

## Chem 545 Synthetic Organic Chemistry (3 credits)

**Pre-requisite:** Chem 542

**Spring 2014**

**Instructor:** Dr. Ming Xian, Fulmer 468, 335-6073, [mxian@wsu.edu](mailto:mxian@wsu.edu)

**Office Hours:** by appointment.

**Class location and time:** Fulmer 432, 12:10-13:00 MWF

### **Course Textbooks:**

It is highly encouraged (especially if you want to stay in this field) that you have access to as many of the following books as possible:

1. "Greene's Protective Groups in Organic Synthesis, 4<sup>th</sup> Edition" by Peter G. M. Wuts and Theodora W. Greene
2. "Strategic Applications of Named Reactions in Organic Synthesis" by Laszlo Kurti and Barbara Czako
3. "Advanced Organic Chemistry: Reactions, Mechanisms and Structure, 5<sup>th</sup> Edition" by Michael B. Smith and Jerry March
4. "Transition Metals in the Synthesis of Complex Organic Molecules, 2<sup>nd</sup> Edition" by Louis S. Hegedus

**Course Description:** This course will provide a survey of modern synthetic methods in organic chemistry. Reagents and reaction conditions, reaction mechanisms, and selectivity issues will be discussed.

**Course Objective:** To broaden the understanding of a variety of organic reactions. The students are expected to learn/understand all lectured information and to do additional coursework (handouts) to cultivate their expertise by being exposed to a variety of other related examples in each topic.

### **Learning Outcomes:**

After completing this course, a student should be able to (1) make informed decisions about HOW to effect organic transformations, (2) analyze chemo-, regio-, and stereoselectivity issues, (3) use their understanding of the reaction mechanism to rationalize/predict outcomes, and (4) interpret and understand the relevant synthetic literature.

### **Grading:**

Grades will be determined based on your performance on written exams and quizzes. Homework will be voluntary. The scores on these exams will be used to assign letter grades based on the following scale:

A	90-100	B	80-83	C	70-73	D	60-63
A-	87-89	B-	77-79	C-	67-69	F	<60
B+	84-86	C+	74-76	D+	64-66		

**Class Schedule:**

Week 1	Jan 13 Intro., Protection/Deprotection	Jan 15	Jan 17 Oxidation/reduction
Week 2	Jan 20 MLK day (No class)	Jan 22	Jan 24
Week 3	Jan 27 Enolate chem	Jan 29	Jan 31 Alkylation
Week 4	Feb 3 Aldol reaction	Feb 5 Aldol--Organocatalysis	Feb 7 Olefination
Week 5	Feb 10	Feb 12 C=C functionalization	Feb 14 <b>Exam 1</b>
Week 6	Feb 17 President' Day (no class)	Feb 19	Feb 21
Week 7	Feb 24 Umpolung	Feb 26 Reactions of C=O	Feb 28
Week 8	Mar 3 Epoxidation	Mar 5	Mar 7
Week 9	Mar 10 Diels-Alder	Mar 12	Mar 14 Sigmatropic Rxns
Week 10	Mar 17 Spring break	Mar 19 Spring break	Mar 21 Spring break
Week 11	Mar 24 Exam 2	Mar 26	Mar 28
Week 12	Mar 31 Cyclizations	Apr 2	Apr 4 TM catalysis
Week 13	Apr 7	Apr 9	Apr 11 NP synthesis
Week 14	Apr 14	Apr 16	Apr 18
Week 15	Apr 21 Name Rxns	Apr 23	Apr 25
Week 16	Apr 28 Review	Apr 30	May 2
Week 17	May 5 <b>Final Exam</b>		

**Lecture Topics**

Acid/base chemistry, pKa  
Protection/Deprotection  
-OH Oxidation  
C=O Reduction  
Enolate chemistry  
Alkylation  
Aldol reaction  
Organocatalysis  
Olefination  
C=C bond functionalizations  
Umpolung Chemistry  
Cyclic additions (Diels-Alder, [3+2])  
Sigmatropic rearrangements  
Transition metal catalyzed reactions  
Name reactions review  
Total synthesis of natural products

***Students with Disabilities:***

Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

***Academic Integrity:***

Academic integrity will be strongly enforced in this course. Any student caught cheating on any assignment will be given an F grade for the course and will be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions: <http://conduct.wsu.edu/default.asp?PageID=338>

***Safety Statement:***

Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.