

Medicinal Chemistry/CHEM 5398
Bioorganic Chemistry/CHEM 6116
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Overview

The practicing physician has an increasing number of drugs in his/her armamentarium. These products are continually improving in efficacy and, with a few notorious exceptions, in safety. The emphasis of this class will be on all classes of pharmaceutical agents, how they were discovered and developed, and on how they work, from a biochemical and physiological perspective. It is my desire to provide a class that illuminates the interconnections of the fields of chemistry, biology, biochemistry, microbiology, and medicine.

Many factors have contributed to the development of this field. Through the science of biology, the disease processes become better understood and prospective biological drug targets are identified. The biochemists have elucidated the precise molecular structure of many of those drug targets and developed assays for the rapid screening of new drug candidates. The role of the chemist has been to synthesize and, in many cases, to design the drugs themselves. As we will see throughout the semester, the speed at which each of these processes can be accomplished has increased exponentially.

Textbooks

This rapid pace of change means that textbooks in this area must be frequently updated. Thus, we will often be forced to rely on the research literature for up-to-date information. It is my goal in this semester to provide you with a current overview of this increasingly important area. I believe that such knowledge will be of use to you regardless of what area of science or medicine you may pick for your career.

I have selected three **textbooks** for the semester (two or more copies of each are on reserve in the library). The first, *An Introduction to Medicinal Chemistry* 4th edition 2009 by Graham L. Patrick (ISBN: 978-01-99234479) provides a layman's overview of medicinal chemistry with considerable insight into how the drugs work and the current analysis of the methods of drug discovery. The second, Goodman and Gilman's *The Pharmacological Basis of Therapeutics*, (twelfth edition, 2011, ISBN: 978-0-07-162442-8) will provide a more comprehensive survey of the specific classes of drugs. While the first will undoubtedly be more enjoyable to read, the second will likely become a better reference source. One more paperback textbook, "Antibiotic Basics for Clinicians" 2nd Edition, (ISBN: 978-1451112214) will also be used during the lectures on this subject.

Teaching Objectives:

- 1) Provide a far-reaching overview of the field of medicinal chemistry, with emphasis on the mechanism whereby selected drugs achieve their effect.
- 2) Establish interconnections between the chemical and biological courses you may have taken, especially including Organic Chemistry, Cell Biology, and Biochemistry.
- 3) Provide an overview of careers in the pharmaceutical industry, and help you to understand the working relationships between the scientists, involved in the field.
- 4) Provide a reasonably broad coverage of current pharmaceutical products.

Student Outcomes

Upon completing this course, it is anticipated that the student will:

- 1) Possess understanding of the respective roles of chemists, biologists, physicians, attorneys, and accountants in the process of drug discovery and development and in the health care professions. This will enable students to make informed career choices and to appreciate the highly collaborative nature of individual specialists in the pharmaceutical industry.
- 2) Understand how the pharmaceutical industry operates, including the science and technology involved in drug discovery, the creation and protection of intellectual property, and drug development.
- 3) Understand the chemical mechanisms whereby drugs achieve their effect on biological targets, including both enzymes and receptors. The student will be enabled to employ fundamental chemical and biological principles in his/her analysis of drug action.
- 4) Understand the current capabilities and the limitations of the utilization of pharmaceutical substances in the treatment of disease.

Grading: We will have two exams, a midterm exam and a cumulative final, along with a term paper (and oral presentation), and several homework assignments. Each exam, the term paper/presentation, and the average grade on the homework will each be worth 20% of your grade. Additionally, I will record your classroom participation as the final 20%.

Expectations of the Student: I anticipate that, for every hour of class time, approximately two hours will be spent reading and completing written homework. I expect that students will attend class ready to participate in classroom discussions.

Important Dates:

First Day of Class: Thurs, August 23

No Class: Thurs, Sept. 6 and Tues, Sept. 11 (I am out of town).

Choose Term Paper/Presentation Topic: By Tues., September 11

Friday, Sept. 28th, 3:00 PM Mandatory seminar: Jeffrey A. Stafford "Contemporary Medicinal Chemistry and the Discovery of Pazopanib (Votrient)"

Preliminary review articles (term paper) titles turned in: Tuesday, October 2.

Tuesday, October 9 and Thursday, October 11, Graduate Student Presentations

No Class: Tuesday, October 16 (Fall Break).

Midterm Exam: Thursday, October 18 (last day for Chem 6116)

No Class: Tuesday, October 23 (I am out of town).

Rough Draft turned in: Tuesday, November 13

No Class: Thursday, November 22, Thanksgiving.

Final Draft turned in: Thursday, November 29

Last day of this class: Thursday, November 29

Final Examination: Fri., Dec. 7th, 3 PM.