

**Chemistry 483a**  
**Topics in Mechanistic Organic Chemistry**

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**Lectures:** Monday, Wednesday and Friday, 9:30 a.m., room 115

**Topics:** Chemical kinetics and thermodynamics:  
rate laws, steady state approximation, pseudo-first-order reactions  
experimental determination of rate and equilibrium constants  
Eyring and Arrhenius equations, temperature effects on rate constants  
transition states, Hammond postulate, reaction coordinate diagrams  
principle of microscopic reversibility

Application of kinetic methods in the study of reaction mechanism  
the rate law and the stoichiometry of the transition state  
pH rate profiles  
kinetic isotope effects  
structure-reactivity relationships, linear free energy relationships  
Hammett equation, Brønsted catalysis law  
solvent and medium effects

Aromaticity, pericyclic reactions and orbital symmetry:  
aromaticity, Hückel rule, antiaromaticity  
FMO theory, Woodward-Hoffmann rules, Hückel-Möbius model  
pericyclic reactions: sigmatropic rearrangements, electrocyclic reactions,  
cycloadditions

Assessment:	Problems sets	10%
	Two tests	35%
	Final examination	55%

**Text:** There is no required textbook  
The following texts are recommended for further study and reference:  
T.H. Lowry and K S. Richardson, *Mechanism and Theory in Organic Chemistry*, (3<sup>rd</sup> ed.), Harper and Row, 1987.  
N.S. Isaacs, *Physical Organic Chemistry*, Longmans, 1995.  
F.A. Carey and R.A. Sundberg, *Advanced Organic Chemistry*(3<sup>rd</sup> ed.), Plenum, 1990,  
esp. Part A.  
F.A. Carroll *Perspectives on Structure and Mechanism in Organic Chemistry* , Brooks-Cole,  
1998  
E. V. Anslyn and D. A. Dougherty *Modern physical organic chemistry* ,  
University Science, 2006.