Chemistry 531
Fall 2016
Survey of Organic Reactions
California State University Northridge

Lecture:

Instructor:	Dr. Thomas Minehan
Office:	Science 2314
Office hours:	T 12:00-2:00 pm
E.mail:	**thomas.minehan@csun.edu**
Class Meetings:	TR, 5:00 pm –6:15 pm **Eucalyptus Hall 2222**
Required Texts:	Corey and Kurti, *Enantioselective Chemical Synthesis*
Supplementary Texts:	Kurti and Czako, *Strategic Applications of Named Reactions in Organic Synthesis*
Course Web Site:	http://tminehan.com/chem531.html

Prerequisite for Enrollment in Chemistry 531
A passing grade in Chemistry 334 or its equivalent

Course Focus: **One of the most important skills of a modern scientist is the ability to synthesize simple or complex molecules. Very frequently, this skill may be put to use to solve problems in areas well outside the realm of organic chemistry.** The purpose of this class is to introduce the student to a broad range of transformations in modern synthetic organic chemistry. An emphasis will be placed on carbon-carbon bond-forming reactions and asymmetric transformations. Some topics include: transition-metal catalyzed cross-coupling processes, olefination reactions, asymmetric aldol and allylation reactions, and catalytic asymmetric oxidation and reduction methods. The second portion of the class will involve a discussion of the principles of retrosynthetic analysis (how to rationally design a synthesis of a complex molecule), and a considerable amount of time will be spent analyzing total syntheses from the current literature. Although there is a textbook for the course, the emphasis will be on material from the primary literature, and so the student should gain an early familiarity with how to access ACS journals (*JACS, JOC, Org.Lett.*) as well as recent Elsevier (*Tetrahedron*, *Tetrahedron Letters*) and Wiley (*Angew. Chem., Eur. J. Org. Chem.)* publications from the web, as well as proficiency in the use of the SciFinder Chemical Database.

Student Learning Outcomes for Chem 531 (B.S. and M.S. Program):
SLO1(m): Demonstrate basic knowledge in the area of organic chemistry. (Assessment tool: course exams).
SLO2(m): Organize and communicate scientific information clearly and concisely, both verbally and in writing (Assessment tool: final synthesis project / oral presentation / rubric).
SLO3(m): Effectively utilize the scientific literature to research a chemistry topic (Assessment tool: final synthesis project / written presentation / rubric).

Grading:

- Midterm Exam: 30% (150 pts)
- Final Exam (cumulative): 30% (150 pts)
- Presentation: 30% (150 pts)
- Class Participation: 10% (50 pts)

Total: 500 pts.

*Grades: 100-85%: A, 84-70% B, 79-60% C, 50-60% D

Exams: The midterm will focus on the first half of the course and will involve questions based on literature articles. The final exam will focus on target molecule synthesis.

Class Participation: After the midterm, retrosynthetic analysis will be discussed and the class will break up into groups to discuss key steps (focusing on carbon-carbon bond formation) of representative total syntheses from the current literature, which will then be presented to the class. Appropriate literature references will be given to the groups beforehand via the course website. It is critical that all members of a group download the literature references and read them before coming to class!

Presentation: Each student will choose a molecule from the original literature (which either has or has not been previously synthesized) and, after instructor approval, design a total synthesis that will be presented to the class (~20 minutes) *via* powerpoint. The student should make use of reactions learned in the course or from the current literature. In addition to the presentation, students will turn in a copy of their proposed synthetic route, along with stereochemical rationale and justification for the key steps (*JACS* communication style paper, 2 pages max*)*.

***Attendance:** Attendance in the lecture is **mandatory**

***Drop/ Withdrawal Policy:** The chemistry department adheres to the university policy concerning withdrawal from the course. A full description is published in the university catalog for the dates fixed for adding, withdrawal, etc. **Academic failure does not constitute a clear and compelling reason for withdrawal from class** or for the assignment of an incomplete grade after the date for withdrawal, as specified in the University catalog, is passed.

Make up exams are normally not given, and will be considered only under very compelling and unusual circumstance and when proper documentation is provided in support of such a request.

Cheating: Cheating on an exam will result in failure on that exam plus possible disciplinary action by the Dean of Students. In any instance of academic dishonesty the University's disciplinary procedures will be followed.

Common Journal Abbreviations: ***JACS*** = Journal of the American Chemical Society; ***JOC***=Journal of Organic Chemistry; ***TL***=Tetrahedron Letters; ***Tet***=Tetrahedron; ***ACIEE***=Angewandte Chemie International Edition in English; ***OL***=Organic Letters

Chemistry 531
Course Schedule

Dates	Topics	Reading
Aug 30, Sept 1	Protecting Groups	handouts
Sept. 6	Asymmetric Enolate Alkylation	C&K, 56-63
Sept. 8	Asymmetric Aldol Reactions	C&K, 64-70
Sept. 13	Asymmetric Allylation	C&K, p 78-79
Sept. 15	Asymmetric Diels-Alder Reactions Sigmatropic Rearrangements: [3,3], [2,3]	C&K, p. 110-114, 121-128
Sept. 20	Olefination Reactions: Wittig, Julia, Peterson, Tebbe, Shapiro	handouts
Sept. 22	Olefin Metathesis	handouts
Sept. 27, 29	Stille, Suzuki, Heck Reactions; Cuprates	C&K 101-106 handouts
Oct. 4, 6	Oxidation/ Asymmetric	C&K, p 38-48
Oct. 11, 13	Reduction / Asymmetric	C&K, p 6-27
Oct. 18, 20	Organolithium, zinc, and gold catalysis	C&K 71-77 handouts
Oct. 25, 27	Organocatalysis, C-H insertion, carbenoids	C&K 108-109 handouts
Nov. 1	Midterm	

Nov. 3	Retrosynthetic analysis/ Examples	C&K 154-170
	Syntheses posted to website	
Nov. 8, 10	Analysis of Total Syntheses	C&K 183-185
	Syntheses posted to website	
Nov. 15, 17	Analysis of Total Syntheses	C&K 199-202
	Syntheses posted to website	
Nov. 22, 29	Analysis of Total Syntheses	C&K 309-311
	Syntheses posted to website	
Dec. 3, 6, 8	Student Presentations	
Dec. 13	Final Exam 5:30-7:30pm	