

CHEM 9713R Advanced Medicinal Chemistry

Syllabus Fall 2024

0.25 Credit Chemistry Graduate Course

Course Description

This course will explore medicinal chemistry concepts primarily through case studies of specific classes of therapeutic and diagnostic agents. It will begin with an overview of medicinal chemistry concepts, including a discussion of the methods of drug discovery, the classes of drug molecules (small molecules, peptides, antibodies), methods of optimization and preclinical evaluation. Those with limited background knowledge in medicinal chemistry concepts and terminology will be expected to cover introductory material outside of course lecture time. Case studies of drug discovery will be presented, including the discovery of targeted oncology drugs and the development of imaging agents. There will be a focus on modern medicinal chemistry concepts, such as fragment based design and allosteric modulation. An independent study will be a course requirement with both written and presentation components.

Lectures

Lectures will be provided in-person with a guest lecture using Zoom. The course will run from Thursday October 31, 2024 through to Thursday December 5, 2024, weekly on Thursday from 9:30 AM to 12:00 PM. Course times are subject to change depending upon TA needs for the Department of Chemistry.

Topics Covered

The following topics will be covered during the course, subject to modification. An emphasis is placed on case studies from the medicinal chemistry literature.

1. MedChem Defined
2. The Drug Discovery Process
 - a. Classes of molecules
 - b. Target validation
3. Drug discovery methods and technologies
4. Brief review of intermolecular bonding forces
5. Drug Targets with emphasis on case studies
 - a. Enzymes
 - b. Receptors
 - c. Nucleic acids
 - d. Protein-protein interactions
6. Brief review of DMPK & ADMET
7. Overview of clinical trials
8. Computational approaches to drug discovery (guest lecture)
9. Tentative – drug discovery case study in oncology; peptide based theranostics
10. Independent study presentations describing the discovery of a new chemical entity leading to a drug candidate

Course Material

There is no official course textbook. A recommended textbook for background material is: "An introduction to medicinal chemistry" by Graham L. Patrick 6th or 7th ed. ISBN 978-0-19-874969-1. The e-book version may be purchased, although there is no requirement to do so. However, students with limited background in the fundamentals of medicinal chemistry will require access to introductory medicinal chemistry literature. Journal articles will be provided. Students will be required to use library resources for database searches and journal articles, for their assignments and independent study.

Course Evaluation

| | |
|--|-----|
| Assignments | 30% |
| Independent Study Report | 20% |
| Independent Study Presentation (includes peer-reviewed evaluation) | 40% |
| Participation | 10% |

Course Website and Communication

News and updates will be posted on Brightspace (OWL). This is the primary method by which information will be disseminated to everyone in the class. Please remember that it is your responsibility to check OWL on a regular basis.

Email regarding the course must be sent using your Western email account and must have 9713 in the subject line.

Learning Outcomes

Upon completion of Chem 9713R, students will be able to describe the drug discovery process, will understand the recent approaches being used in drug discovery, will learn to independently seek resources on the topic of medicinal chemistry, and will gain skills in summarizing and presenting scientific information to their peers.

Course attendance and missed tests/exams

You are responsible for all information presented during class. Information missed due to course absences will not be considered for the basis of a grade appeal.

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your instructor within 48 hours after you are capable to do so. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. The weight of missed course material will be transferred to other course components, at the discretion of the instructor, in cases where medical accommodation has been granted.

It is the policy of the Department of Chemistry that when a student takes a test or makes a presentation, they have deemed themselves fit to do so. Claims of distress or medical issues after the fact will not be considered for the basis of a grade appeal.

Notes on Academic Honesty:

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Website:

www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Generative AI is not permitted to be used for assignments, reports or presentations.

Health and Wellness

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. Information regarding health- and wellness-related services available to students may be found at: <http://www.health.uwo.ca/>

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at: http://www.health.uwo.ca/mental_health/resources.html