CH4120
Fall Semester 2007

Instructor: Dr. Dallas K. Bates
dbates@mntu.edu

Class time and place: Blg 19 215 @ 11:05 – 11:55 am MWF

Office Hours: by arrangement (email me, I am available to accommodate most class schedules)

Office: 19-620A (over the summer my office moved!)


Useful REFERENCE texts:
The Merck Index;
D. Lednicer, The Organic Chemistry of Drug Synthesis (5-volume set);
M.E. Wolff, Burger's Medicinal Chemistry and Drug Discovery (6-volumes)

Software: HyperChem v7.x, ChemDraw, Molecular Conceptor 2

Class Format

This course is a cornerstone course in the recently approved Pharmaceutical Chemistry degree program. It focuses on medicinal chemistry topics and includes both physical organic chemistry and organic synthesis components. Class format is a lecture/recitation format; class participation is expected and there will be at least one oral presentation in class for each student.

We live in interesting times
As chemical biology unravels more and more mysteries about the human genome, molecular regulation of biological events, and molecular interactions underlying infection and immune response opportunities abound for design of new drugs. But if our molecular understanding of disease is becoming so precise, why isn’t the market place being flooded with new and novel ‘cures’ and treatments? All of this occurring at a time when the pharmaceutical and health care industries are beginning to be carefully scrutinized, drug manufacturing and drug discovery are being increasingly outsourced, and consolidation of the major players in the pharmaceutical arena is taking place. Both opportunities and perils are unprecedented.

What to expect
First of all, I want this class to be fun and I will try to discuss examples of class material that are interesting and relevant. The class is also rigorous and each student will have to work outside of class. There are assignments outside class including graded homework, articles from the original literature, and ungraded assignments using software. A medicinal chemistry-oriented self-paced software package (Molecular Conceptor) is available. This software (for which we have 6 licensed seats) is located in the Chemistry Computer Lab. The program uses some cheesy graphics and (in my opinion) too many unnecessary slides but it also contains many nice examples of molecular modelling/graphics, not otherwise available on campus, showing molecules docked to receptors and it has lots of examples of concepts discussed in class. Take a look at it – I will assign some sections during the semester.

**Grading:**

At the end of the course, each member of the class will prepare and present a poster related to topics covered during both course parts. Details will be provided later. This poster is only a small contributor to your final grade.

Graded material will consist of

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>45%</td>
</tr>
<tr>
<td>Final</td>
<td>25%</td>
</tr>
<tr>
<td>Poster</td>
<td>5%</td>
</tr>
</tbody>
</table>

If you must miss a class, email me prior to class indicating the reason for your absence. Quizzes missed due to an unexcused absence are graded as 0.
TOPICS

Some of the topics we will discuss include: (This is still a work in progress!)

Medicinal Chemistry – Historical Context
   Lead compounds and their sources
   Bioisosteric replacement
   Thinking beyond simple organic structures drawn
      on paper – Molecular shapes and
      conformations
   Bio-active conformations
   Conformations analysis
   Introduction to molecular modeling
      Torsion angles
      Molecular energies
      1D and 2D potential energy surfaces
      Thermodynamics: conformer populations
      Bio-active conformation revisited
      Kinetics: molecular rotations and other
         assorted molecular gyrations
      Molecular mechanics

Topics in rational drug design:
   Pharmacophore-based drug design
      The pharmacophore
      Functional group modification
      Molecular mimicry
      SAR
      Structure modification
   Receptor- based drug design
      Receptors (Chapter 2)
      Docking

Case studies in Drug Discovery
   Antithrombotics Ticlid® and Plavix®
   Anticancer agents Gleevec® and Iressa®
   Antidepressants Prozac®, Zoloft®, and Paxil®
NOTE:

Periodically, information about CH4120 will be posted on the CH4120 course web page (go to the MTU Chemistry homepage, click on “course” in the menu on the left side of the page, then click on CH4120. Check it once in a while for new material. I will email you if I post dated, graded material to the page.

The Blue Book of Useful Med. Chem. Information

A hand-written (no exceptions) “Blue Book of Useful Med. Chem. Information” may be used on quizzes and the final exam. You may include any information in the blue book. The ONLY source that may be used on tests and quizzes is your blue book and all information in the blue book must be hand-written by the individual using it. You can add new material to your bluebook at anytime- plan ahead for expansion of various sections during the semester.