and physical chemistry will be helpful.
- No student shall give, sell, or otherwise distribute to others or publish any electronically available course materials or recordings made during any course presentation without the written consent of the instructor.

Study tips:

- I am posting lecture note slides on-line before the class meets so that you can focus on following my talk. The slides are mainly illustrative and you need to follow the lecture in order to fully understand the topics I cover.
- Come in class prepared. Read the relevant textbook material and required reading **before** the class meets. I like to interact with students during our meetings and you enjoy the lectures more if you can think along.
- Review (or rewrite) your class notes the same day and supplement them with material from the textbook and other resources (optional reading, Internet). Ask for help if something remains unclear.
- This course is not about memorization of names, reactions, or facts. It is about understanding the process, its principles and methods. You should demonstrate good understanding of the material when answering assignment questions and the exam problems. Your creativity and originality are highly important for getting a high score in the final written proposal.

Good luck! — Kalju

Chem162B/262B Planned schedule for the Winter 2010

Jan 4th	M	Overview of the course, review of key concepts from Chem 162A	
Jan 6th	W	Introduction to enzymes; enzymes as drug targets	
Jan 8th	F	Enzyme mechanisms	
Jan 11th	M	Study of enzyme mechanism and kinetics	
Jan 13th	W	Enzyme inhibition. Reversible inhibitors, Transition state analogs	
Jan 15th	F	Tutorial: Modeling of chemical reactions and transition state analogs	
Jan 18th	M	Martin Luther King, Jr.'s Birthday	
Jan 20th	M	Enzyme inhibition. Mechanism-based inactivators	**First assignment due**
Jan 22nd	W	Tutorial: Chemical databases and visualization of macromolecules	
Jan 25th	M	Enzyme inhibition: Further examples	
Jan 27th	W	Molecular recognition: Principles and methods	**Second assignment due**
Jan 29th	F	Molecular recognition: Interactions between molecules	
Feb 1st	M	Molecular recognition: Entropy of binding; hydrophobic effect	
Feb 3rd	W	Molecular recognition: Optimization strategies	
Feb 5th	F	Tutorial: Molecular Recognition	
Feb 8th	M	Structure-based drug design: Principles	
Feb 10th	W	Structure-based drug design: Modeling protein flexibility	**Third assignment due**
Feb 12th	F	Tutorial: Structure-based drug design: Rational design of enzyme inhibitors	
Feb 15th	M	President's day	
Feb 17th	W	Structure-based drug design: Docking	**Fourth assignment due**
Feb 19th	F	Tutorial: Target structure-based drug design: Docking	
Feb 22nd	M	Midterm Exam	
Feb 24th	W	Introduction to pharmacokinetics	
Feb 26th	F	ADMET as a challenge in drug discovery	
Mar 1st	M	Drug metabolism: Principles	
Mar 3rd	W	Drug metabolism: Cytochrome P450 chemistry	**Fifth assignment due**
Mar 5th	F	Drug metabolism: Optimization strategies	
Mar 8th	M	Drug toxicity and drug-drug interactions	
Mar 10th	W	Prodrugs	**Sixth assignment due**
Mar 12th	F	Drug delivery technologies	**Written proposals due**

Assignments
(will be posted on Wednesday one week before the due date)
1. Transition state analogs as enzyme inhibitors
2. Covalent inactivation of enzymes
3. Molecular recognition
4. Structure-based drug design
5. Molecular docking
6. Drug metabolism, prodrugs, drug delivery