

Advanced Organic Chemistry: Synthesis (CHEM 311/511)

Fall 2009

Prof. W. P. Malachowski

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web page:

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course web page:

<http://www.brynmawr.edu/chemistry/malachowski/AdvOChem/AdvOChem.html>

Educational Goals:

- develop a knowledge base of synthetic organic chemistry reactions
- develop an understanding of structure-reactivity principles in a variety of chemical structures
- develop the ability to devise synthetic strategies to complex molecule construction
- develop fundamental critical thinking skills, including pattern recognition and analogous reasoning

Class meetings:

Tues. and Thurs. 10:10-11:30 AM. All class meetings will be held in PSB 278.

Office Hours: Mon. 4:00-5:30 PM, Wed. 9:30-11:00 AM, and by appointment

Textbook: *Advanced Organic Chemistry, Part B: Reactions and Synthesis*, 5th edition (2008) by Francis A. Carey and Richard J. Sundberg

Additional References

Useful Websites

<http://www.organic-chemistry.org/> (site developed by Prof. Douglass Taber, University of Delaware)

<http://www.chem.wisc.edu/areas/organic/index-chem.htm> (site developed by Prof. Hans Reich, University of Wisconsin)

<http://www.ilpi.com/organomet/> (organometallics site developed by Dr. Robert Toreki)

Books in Stacks:

- Advanced Organic Chemistry: Reactions, Mechanisms and Structure*, 4th edition (1992) by Jerry March;
- 5th edition (2001) by Michael B. Smith and Jerry March
- *March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure*, 6th edition (2007) by Michael B. Smith and Jerry March
- Advanced Organic Chemistry, Part A: Structure and Mechanisms*, 5th edition (2007) by Francis A. Carey and Richard J. Sundberg
- Advanced Organic Chemistry: Reactions and Mechanisms*, (1998) by B. Miller
- Protective Groups in Organic Synthesis*, 3rd edition (1999) by Theodora W. Greene and Peter G. M. Wuts
- Organic Reactions*, Wiley (1942-2009)

Books in Reference Section:

- Encyclopedia of Reagents for Organic Synthesis*, (1995) Leo Paquette
- Handbook of Reagents for Organic Synthesis* (1999)
- Comprehensive Organic Synthesis: Selectivity, Strategy, and Efficiency in Modern*

Organic Chemistry, (1991) eds. Barry M. Trost and Ian Fleming
 -*Comprehensive Organic Transformations: A Guide to Functional Group Preparations*, 2nd edition (1999) by Richard C. Larock
 -*Comprehensive Organometallic Chemistry*, (1982) eds. G. Wilkinson, F. G. A. Stone, E. W. Abel
 -*Comprehensive Organometallic Chemistry II*, (1995) eds. G. Wilkinson, F. G. A. Stone, E. W. Abel

Good Review Article in the Literature:

"The Art and Science of Total Synthesis at the Dawn of the Twenty-First Century", K. C. Nicolaou, D. Vourloumis, N. Winssinger, P. S. Baran; *Angew. Chem. Int. Ed. Engl.* **2000**, 39, 44-122.

Class Schedule:

Week	Tuesday	Thursday	Lecture Topic (Text Reading)
1	9/1	9/3	Introduction and Enolate Chemistry (Ch. 1)
2	9/ 8	9/10 <i>PS #1</i>	Enolate and Aldol Reactions (sect. 2.1-2.3)
3	9/15	9/17	Conjugate Addition Reactions (sect. 2.6)
4	9/22 <i>PS #2</i>	9/24	Alkene Synthesis (sect. 2.4 and 8.4) and Protecting Groups (3.5)
5	9/29	10/1 <i>PS #3</i>	Oxidation Reactions (Ch. 12)
6	10/6	10/8 Exam 1	Oxidation Reactions (Ch. 12 con't.)
Fall Break	10/10-10/18		
7	10/20	10/22	Reduction Reactions (Ch. 5) and Hydroboration (sect. 4.5)
8	10/27 <i>PS #4</i>	10/29	Organometallic Chemistry (Ch. 7 and sect. 8.1)
9	11/3	11/5 <i>PS #5</i>	Organopalladium Chemistry (sect. 8.2)
10	11/10	11/12	Diels-Alder Reaction (sect. 6.1) and 1,3-Dipolar Cycloaddition (sect. 6.2)
11	11/17 <i>PS #6</i>	11/19	Sigmatropic Rearrangements (sect. 6.4)
12	11/24 Exam 2	Thanksgiving Break	
13	12/1	12/3	Student Oral Presentations
14	12/8	12/10	Student Oral Presentations

Problem Sets: There will be six take-home problem sets which will be collected at the beginning of class on the date shown on the schedule above. You may work in study groups to complete the problem sets, but you should submit your own version of the problem set solution.

Exams: There will be two mid-semester exams given during the class meeting time on October 8 and November 24.

Oral Presentation: Students will work in groups of two or three to present a recent article from the organic chemistry literature to the class. The literature article will be chosen by the students from a selection of articles on organic chemistry topics assembled by the instructor. Student groups will have 30-45 minutes to deliver a presentation which explains the context and significance of the literature article while exploring the experimental details of the research.

Final Exam: There will be a three-hour self-scheduled final exam without lecture notes, textbook or any other associated course materials.

Course Grading:

Problem Sets	20 pts. (x6)	=120 pts.
Mid-term Exams	100 pts. (x 2)	=200 pts.
Oral Presentation		=100 pts.
Self-scheduled Final Exam		<u>=150 pts</u>
		570 pts.

Approximate Grading Scheme:

95-100%	4.0	73-76%	2.0
90-94%	3.7	70-72%	1.7
87-89%	3.3	67-69%	1.3
83-86%	3.0	63-66%	1.0
80-82%	2.7	<63%	0.0
77-79%	2.3		

I reserve the right to make modifications to this scheme when I consider it necessary.

Students with Disabilities: Students who think they may need accommodations in this course because of the impact of a disability are encouraged to meet with me privately early in the semester. Students should also contact Stephanie Bell, Coordinator of Access Services, at 610-526-7351 or sbell@brynmawr.edu, as soon as possible to verify their eligibility for reasonable accommodations. Early contact will help to avoid unnecessary inconvenience and delays.