

**SYLLABUS - FALL '01
CHEMICAL SYSTEMS I
MWF 9:00-9:50 SGM 229**

CHEM 3110

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Text: Advanced Organic Chemistry. F. Carey & R. Sundberg (A & B).

Exams: Two midterm exams (1st exam: Parts 1 & 2; 2nd: Parts 3 & 4) and the final (cumulative, Parts 1-5)

Homeworks: Every Part comes with a homework (graded). Homeworks are due the class period immediately following the last lecture of each respective chapter. Additionally, every class you will be given an "Electron Pushing" problem, not related per se to the Part under study, but designed to help develop a grasp of organic reaction mechanisms. These are not graded, but extra points are assigned for just attempting to solve them.

Named Reactions to Know: Every class will start with a 5-7 minute mini-presentation (students take turns) covering one Organic Named Reaction (the list is included). A good reference source for this is March's Advanced Organic Chemistry (Wiley-Interscience).

You final grade will be a weighted sum of:

Homeworks (15%)

Electron Pushing (10 %)

Named Reactions (10 %)

Two Midterm Exams (20% each);

Final Exam (25%)

Part 1. Stereoelectronic Principles.

Enantiomers, diastereomers, dynamic stereochemistry, stereospecific vs. stereoselective reactions, racemization, prochirality.

Part 2. Conformational, Steric and Stereoelectronic Effects.

Steric strain, molecular mechanics, conformational analysis of acyclic and carbocyclic compounds, anomeric effect in heterocycles, conformational effects on reactivity, other steric effects on reactivity.

Part 3. Mechanisms

Study and description of organic reaction mechanisms, thermodynamics, kinetics, substituent effects and linear free energy relationships, basic mechanistic concepts: kinetic versus thermodynamic control, Hammond's postulate, the Curtin-Hammett principle, isotope effects, acid-base catalysis, Bronsted equation.

Part 4. Nucleophilic Substitution.

The S_N1, S_N2 mechanisms, borderline mechanisms, carbocations, ion pairs; effects of solvent, leaving groups, substituents, neighboring groups etc. on the rates; non-classical carbocations.

Part 5. Polar Addition and Elimination Reactions.

Regio- and stereochemistry of additions, A_DE mechanism; β-elimination reactions: E1, E2 and E1cb mechanisms; variable nature of E2 transition state, More O'Ferrall diagrams.

Name Reactions to Know.

Reaction	Student's Last Name	Date
Acyloin Condensation		
Arbusov Reaction		
Arndt-Eistert Reaction and Wolff Rearrangement		
Baeyer Villiger Oxidation		
Beckman Rearrangement		
Cannizarro Reaction		
Claisen Condensation		
Cope and Claisen Rearrangements		
Curtius and Hofmann Rearrangements and Schmidt Reaction		
Darzens Condensation		
Dieckman Condensation		
Diels-Alder Reaction and Ene Reaction		
Favorskii Rearrangement		
Fisher Indole Synthesis		
Friedel-Crafts Acylation and Alkylation		
Haloform Reaction		
Mannich Reaction		
McMurry Coupling		
Michael Addition and Robinson Annelation		
Mitsunobu Reaction		
Oppenauer Oxidation and Meerwein-Pondorf-Verley Reaction		
Paternò-Büchi Reaction		
Pinacol-Pinacolone Rearrangement		
Pummerer Rearrangement		
Ramberg-Backlund Rearrangement		
Reformatsky Reaction		
Swern Oxidation		
Wolff-Kishner Reduction		
Wittig Reaction		
Wittig Rearrangement		