**Mechanistic Enzymology**

**Chem 413 / Bioc 403**

<table>
<thead>
<tr>
<th>Professor</th>
<th>Dr. Paul Shipley, Fipke 349</th>
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<tbody>
<tr>
<td>Contact information</td>
<td>email: <a href="mailto:Paul.Shipley@ubc.ca">Paul.Shipley@ubc.ca</a>, web site at <a href="http://people.ok.ubc.ca/pshipley">http://people.ok.ubc.ca/pshipley</a>, or by phone at 807-8749</td>
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<tr>
<td>Prerequisite</td>
<td>Chemistry 204</td>
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<tr>
<td>Course Schedule</td>
<td>MWF 10:30-11:30</td>
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<tr>
<td>Office hours</td>
<td>I am around most of the time from 9 to 5, and usually longer. If you can't find me, check my research lab. If I’m in the NMR lab, you’re hooped,</td>
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<pre><code>              | 2. Second year organic chemistry textbook - your favorite. If you sold yours, shame on you! (you can borrow one from me). |
</code></pre>
| Grading            | Paper and Presentation 20%  
                  | Midterm 1 20%            
                  | Midterm 2 20%            
                  | Final Exam 40%           |
Academic Misconduct
Cheating and plagiarism both constitute academic misconduct, which may carry penalties as severe as a mark of zero for the entire course and permanent expulsion from the university. For a complete description of policies on academic misconduct. Please refer to the following page describing academic integrity at UBC Okanagan and the appropriate section of Chapter V of the UBC Calendar.
http://web.ubc.ca/okanagan/faculties/resources/academicintegrity.html
http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0

Disability Services
If you require disability related accommodations to meet the course objectives please contact the Coordinator of Disability Resources located in the Student development and Advising area of the student services building. For more information about Disability Resources or about academic accommodations please visit the website at
http://okanagan.students.ubc.ca/current/disres.cfm

Absences
If you miss an exam or a laboratory section, you will not be allowed to retake or redo the assignment unless you can prove that you had a valid reason for your absence. A valid reason would be a documented illness, death in your family, a car accident on the way to class (please don't run into a tree on your way to school to postpone an exam), or some similar emergency that you are able to document (photos of the car after the wreck will be posted on the web page). Invalid reasons would include breaking up with your girlfriend/boyfriend, an unmissable curling match, a bad hair day, I think you get the picture
1. Introduction
   - Cool Stuff
   - Protein Structure
   - Protein Modifications
   - Pathways and ways to determine them

2. Enzymatic Catalysis
   - Basic thermodynamics
   - TS destabilization
   - Types of catalysis
   - Dang cool enzyme tricks
   - Purification and characterization of proteins

3. Kinetics
   - Review of first year kinetics (you'll thank me later)
   - Basic Michaelis-Menten kinetics
   - More advanced kinetic models and their relationship to MM kinetics
   - Intermediates, transition states, and analyzing active sites
   - The mighty kinetic isotope effect

4. Additions to Carbonyl Centres
   - Peptidases
   - Esterases
   - Coenzyme A, the world's greatest leaving group
   - ATP, another great leaving group generator
   - Glycosyl transferases
   - SAM

5. Redox Chemistry
   - NAD dependent oxidoreductases
   - Flavin dependent oxidoreductases
   - Metal dependent oxidoreductases - a brief overview (covered in detail in bioinorganic chemistry)

6. Forming Carbon-Carbon Bonds
   - Carbanion equivalents
   - Carbocation equivalents
   - Radical dude

7. Additions and Eliminations
   - Hydratases and dehydratases
   - Lyases
   - Phosphate and pyrophosphate eliminations

8. Amino Acid Chemistry
   - The alpha position
   - The beta position
   - The gamma position
   - Decarboxylases
   - Imines and eneamines

9. Isomerases
   - Racemases
   - Epimerases
   - Tautomerases
   - Allylic isomerization

10. Radical Reactions
    - B12 dependent rearrangements
    - Protein radicals
    - Sulfur dependent radical initiation