Chemistry 843
Advanced Organic Chemistry
Contemporary Physical-Organic Chemistry

Spring Semester 2005

8:50 am, MWF, B357 Chemistry

Instructor Professor Robert J. McMahon — 6209 Chemistry
mcmahon@chem.wisc.edu — phone: 262-0660; FAX: 263-5549

The course will emphasize basic principles of physical-organic chemistry that constitute the foundation for understanding contemporary research in diverse areas of organic chemistry.

Principles of Photochemistry, Photophysics, and Electrochemistry

basic aspects of photochemical kinetics and photophysics; photolithography and patterned imaging; luminescent sensors; luminescence probes of complex polymer or biological systems; photovoltaics and solar energy conversion; photobiology (vision, photosynthesis, nucleic acid damage and repair); chemiluminescence

Kinetics, Reaction Dynamics, and Potential Energy Surfaces

femtosecond spectroscopy; dynamical control; potential energy surfaces (conical intersections, valley-ridge inflections, bifurcated transition states); coarctate and pseudopericyclic reactions

Gas-Phase Ion Chemistry / Solvation

acidity, bond energies, thermochemistry

Ionic Reactive Intermediates

radical ions and nitrenium ions in biological systems

Neutral Reactive Intermediates

cycloaromatization reactions and their biological relevance (Bergman / Myers / Saito / Schmittel); arynes, carbenes, diradicals, nitrenes, radicals; photoaffinity labeling

Novel Aromatics

structure, reactivity, physical properties of strained hydrocarbons, carbon-rich compounds, non-planar aromatics, fullerenes, nanotubes

Nonlinear Systems

nonlinear kinetics in asymmetric synthesis; autocatalysis; chemical models for blood clotting

Students enrolling for 2 credits will be required to prepare an original, independent research proposal on topic related to the course content. Students enrolling for 3 credits will be required to prepare both an independent research proposal and a paper on a literature topic related to the course content. The proposals will be presented to the class at the end of the semester in the context of an informal "group meeting".

Students interested in auditing or "sitting-in" on this course are welcome.
Please contact Prof. McMahon to notify him of your interest.

*Note: Chemistry 841 is **not** a prerequisite for this course.*