CHEM 4670 Drug Design and Drug Discovery

2018-2019 Regular Session (18R)

Credit hours: 3 at the 400 level

Course Instructors:

Course instructor: F. Schweizer, Room 460 Parker Building, phone (204) 474-7012; fax: 474-7608; E-mail: Frank.Schweizer@umanitoba.ca
Office hours: Tuesdays 10-11am.

Purpose of the Course:

The course will give the student an understanding of the design, synthesis and interactions of drug molecules. Emphasis will be on the organic chemical principles and reactions vital to drug design and drug action.

Course Objectives:

Upon completion of the course, the student should be able to demonstrate an understanding of the concepts involved in drug design and drug interaction, drug synthesis and biological evaluation.

Course Requirements:

Prerequisites: Chem 2210 and 2220 or equivalent.

Syllabus:

1. Introduction
2. Drug Discovery, Design and Development
   (a) Drug Discovery
   (b) Lead Modification: Drug Design and Development
   (c) Quantitative Structure-Activity Relationships
3. Receptors
   (a) Introduction
   (b) Drug-Receptor Interactions
   (c) Interactions involved in the Drug-Receptor Complex
   (d) Determination of Drug Receptor Interactions
   (e) Theories for Drug-Receptor Interactions
   (f) Topographical and Stereochemical Considerations
4. Enzymes
   (a) Enzymes as catalysts
   (b) Mechanisms of Enzyme catalysis
   (c) Coenzyme Catalysis

5. Enzyme Inhibition and Inactivation
   (a) Introduction
   (b) Drug Resistance
   (c) Drug Synergism
   (d) Reversible Enzyme Inhibition
   (e) Irreversible Enzyme Inhibition

6. DNA-Interactive Agents
   (a) Introduction
   (b) DNA Structure and Properties
   (c) Classes of Drugs That interact with DNA

7. Special Topics (if time permits)
   (Drug Metabolism, Drug Resistance, Synergism, Prodrugs and Delivery Systems)

Recommended texts and references:

The recommended textbook for this course is “The Organic Chemistry of Drug Design
In addition, instructor will provide relevant reading material such as review articles and
research papers. Solving the problems at the end of each chapter will be an excellent way
to prepare yourself for the exams.

Assumed background:

It is assumed that the student has taken a one-year course in organic chemistry that
included amino acids, proteins, and carbohydrates and is familiar with basic organic
reaction mechanisms.

Prerequisite: CHEM 2220 or equivalent.

Teaching and learning methods:

Students are expected to question any items that are unclear during lectures. Teaching
and learning methods may include lectures, primary literature searches, web searches,
computer simulation and discussion of research articles. Instructor will provide additional
relevant reading material. Students are responsible for knowing the indicated reading material for examination purposes.

**Evaluation:**

Mid-term 1: October 11, 2018 (35%)
Mid-term 2: November 20, 2018 (35%)
Assignment: (take home style): (20%)
Quiz: December 04, 2018 (10%)

All Mid-term exams are in class exams. Assignment will be handed out between midterm 01 and midterm 2. Please use course website for further updates, lecture notes, etc. Late hand in of assignments will be penalized by deduction of 50%/per day. Assignments can be discussed in groups. However, every student is responsible to hand in his own and independently written report. The UofM policy on academic dishonesty including “plagiarism, cheating and fraud” and “examination personation” found in the University General Calendar will be applied.