Course syllabus for Chemistry 162/262

Drug Design (Winter 2005)

Class meets: Mon, Wed, Fri **12:00 – 12:50** AM **Phelps 1440**

Instructor: Professor *Kalju Kahn*, Office: PSB-N 1511
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Office Hours: Tue 12:00-1:00 and Thu 12:30-1:30 PM or by appointment
Course website: http://www.chem.ucsb.edu/~kalju/chem162

Lecture Textbooks:

Required: Richard B. Silverman,
The Organic Chemistry of Drug Design and Drug Action, 2nd edition (2004)

***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 are:

- Target validation
- Enzyme inhibition
- Structure-base drug design
- Drug metabolism

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 poster presentation (20 points), and the final written research proposal (50 points). Grading will be based on the curve but you have to meet a certain level to get a grade higher than F.
- The course requires that you have a solid understanding of basic biology and organic chemistry; good background in biochemistry and physical chemistry will be very helpful.

Study tips:

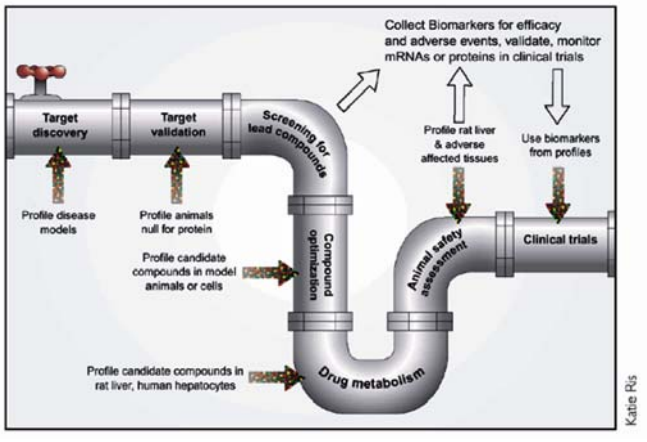
- I am posting lecture note slides on-line before the class meets so that you can focus on following my talk. The slides are mainly illustrative and you need to follow the lecture in order to fully understand the topics I cover.
- Come in class prepared. Read the relevant textbook material and required 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 midterm problems. Your creativity and originality are highly important for getting a high score in the final written proposal.

Good luck! — Kalju

Chem162/262 **Schedule for the Winter 2005**

Jan 3rd	M	Overview of the course. History of drug design.	
Jan 5th	W	Current trends and future of drug design. Diseases.	
Jan 7th	F	Target validation.	
Jan 10th	M	Target Validation.	
Jan 12th	W	Enzymes as drug targets.	**First assignment due**
Jan 14th	F	Receptors as drug targets.	
Jan 17th	M	Martin Luther King, Jr.'s Birthday.	
Jan 19th	W	Enzyme mechanisms.	**Second assignment due**
Jan 21st	F	Enzyme kinetics and inhibition. Reversible inhibitors, TSA.	
Jan 24th	M	Irreversible inhibitors. Mechanism-based inactivators.	
Jan 26th	W	Drug–receptor interactions. Pharmacodynamics.	**Third assignment due**
Jan 28th	F	Biochemical and cell-based assays, lead identification.	
Jan 31st	M	Biomolecular interactions and binding thermodynamics.	
Feb 2nd	W	Structure-based drug design: Principles.	**Fourth assignment due**
Feb 4th	F	Structure-based drug design: Docking and visualization, FEP	
Feb 7th	M	QSAR: Theoretical foundations.	
Feb 9th	W	QSAR: Applications.	**Fifth assignment due**
Feb 11th	F	Combinatorial chemistry and screening	
Feb 14rd	M	Pharmacokinetics (ADME).	
Feb 16th	W	Medicinal Chemistry: Lead modification.	
Feb 18th	F	**Mid-Term Examination (45 minutes)**	
Feb 21st	M	President's Day	
Feb 23rd	W	Drug metabolism: Principles and Methods	**Sixth assignment due**
Feb 25th	F	Drug metabolism: Pathways for deactivation	
Feb 28th	M	Prodrugs. Drug delivery systems.	
March 2nd	W	Pharmacogenomics.	**Seventh assignment due**
March 4th	F	Pharmacogenomics.	
March 7th	M	Nucleic acids as therapeutics.	
March 9th	W	Proteins as therapeutics (Amgen guest lecture?).	**Eight assignment due**
March 11th	F	**Posters**. Noon–2:00 PM, Chemistry breezeway.	
March 14th	F	**Written proposals due**	

Assignments
(will be posted on Wednesday one week before the due date)
1. Target validation exercise
2. Enzymes and receptors
3. Enzyme mechanisms, kinetics, and inhibition
4. Biomolecular interactions and assay development
5. Structure-based drug design
6. QSAR and combinatorial chemistry, screening
7. Drug metabolism, prodrugs, drug delivery
8. Pharmacogenomics



Chem162/262 **Textbook reading guide**

It is not necessary to know all the material in the textbook for this course. The following pages are most relevant for each topic that we discuss. However, interested students are encouraged to read more. N/A means that the textbook does not offer adequate coverage; students should use posted research literature or other more specialized texts as a source of additional information.

Jan 3rd	M	Overview of the course. History of drug design.	1-11
Jan 5th	W	Current trends and future of drug design. Diseases.	N/A
Jan 7th	F	Target validation.	N/A
Jan 10th	M	Target Validation.	N/A
Jan 12th	W	Enzymes as drug targets. Drug Resistance.	229-240
Jan 14th	F	Receptors as drug targets.	122-124
Jan 17th	M	Martin Luther King, Jr.'s Birthday.	
Jan 19th	W	Enzyme mechanisms.	174-190
Jan 21st	F	Enzyme kinetics and inhibition. Reversible inhibitors, TSA.	227-264
Jan 24th	M	Irreversible inhibitors. Mechanism-based inactivators.	274-302
Jan 26th	W	Drug–receptor interactions. Pharmacodynamics.	131-159 (-165)
Jan 28th	F	Biochemical and cell-based assays, lead identification.	11-17
Jan 31st	M	Biomolecular interactions and binding thermodynamics.	122-136
Feb 2nd	W	Structure-based drug design: Principles.	268-272
Feb 4th	F	Structure-based drug design: Docking and visualization, FEP	78-83
Feb 7th	M	Pharmacokinetics (ADME).	N/A
Feb 9th	W	QSAR: Theoretical foundations & Bioavailability	51-66
Feb 11th	F	QSAR: Applications to increase efficacy	66-78
Feb 14th	Medicinal Chemistry: Lead modification		7-34
Feb 16th	W	Combinatorial Chemistry	34-50
Feb 18th	F	**Mid-Term Examination (45 minutes)**	
Feb 21st	M	President's Day	
Feb 23rd	W	Drug metabolism: Principles and Methods	406-414
Feb 25th	F	Drug metabolism: Pathways for deactivation	415-448
Feb 28th	M	Prodrugs. Drug delivery systems	498-528
March 2nd	W	Pharmacogenomics	N/A
March 4th	F	Pharmacogenomics	N/A
March 7th	M	Nucleic acids as therapeutics	324-328, 342-359
March 9th	W	Proteins as therapeutics (Amgen guest lecture?)	N/A
March 11th	F	**Posters**. Noon–2:00 PM, Chemistry breezeway	