Instructor: Christopher M. Cheatum  
Office 326 IATL  
Phone 353-0379  
Email christopher-cheatum@uiowa.edu  
Lecture: 11:00 -12:15 Tuesday/Thursday in C129 PC  
Office Hours: 1:30-3:00 Tuesday/Thursday or by appointment  

Course Objectives:  
To develop both a conceptual and a quantitative understanding of the rates of chemical reactions and what those rates can reveal about the underlying nature of reactive processes. We will explore the quantitative description of reaction rates and mechanisms. We will also study fundamental chemical processes to understand how reactions happen at a molecular level and what aspects of the chemistry are most important in controlling the rate and outcome of a chemical reaction.

Topics:  
Elementary Kinetics  
Rate Laws and Mechanisms  
Exact and Approximate Methods of Integration  
Numerical Methods of Integration  
Experimental Kinetics  
Examples: Free Radical Chain Reactions and Enzyme Catalysis  
Surface Kinetics and Adsorption  
Factors That Influence Rates: Pressure and Temperature  
Theories of Reaction Rates  
Collision Models  
Hard Sphere and Line-of-Centers Cross Sections  
State-to-State Rates and Thermal Averages  
Microscopic Reversibility and Detailed Balance  
Potential Energy Surfaces  
Statistical Models  
Transition State Theory  
Isotope Effects, Tunneling  
Unimolecular Processes  
Nonstatistical Behavior and Energy Transfer  
Reactions in Solution  
Diffusion  
Solvation and Solvent Effects on Solutes  
Diffusion Controlled Reactions  
Kramers’ Theory  
Marcus Theory  
Grading:  
Exam 1 February 23 (Tentative) 25%  
Exam 2 April 19 (Tentative) 25%  
Problem Sets Approximately 6 25%  
Final Paper/Oral Presentation April 24-May 3 25%  

Final grades will use +/- designations.
**General Information:**

The prerequisite for this course is 4:132 (Physical Chemistry II). Although I will make every effort to develop concepts from first principles, basic elements of quantum mechanics and statistical mechanics will be necessary background material.

This is a 3 credit hour course, so under University policy you should expect to spend six hours per week outside of class on activities related to this course.

**Administrative Home**

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook.

**Electronic Communication**

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences. (Operations Manual, III.15.2. Scroll down to k.11.)

**Accommodations for Disabilities**

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/~sds/ for more information.

**Academic Honesty**

All CLAS students have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

**CLAS Final Examination Policies**

The date and time of every final examination is announced during the fifth week of the semester; each CLAS student will receive an email from the Registrar stating the dates and times of the student's final exams. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period.

**Making a Suggestion or a Complaint**

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

**Understanding Sexual Harassment**

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

**Reacting Safely to Severe Weather**

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety web site.