Instructor Information

Instructor:  Dr. Tarun K. Dam  
Office Location:  510C Chem Sci  
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>
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<tr>
<td>I</td>
<td></td>
<td></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>
</tr>
<tr>
<td>X</td>
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<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>Midterm I</th>
<th>20%</th>
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<tbody>
<tr>
<td>Midterm II</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm III (Final)</td>
<td>35%</td>
</tr>
<tr>
<td>Research presentation</td>
<td>20%</td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
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Schedule of Exams

Midterm I: February 19, 2014
Midterm II: March 19, 2014
Midterm III (Final): April 28, 2014

Course Policies

Classroom participation is very important for this course. By participation I mean enthusiastic engagement during class, asking and answering questions, and articulating and defending ideas.
You must come to all classes. Please be punctual.
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/CH5110: Pharmaceutical Chemistry-Mechanism of Drug Action

[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 19, 2014)**

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 19, 2014)**

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 28, 2014)

Research Presentation: This will consist of an oral presentation. The presentation 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.