Syllabus
Synthetic Organic Chemistry
Chem 1310/2370, Fall 2012
Course Number 12221

Instructor: Kay M. Brummond, 807 Chevron Science Center, kbrummon@pitt.edu

Office Hours: By Appointment

Class Period: Monday, Wednesday and Friday (see schedule), 9:00-9:50, CSC 135, 2 Credits

Course Objectives: This course will focus on strategies and tactics used in the synthesis of organic compounds. One of the most powerful skills that you can bring to the table as a card-playing organic chemist is the ability to predict function based upon structure. The ability to predict function enables: synthetic chemists to design new reactions; medicinal chemists to make better drugs; toxicologists to predict adverse effects of compounds on living systems; pharmacologists to understand biochemical function; material scientists to design new light harvesting complexes; atmospheric chemists to study how human behavior contributes to global warming; the list goes on and on and underscores the importance of chemistry. As a student in this course you will continue to develop your expertise in predicting function and reactivity by: finely tuning your arrow pushing skills through practice and performing conformational analysis using both hand-held models and Spartan. In addition, we will also use Spartan for spectroscopic and pKa predictions. There are mainly four classes of reactions: polar, pericyclic, radical and transition metal-mediated and transition-metal catalyzed. We will delve into each one of these classes of reactions along with some real-world applications.

Textbook, molecular models, Spartan software: All lectures and reading assignments will be taken from the primary literature, the internet, and readily available textbooks, so a textbook purchase is not required. If you like to buy a book-I highly recommend: The Art of Writing Reasonable Organic Reaction Mechanisms, second edition by Robert Grossman, http://www.chem.uky.edu/research/grossman/textbook.html.

If you do not own a molecular model kit, you should purchase or borrow one; I recommend HGS Polyhedron molecular models. We will be using Spartan for some of the take home assignments. I will be handing out instructions on how to download the Spartan software.

Grading: Two Midterm exams (each worth 100 points); Final examination (200 points); one in class presentation (100 points); and homework (200 points). Homework will periodically be assigned, it will be announced in advance and you will have at least five days to complete each assignment.

Examination Dates: *There will be no make-up exams.*
Exam #1, Wednesday, September 26
Exam #2, Wednesday, October 24
Final Exam time will be voted on in class

Presentation: The topic of your presentation should concern a current event (within the past three years) and the organic chemistry associated with it. The length of the presentation will be 15 minutes with 5 minutes for questions. You should have between 5-10 powerpoint slides for your presentation which will be handed in for grading. *The topic must be approved by Professor Brummond before October 31.* You will give your presentation sometime in December (dates will be voted on by class).

Chemical Information Retrieval Skills: Students who intend to become a practicing chemist, or who will use chemistry in an allied field of science or medicine should know how to use the chemical literature effectively and efficiently. Students should be able to retrieve specific information from the chemical literature and use the peer-reviewed scientific literature effectively.

Disability Resources and Services*: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resource and Services, 140 William Pitt Union, (412) 648-7890/(412) 383-7355 (TTY), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.*

Schedule: The topics listed below are subject to change but efforts will be made to adhere to the basic format.

Monday, August 27, Introductions, discussion of syllabus, textbooks and course goals, Getting Reacquainted with the Basics of Organic Chemistry and Classes of Transformations and Mechanisms, Grossman Chapter #1

Wednesday, August 29, Getting Reacquainted with the Basics of Organic Chemistry and Classes of Transformations and Mechanisms, Grossman Chapter #1

Wednesday, Sept 5, Pericyclic Reactions and Frontier Molecular Orbital Theory (FMOT) Grossman Chapter #4

Monday, Sept 10, Diels-Alder Reactions, Retrosynthetic Analysis and Stereospecificity

Wednesday, Sept 12, Hexacyclinol and Computational NMR Predictions

Monday, Sept 17, Claisen Rearrangement, Conformational Analysis

Wednesday, Sept 19, Cope Rearrangement, Reaction Equlibria, Retrosynthetic Analysis

Monday, Sept 24, Electrocyclizations, FMOT, Vitamin D Synthesis

Wednesday, Sept 26, Exam #1

Monday, October 1, 1,3-Dipolar Cycloaddition Reactions, "Click" Chemistry and Chemical Biology

Wednesday, October 3, Basics of Transition Metal Catalysis, Grossman, Chapter #6

Tuesday, October 9, Olefin Metathesis

Wednesday, October 10, Transition Metal-Catalyzed Cross Coupling Reactions

Monday, October 15, Pauson-Khand and other Cyclocarbonylation Reactions

Wednesday, October 17, Sharpless, Jacobsen, Shi Epoxidations and other Oxidations

Monday, Oct 22, C-H Activation

Wednesday October 24, Exam #2

Monday, November 5, Patents 101, for Chemists

Wednesday, November 7, Halogenation, Thermodynamics and Kinetics, Ozone Depletion

Monday, November 12, Free Radical Reactions and Cascade Cyclizations

Wednesday, Nov 14, Ene-Diyne Chemistry and a Potent Anticancer Agent

Monday, Nov 19, TBA

Wednesday, Nov 21, Thanksgiving break-no class

Monday, November 26, TBA

Wednesday, November 28, TBA

Monday, Dec 3, Student Presentations

Wednesday, Dec 7, Student Presentations

Friday, Dec 9, Student Presentations

December 10-15, Final exam