CHEM-4346/CHEM-5399

Advanced Organic Chemistry: Medicinal Chemistry

Course and Faculty Information

Course Description

This class provides an overview of medicinal chemistry from the perspective of organic chemistry. Broadly speaking, medicinal chemistry is devoted to the discovery and development of new agents for treating diseases. In this class, we will focus on various aspects of medicinal chemistry: taken together, these topics will provide students with an understanding of the factors that contribute to the discovery, design, assessment, and optimization of drugs. The material is divided in two parts: The first part focuses on the general principles of medicinal chemistry (molecular targets, ADME, drug discovery and design, etc.), while the second part covers some of the most common classes of drugs. The material integrates students' previous knowledge of general and organic chemistry. Topics pertaining to cell biology, biochemistry, and biology will be reviewed as needed.

Credits: 3
Prerequisites: CHEM 3344 (Organic II)
Meeting: M,W – 6:00 pm – 7:20 pm, RBS 2024

Contact Info

Instructor: Dr. Joshua A. Lutz
Email: jlutz@uttyler.edu;
Office: Ratliff Building South (RBS) room 3013
Office Hours: 9:00 am – 11:00 am, M-F or by appointment

Course Learning Outcomes

This course aims to familiarize the students with concepts related to the discovery, development, and use of pharmaceutical compounds. While this course will provide a good foundation for students continuing their training in health professions, the focus will be more on the chemistry behind drugs rather than their administration. By the end of this course students will:

- understand how drugs are discovered and rationally developed
- appreciate how drugs are processed in the body, and how this processing impacts their efficacy
- recognize several classes of drugs based on their molecular structure
- understand the mechanism of action, history, and development of some of the most common classes of drugs

Textbooks

There is no required textbook for this course. However, I have listed below some textbooks that I will be using to guide the course material. Additionally, the course will make use of current scientific research articles when appropriate. In the tentative course schedule, there are recommended readings with each section. These chapters come exclusively from "Introduction to Medicinal Chemistry" (entry #1 below).

1. Graham Patrick, Intro to Medicinal Chemistry, 5th edition (6th or 7th is fine too). Oxford Press
2. Richard B. Silverman & Mark W. Holladay, The Organic Chemistry of Drug Design and Drug Action, 3rd edition, Academic Press
3. Victoria F. Roche, S. William Zito, Thomas L. Lemke, and David A. Williams, Foye's Principle of Medicinal Chemistry, 8th Edition, Wolters Kluwer Press

Computer Requirement

Access to Canvas

Student Success
To be successful:

- check the Canvas course daily
- read announcements
- read and respond to course email messages as needed
- complete assignments by the due dates specified
- communicate regularly with your instructor and peers
- create a study and/or assignment schedule to stay on track

Grade Distribution

The overall grade will be determined by the student's performance on midterm exams, assigned homework, and a final cumulative exam. Additionally, students taking the graduate version of the course (CHEM 5399) will have a report and presentation. Participants in CHEM 4346 will be graded based on attendance and attention during the graduate presentations. Examinations will cover all materials from text, lectures, and any assigned materials. Homework will reinforce recently taught concepts and may include topics taught in previous lessons.

The breakdown of these components to your final grade is as follows:

Homework 10%

Report and Presentation 20%

Midterm Exams (3) 45%

Final Exam 25%

Total 100%

Tentative Course Schedule

Dates	Topic	Reading	Assignment
Jan 12 & 14	Introduction to Medicinal Chemistry	Syllabus; Chapter 1 in Textbook	(Read 1.2.1 Cell Structure)
MLK & Jan 21	Drug Targets and Intermolecular Bonding Forces	Ch. 1-6	
Jan 26 & 28	Drug Targets and Intermolecular Bonding Forces	Ch. 1-6	**HW#1 Due (Friday, Jan 30th by midnight)**
Feb 2 & 4	Pharmacokinetics/ADME	Ch. 11	
Feb 16 & 18	Drug Discovery, Design, and Development (w/intro to QSAR) **Exam #1**	Ch. 12-15; 17 & 18	• **HW#2 Due (Friday, Feb 20th by midnight)** • **Topics for Grad Projects are Due**
Feb 9 & 11	*Case Study: Hypertension*	Ch. 15 (CS 2)	
Feb 23 & 25	*Case Study: Cholesterol*	Ch. 11 (CS 1.1)	
Mar 2 & 4	*Case Study: Antibiotics*	Ch. 19	**HW#3 Due (Friday, Mar 6th by midnight)**
Spring Break	No Class		
Mar 16 & 18	*Case Study: Depression* **Exam #2**	CS 7	
Mar 23 & 25	*Case Study: Diabetes & Obesity*		*ACS WEEK*
Mar 30 & Apr 1	*Case Study: Cancer*	Ch. 21	**HW#4 Due (Friday, Apr 3rd by midnight)**
Apr 6 & 8	*Case Study: Hormonal Therapies* **Exam #3**	Ch. 21.4	**Graduate Project Papers are Due**
Apr 13 & 15	**Graduate Presentations**		
Apr 20 & 22	**Graduate Presentations**		
Apr 27 & 29	**Final exam Wednesday, April 29th, 7:15-9:15 p.m.** To see full finals schedule click here		

Academic Honesty

Cheating of any kind will not be tolerated. Please make yourself aware of the university policy for academic dishonesty in the Student Guide to Conduct and Discipline at UT Tyler. During examinations writing utensils, a calculator (non programmable), and ruler are the only things that will be allowed on your desk, in addition to scrap paper that will be provided. All questions concerning the exam should be directed to the instructor and any talking amongst students may be punishable by point deductions as the instructor sees fit.

NOTE THE POLICY FOR SMART DEVICES BELOW.

Cell phones and smart watches/electronic devices must be put away during exams. If they are observed out in a visually accessible place (i.e. between legs, on the floor, etc.), it will be assumed that they are being used to cheat and your exam will be taken, you will receive a zero score (0 points) for the exam, and you will be referred to the Office of Judicial Affairs

Artificial Intelligence Use Policy:

For this course, artificial intelligence (AI) use on assignments is not permitted. The work submitted by students in this course will be generated by themselves. It is to the benefit of the student that any homework assigned be done by the student without any AI services. Any instance of the following constitutes a violation of UT Tyler's Honor Code: a student has another person/entity do any portion of a graded assignment, which includes purchasing work from a company, hiring a person or company to complete an assignment or exam, using a previously submitted assignment and/or using AI tools (such as ChatGPT).

Attendance and Make-up Policy:

Attendance will not be taken throughout the semester but is highly recommended. Your understanding of the material will be improved significantly if you attend every lecture. This is an upper level/graduate course, so my assumption is that you are in the course because you want to learn the material. Make-ups will be allowed only for University of Texas at Tyler allowed reasons. Please inform me early if you know that you will miss a class. The only time that attendance will be monitored is during the graduate student presentations at the end of the semester. All undergraduates will receive credit for attendance and attention during these presentations.

I reserve the right to make modifications as needed to the course. This will be done in accordance with university bylaws.

See links below for additional information about student resources and university policies:

Student Learning Resources

Resources for Students

UT Tyler Handbook of Operating Policies