

ORGANIC SYNTHESIS
CHE 6973.002/CHE 4953.002 Fall 2010

Time: 5:30-6:45 pm Tuesday, Thursday

Location: Main Building 1.126

Instructor: Dr. Oleg Larionov

Office: 4.117. **Phone:** 458-6050

e-mail: oleg.larionov@utsa.edu

Office hours: 5:00-7:00 pm Friday, and by appointment

Required textbook: 1) Carey, F. A.; Sundberg, R. J. *Advanced Organic Chemistry Part B: Reactions and Synthesis*, 5th edition, Plenum Press: New York, 2007.

2) Handouts distributed in class, online publications assigned for reading.

Chemical drawing software: ChemDraw (preferred, any version) or Symyx Draw 3.3 (previously IsisDraw, free).

Other useful textbooks: 1) Greene, T. W.; Wuts, P. G. M. *Protective Groups in Organic Synthesis*, 4th edition, Wiley, 2007.

2) Carey, F. A.; Sundberg, R. J. *Advanced Organic Chemistry Part A*, 5th edition, Plenum Press, 2007.

3) Wyatt, P.; Warren, S. *Organic Synthesis: Strategy and Control*, Wiley, 2007.

4) Kürti, L.; Czakó, B. *Strategic Applications of Named Reactions in Organic Synthesis: Background and Detailed Mechanisms*, Elsevier Academic Press, 2005.

Prerequisites: CHE 2603 and CHE 2623/3643

Course outline: The course will tentatively cover all chapters of the textbook. Additional material from modern literature will also be covered. Solid knowledge based on *Organic Chemistry 1 and 2* is critical for successful participation in the course. The course is designed to provide students with the knowledge on the state-of-the-art of organic synthesis. By the end of the course the students are expected to develop the skills necessary to:

- independently propose a reasonable synthetic route to a complex molecular target;
- critically assess other students' proposals and literature syntheses;
- present their proposed syntheses in a form of oral presentation and in a written format acceptable for publication in peer-reviewed journals.

Topics:

- I. Organic Synthesis: historical overview, major concepts, current trends, new approaches
- II. Control of stereoselectivity, analysis of interactions stabilizing pre-transition state complexes
- III. Protective groups
- IV. Reductions
- V. Oxidations
- VI. Main-group organometallic reagents and enolates
- VII. Transition metal-catalyzed C-C bond forming reactions
- VIII. Formation of C=C- and C≡C-bonds: Wittig olefination, alkene, alkyne and cross metathesis
- IX. Pericyclic reactions
- X. Cycloadditions
- XI. Carbocations
- XII. Carbenes
- XIII. Radical reactions
- XIV. Multistep synthesis: case studies

GRADING: Points will be accumulated from 3 problem sets, 1 midterm exam, a peer review, a written proposal, attendance, and an oral presentation during the final exam.

Grading scheme

Attendance	28 x 3 pts	84 points
Problem Sets	3 x 72 pts	216 points
Synthesis Proposal		200 points
Peer review		50 points
Oral Presentation		100 points
Final Draft		50 points
Midterm Exam		200 points
Total		900 points

Grades will be assigned based on the following scale:

A: 86-100%

B: 75-85%

C: 65-74%

D: 55-65%

Tentative course calendar: Fall semester 2010

August		September		October		November		December	
Tue	Thu	Tue	Thu	Tue	Thu	Tue	Thu	Tue	Thu
			2	5	7	2	4		2 Proposal: peer review due
		7	9	12 Problem set #2 due	14	9	11 Problem set #3 due	7 Student Study Day: No class	
		14 Problem set #1 due	16	19	21 Midterm Exam	16	18	TBA Final exam: oral presentations Proposal: final draft due	
	26 Introduction	21	23	26	28	23 Proposal: first draft due	25 Thanks- giving: No class		
31		28	30			30			

Color scheme: no fill – regular class; yellow fill – regular class, problem sets due; tan fill – exam days; green fill – No class.

Additional information:

- A high level of participation is expected from students.
- Each attended class will bring you 3 points. Midterm exam and final exam days will not be counted. Students will be „excused without penalty“ when observing a religious holy day or participating in a University-sanctioned event. Students are responsible for notifying the instructor and providing evidence of the holy day or event prior to the day of absence. They are also responsible for any classroom work missed.
- Visiting during office hours is encouraged.
- Students are responsible for *all course material* previously covered in the chemistry sequence. Pay particular attention to the organic sequence.
- MS and doctoral students will be required to submit in-depth, high quality exam answers and proposals.
- Announcements made in the class supersede the information given in this syllabus.
- The schedule may be subject to occasional changes.

- Late submission of the homework will lead to the loss of points: problem sets (**-15 points/day**), first draft of the proposal (**-30 points/day**) and peer review (**-20 points/day**). The final draft must be submitted at the day of the final exam (**no late submission**).
- One of the important qualities of an organic chemist is an ability to design a viable synthetic route to a relatively complex molecular target. Organic chemists should also be able to present their ideas in a written and oral form in an attractive and efficient manner, as well as recognize the deficiencies and shortcomings of proposed synthetic pathways. Early in the course each student will be assigned a naturally occurring or pharmaceutical compound. The students will have enough time (~8 weeks) to think about possible approaches to their molecules. During this time the students will also be expected to familiarize themselves with chemical drawing software. The students will also receive a Microsoft Word template used to prepare publications in the *Journal of the American Chemical Society*. The students will use this template to write their own synthetic proposal. Students are not allowed to share their ideas with others in the class until November 23. Two copies of the **first draft of this proposal** will have to be submitted on November 23. One of the copies will be given to another student in the class who will write a *critique* (**peer review**), noting the deficiencies and potential problems, which may be encountered in the synthesis. Two copies of the peer review will have to be submitted on December 2. One copy will be used by the author of the proposal to respond to the critique and/or correct the shortcomings of the proposal. During the time preceding the final exam the students will have to prepare a PowerPoint presentation, which they will use to present their proposed route in the form of **oral presentation** on the day of the final exam. The **final draft of the written proposal** will also have to be submitted on the final exam day. No additional tests will be distributed in the final exam.
- Academic misconduct (e.g. plagiarism and collusion) is subject to an academic penalty by the course instructor and/or a disciplinary sanction by UTSA. Definitions of academic misconduct, the associated penalties and disciplinary procedures are described in the student code of conduct. The student code of conduct can be viewed at the following address: <http://www.utsa.edu/infoguide/appendices/b.html>
- Please contact me during my office hours, if, due to a documented disability modifications in seating, testing, or other class requirements have to be made. Please also contact the Office of Disabled Student Services (DSS), MS 2.03.18 or at 458-4157 to make arrangements for these services.
- Students are not automatically dropped from the class if they stop attending it.
- University policy does not permit visitors in a class.
- University policy does not permit faculty or office staff to report grades by telephone, fax, or email.
- Use of music players, photo- and video- recording devices, cell phones (except for emergency cases) and other communication devices is not permitted in the class. Notebooks are allowed for the purpose of taking notes, but not in the mid-term exam. Calculators may be used in class at any time.
- Under no circumstances will non-enrolled students be permitted to continue attending a class after the end of Census Day.
- The final grades will be announced by **5:00 pm Thursday, December, 16 2010**.