

**UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
WINTER 2019**

1. Course: CHEM 599-659 Selected Topics in Chemistry: Medicinal Chemistry

LEC	DAYS	TIME	ROOM	PROFESSOR	OFFICE	EMAIL	OFFICE HOURS
L01	TR	9:30-10:45	ST 127	Dr. D. Derksen	SB 231	dderksen@ucalgary.ca	Open Door

To avoid IT problems, it is recommended that the students use their U of C account for all course correspondence. Please use "CHEM 599/659 inquiry" as the Subject of your e-mail.

Desire 2 Learn (D2L): CHEM 599 L01 - (Winter 2019) - Selected Topics in Chemistry: Medicinal Chemistry
<https://d2l.ucalgary.ca/d2l/home/171384>

Departmental Office: Room SA 229, Tel: (403) 220-5341, e-mail: chem.undergrad@ucalgary.ca

2. Course Description: An introduction to concepts in medicinal chemistry including synthesis, lead discovery, rational drug design, receptors and basics of metabolism.

3. Reference Textbooks (Suggested, not required):

"Drug-like Properties: Concepts, Structure Design and Methods" Edward Kerns and Li Di, Academic Press.

"The Organic Chemistry of Drug Design and Drug Action," 3rd Edition by Silverman and Holladay, Academic Press.

"Organic Chemistry" 2nd Edition by Clayden, Greeves, and Warren, Oxford University Press.

4. Topics Covered and Suggested Readings:

Course Contents

1) Historical Overview of Drug Discovery and Introduction

- Drugs discovered without rational design
- Overview of modern rational drug design
 - Stages of drug discovery
- ADME

2) Lead Discovery and Lead Modification

- Lead discovery
 - Endogenous ligands and natural products
 - Fragment-based lead discovery
- Lead modification
 - Solid phase peptide and organic synthesis
 - Structure-activity-relationship (SAR) studies
 - Isosteres
 - Conformational analysis and constraints
 - Peptidomimetics/Amino acids
 - Heterocycle synthesis

Common reactions in medicinal chemistry

- Cross coupling
- Amide bond forming methods
- pKa
- Synthetic design
- SciFinder and Reaxys

3) Physiochemical properties

- Rules for rapid profiling from structures
- Lipophilicity
- pKa

- Solubility
- Permeability

4) Receptors/Enzymes

- Drug-receptor interactions
- How interactions are determined
- Drug and receptor chirality
- Overview of enzymes as catalysts
- Inhibition and inactivation
- Irreversible enzyme inhibitors

5) Barriers to effective drugs/ metabolism

- BBB, plasma stability
- Pathways for drug deactivation and elimination
- Phase I transformations and mechanisms
- Phase II transformations and mechanisms
- P450 inhibition, hERG blocking, toxicity
- Intro to pharmacokinetics

6) Graduate student proposals/presentations

CUMULATIVE FINAL

Department Approval _____ Electronically Approved _____ Date _____ January 6, 2020 _____