

Chemistry 841 – Organic Synthesis – Spring 2017 — MWF 11:00–11:50am, Room 1315 Chemistry

Syllabus for Part 1 (Wednesday, January 18 – Monday, March 6)

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**Instructor:** Tehshik Yoon (tyoon@chem.wisc.edu)

**Office Hours:** Mondays 2:00pm to 3:00pm (Room 5317)

**Course Description:** Chem 841 is a graduate-level course in contemporary synthetic organic chemistry. The first half of the course covers transformations of carbonyl compounds, focusing on strategies to control the stereochemistry of these reactions.

**Objectives:** The major goals for this part of this course are:

1. To familiarize you with the concepts and terminology that you will need to read and understand the literature of modern organic synthesis.
2. To train you to use retrosynthetic logic in planning synthetic routes.
3. To use enolate alkylations, aldol reactions, and carbonyl addition reactions as a framework in which to discuss these general ideas.

**Course Website:** This course will make extensive use of Learn@UW.

**Textbooks:** There is no required textbook. Readings and other supplementary material will be posted on Learn@UW.

The following books are excellent references for background reading. They are all available in my personal collection, and I am happy to let you check them out.

Louden, *Organic Chemistry* (textbook for Chem 345)  
Carey and Sundberg, *Advanced Organic Chemistry*, Part B  
March, *Advanced Organic Chemistry*  
Nicolaou and Sorensen, *Classics in Total Synthesis*  
Kurti, *Strategic Applications of Named Reactions in Organic Synthesis*

**Grading:** Grades for the first half of the course will be determined as follows:

Problem Sets (6 x 25 pts)	150 pts
Midterm Examination	100 pts
Participation (2 pts ea)	20 pts
<i>Total</i>	270 pts

- Problems sets will be assigned weekly. They are open-note, and collaboration is encouraged. Looking up solutions in the literature, however, defeats the purpose of the problem sets and is off-limits.

- The midterm exam will be given during a 2-hour block in the evening on Monday, March 6.

- A maximum of 20 points of participation points will be given out to incentivize asking and answering questions.

## Tentative Overview of Topics

Unit 1: *Concepts: Retrosynthesis and Synthetic Strategy*

- Functional Group Intercoversions (FGIs)
- Protecting group chemistry

Unit 2: *Carbonyl addition reactions*

- Cyclic stereocontrol
- The Felkin-Anh model
- The Cram chelate model
- "Directed" reduction

Unit 3: *Enolate alkylations*

- Enolate formation and reactivity
- Stereoselective enolate alkylation (chiral auxiliary control)

Unit 4: *Aldol Chemistry*

- "Simple" diastereocontrol (the Zimmerman-Traxler model)
- Chiral auxiliary strategies for stereocontrolled aldol addition
- "Double diastereodifferentiation"
- Asymmetric catalysis

Unit 5: *Olefination Chemistry*

- Wittig olefinations
- Julia olefinations

Unit 6: *Reactions of alkenes*

- Epoxidation, reactions of epoxides
- Dihydroxylation, aminohydroxylation