

Chemistry 414/614 (CHE 414/614)
Introduction to Medicinal Chemistry
Spring Semester 2017

Professor James Houglan

Office: 454 LSC

Office hours: Tuesdays 1:30-2:30 PM or by
appointment

Email: houglan@syr.edu

Lecture time: TTH 9:30-10:50

Room: Sims 331

Credits: 3

Prerequisites: Undergraduate organic chemistry

Course description and rationale

CHE 414/614 is an advanced undergraduate-level and introductory graduate course which presents material and concepts regarding the chemistry, biochemistry, and biology involved in drug development. This course presents an overview of modern medicinal chemistry, from first principles of drug action to design and development of potential therapeutics, and assumes background knowledge of general and organic chemistry. The focus is on building upon the understandings of the molecular function of drugs, leading to a broad overview of the topical issues and most frequently used techniques in the medicinal chemistry and pharmaceutical fields.

Learning outcomes

Upon completion of this course, a student should have mastered the following areas/skills:

- Gain familiarity with the chemical nature and biochemical behavior of common classes of drug targets and modes of drug action
- Understand the concepts of pharmacodynamics, pharmacokinetics, and drug metabolism and how these processes impact drug activity within the body
- Be able to describe the process of drug discovery from initial compound identification and optimization to market approval

Textbooks and reading assignments

Textbook

Graham Patrick, *An Introduction to Medicinal Chemistry, 5th Ed.* Oxford University Press, 2013
ISBN-13: 978-0199697397

Additional reading materials may be provided by handout or online through the Blackboard site.

Office hours

Office hours will be held on Tuesdays 1:30-2:30 PM in my office (LSC 454), or by appointment.

Course requirements, evaluation, and grading

Students will be evaluated based on the following elements:

	CHE 414	CHE 614
Activity	Percentage	Percentage
Exam 1	25	20
Exam 2	25	20
Exam 3	25	20
Class Participation / Peer Evaluations	25	20
Presentation		20
Total	100%	100%

Exams: There will be three exams, with exams held during class time on the days listed in the Course Calendar. The exams are closed book: the textbook and any notes or study aids are not allowed. *Nothing*

with a CPU (e.g. phone, tablet, calculator, etc.) may be visible or audible during the exam. Emphasis for each exam will be placed on material covered since the proceeding exam, but be prepared to apply previously encountered concepts to material found later in the semester. Scores and answer keys will be posted on the course Blackboard website. There are no alternative exam times; should you miss an exam you will receive a zero unless you provide documentation for a medical or other emergency.

Class Participation and Peer Evaluations: Students are encouraged to participate in class discussions throughout the semester, with in-class quizzes also a possible option with quiz scores factoring into the class participation grade. As part of the CHE614 presentation portion of the course, each student (both CHE414 and CHE614) will prepare a peer evaluation for each presentation. Completed peer evaluations are due during Exam Week as noted on the Course Calendar; an evaluation rubric and details regarding the peer evaluation process will be provided shortly following Spring Break.

Presentations: Students enrolled in CHE 614 are required to prepare and give a brief (15 minute) presentation on a drug molecule in which they have chosen. Appendix 7 of the text book (pages: 722-727) is a good starting point for finding molecules/drugs. A minimum list of topics to be discussed in presentations are delineated below:

- A history of the chosen molecule
- A discussion of drug functionality and structure
- A summary of available drug QSAR studies (i.e. information about the hit, the lead, lead optimization, etc.)
- The drugs target and mode of action
- Any competitive structures/drugs currently available
- The current market status and future outlook for the drug

As described above, these presentations will be evaluated by both Prof. Hougland and the other students in the course.

Presentation Deadlines:

- You must choose your drug molecule and have it approved by Prof. Hougland by/before February 9th (Molecules approved on a first-come-first-serve basis)
- Each student must provide an outline for her/his presentation by/before March 9th.
- The slides for all presentations must be submitted to Prof. Hougland by/before April 13th.

Extra credit: No extra credit is available in this course.

Academic Honesty: Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first instance of academic dishonesty by a student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of academic integrity policy. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice.

Complete academic honesty is expected of all students. Any incidence of academic dishonesty, as defined by the SU Academic Integrity Policy (see <http://academicintegrity.syr.edu>), will result in both

course sanctions and formal notification of the College of Arts & Sciences. In this course, students are allowed and encouraged to work and study together, and I encourage you to form study groups. However, all assignments and exams turned in must be the work of the individual student. Cheating in any form will not be tolerated. Students caught in violation of the academic honesty policy will be reported to the academic integrity office and will receive a grade of “F” in the course. Students with pending academic integrity hearings are not allowed to drop the course.

Disability Accommodation: Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. My goal is to create a learning environments that are useable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, I invite any student to meet with me to discuss additional strategies beyond accommodations that may be helpful to your success.

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS) located at 804 University Avenue, room 309, or call 315-443-4498 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue “Accommodation Authorization Letters” to students as appropriate. Students with any sort of disability who may need special accommodations should contact ODS as soon as possible. Accommodations and related support services such as exam administration are not provided retroactively and must be requested in advance. Should no request for special accommodations be received **at least one week** before the exam, I will consider existing exam accommodations to be satisfactory. Please note that accommodation requests must be filed separately for each exam. For more information, see Office of Disability Services, <http://disabilityservices.syr.edu>

Religious Observance Policy: SU’s religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors **before the end of the second week of classes**. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class. Please note that the religious observances policy requires accommodation for the religious holiday itself, not for travel days if a student will be observing the holiday elsewhere.

CHE 414/614 – Spring 2017 Class Schedule (*approximate*)

Date	Topic	Suggested reading (Chapters from Patrick)
1/17	Syllabus & Background	
1/19	Drugs and Drug Targets (overview)	1
1/24	Proteins and Enzymes: Structure and function	2-3
1/26	Proteins and Enzymes: Structure and function	2-3
1/31	Receptors: Structure and Function	4
2/2	Receptors and Signal Transduction	5
2/7	Nucleic Acids: Structure and Function	6
2/9	Exam #1 (CHE614: Presentation Topic/Drug Due)	
2/14	Introduction to Pharmacodynamics	-
2/16	Drug Targets: Enzymes	7
2/21	Drug Targets: Receptors	8
2/23	Drug Targets: Nucleic Acids and Miscellaneous	9-10
2/28	Pharmacokinetics	11
3/2	Pharmacokinetics	11
3/7	Case study: Statins	-
3/9	Exam #2 (CHE614: Presentation Outline Due)	
3/14	<i>No class (Spring Break)</i>	
3/16	<i>No class (Spring Break)</i>	
3/21	Drug Discovery: Finding a lead	12
3/23	Drug Design and Optimization	13-14
3/28	Bringing a Drug to Market	15
3/30	Compound Library Synthesis and Screen/Assay Development	16
4/4	<i>No class</i>	
4/6	Guest lecture: Professor Doyle	
4/11	QSAR: Principles and Case Studies	18
4/13	Exam #3 (CHE614: Presentation Slides Due)	
4/18	CHE614 Student Presentations	
4/20	CHE614 Student Presentations	
4/25	CHE614 Student Presentations	
4/27	CHE614 Student Presentations	
5/2	CHE614 Student Presentations	
5/9 (Tuesday of Exam Week)	Peer evaluations due to Prof. Hougland by 5PM (by email or hardcopy in mailbox)	