Course Syllabus
CH4110 - Pharmaceutical Chemistry – Mechanism of Drug Action
College of Science and Arts
Spring 2011

Instructor Information
Instructor: Dr. Tarun K. Dam
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Telephone: Office – (906)-487-2940
E-mail: tkdam@mtu.edu
Office Hours: MW 11-noon and by appointment

Course Identification
Course Number: CH4110
Course Name: Pharmaceutical Chemistry I Drug Action
Course Location: 215 Chem Sci
Class Times: MWF 10:05am – 10:55am
Prerequisites: CH4710 – Biomolecular Chemistry I

Course Description/Overview
The goal of the course is to understand the molecular basis of drug action. Chemical concepts developed in organic chemistry and biomolecular chemistry courses such as stereochemistry, reaction mechanisms, enzyme structure and function and DNA structure and function will be extended to drug action.

Course Resources
Course Website(s)
- Syllabus can be found at
  http://www.chemistry.mtu.edu/pages/courses/class.php?class=CH4110&section=0A%20&sem=20092

Required Course Text
Other readings as assigned.
## Grading Scheme

### Grading System

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Percentage</th>
<th>Grade points/credit</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% &amp; above</td>
<td>4.00</td>
<td>Excellent</td>
</tr>
<tr>
<td>AB</td>
<td>85% – 89%</td>
<td>3.50</td>
<td>Very good</td>
</tr>
<tr>
<td>B</td>
<td>80% – 84%</td>
<td>3.00</td>
<td>Good</td>
</tr>
<tr>
<td>BC</td>
<td>75% – 79%</td>
<td>2.50</td>
<td>Above average</td>
</tr>
<tr>
<td>C</td>
<td>70% – 74%</td>
<td>2.00</td>
<td>Average</td>
</tr>
<tr>
<td>CD</td>
<td>65% – 69%</td>
<td>1.50</td>
<td>Below average</td>
</tr>
<tr>
<td>D</td>
<td>60% - 64%</td>
<td>1.00</td>
<td>Inferior</td>
</tr>
<tr>
<td>F</td>
<td>59% and below</td>
<td>0.00</td>
<td>Failure</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student’s control. A grade of incomplete may be given only when approved in writing by the department chair or school dean.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>Conditional, with no grade points per credit; given only when the student is at fault in failing to complete a minor segment of a course, but in the judgment of the instructor does not need to repeat the course. It must be made up within the next semester in residence or the grade becomes a failure (F). A (X) grade is computed into the grade point average as a (F) grade.</td>
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### Grading Policy

Grades will be based on the following:

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Midterm I</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm II</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm III</td>
<td>25%</td>
</tr>
<tr>
<td>Research report</td>
<td>25%</td>
</tr>
</tbody>
</table>

### Schedule of Exams

- **Midterm I:** 16 Feb. 2011
- **Midterm II:** 23 Mar 2011
- **Midterm III:** 27 Apr 2011
**Course Policies**

I want a lot of classroom participation. By participation I mean enthusiastic engagement during class, asking and answering questions, and articulating and defending ideas.

You must come to all classes. You are responsible for announcements made in class. Please be punctual; chronic lateness annoys fellow students and me.

**University Policies**

Academic regulations and procedures are governed by University policy. Academic dishonesty cases will be handled in accordance the University's policies.

If you have a disability that could affect your performance in this class or that requires an accommodation under the Americans with Disabilities Act, please see me as soon as possible so that we can make appropriate arrangements. The Affirmative Action Office has asked that you be made aware of the following:

*Michigan Tech complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disabilities Act of 1990. If you have a disability and need a reasonable accommodation for equal access to education or services at Michigan Tech, please call the Dean of Students Office, at 487-2212. For other concerns about discrimination, you may contact your advisor, department head or the Affirmative Action Office, at 487-3310*

**Academic Integrity:**
http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html

**Affirmative Action:**
http://www.admin.mtu.edu/aa0/

**Disability Services:**
http://www.admin.mtu.edu/urel/studenthandbook/student_services.html#disability

**Equal Opportunity Statement:**
Course Outline

CH4110: Pharmaceutical Chemistry-Mechanism of Drug Action

Course Outline:

[Only selected portions of a listed chapter will be discussed. Partially overlapping topics are marked with similar superscripts]

1. INTRODUCTION (Chapter 1)
   Fundamental aspects
   Forces that bind drugs to their target molecules**

2. DRUGS AND THEIR TARGETS@
   (Specific drugs will be discussed for each instance given below)
   A. Drugs that inhibit or perturb enzyme action (Chapter 7)
      Reversible inhibitors
      Irreversible inhibitors
      Inhibitors that bind to allosteric binding sites
      Transition state analogs or inhibitors
      Suicide substrates
      Isozyme specific inhibitors
   B. Drugs that interact with receptors and interfere with signaling (Chapter 8)
      Agonists
      Allosteric modulators
      Antagonists
      Receptor subtype-specific drugs
      Phenomena associated with drug-receptor interaction (Desensitization and sensitization; tolerance and dependence)
C. Drugs that target nucleic acids (Chapter 9)
   - Intercalating agents
   - Topoisomerase poisons
   - Alkylating agents
   - Chain disruptors
   - Ribosome binders
   - Antisense therapy

D. Other drug targets (Chapter 10)
   - Transport proteins
   - Structural proteins
   - Biosynthetic building blocks
   - Biosynthetic processes
   - Protein-protein interactions
   - Lipids
   - Carbohydrates

**MIDTERM I (February 16, 2011)**

3. REACHING THE TARGET AND BINDING TO IT
   A. Pharmacokinetics
      (Absorption, metabolism, excretion)
   B. Pharmacodynamics**@
      (Chapters 11 and 13)

4. HOW TO DESIGN AN EFFECTIVE DRUG
   A. Factors to consider@
      (Chapters 12 and 13)
MIDTERM II (March 23, 2011)

B. Approach

(Chapters 12, 14, 16, 17, 18)

5. DRUG EXAMPLES@

Antiviral (Chapter 20)
Antibacterial (Chapter 19)
Anticancer (Chapter 21)
Antiulcer (Chapter 25)

FINAL EXAM (April 27, 2011)

Research Project: This will consist of an oral report on a drug of your choosing. The report should address most, if not all, of the following: discovery, structure, structure-activity relationships, mechanism of action, and potential side effects. You may use the textbook or draw on your personal experiences to select a drug for study. Keep in mind that there are many drugs with a paucity of information; don’t spend too much time on a drug for which sufficient information is not available. I am always available for further discussions.