课程代码（Coursenumber）
CHEM 3030

课程对象（Audience）
Primarily for Undergraduates

开课教师（Teacher）
Prof. Zax

学期（Semester）
Spring

课程描述（Description））
chemistry is a branch of chemistry which emphasizes the combination of experimental observation with the construction of models for how that data should vary with any of a number of experimentally controllable parameters; as such, great emphasis is placed not only on the acquisition of good data—without which no model is likely to be useful or instructive—but also on its subsequent analysis and numerical simulation so as to test the model; as only with regards to the model is it likely that any of the data will provide meaningful information about chemistry at the level of atoms and bonds. This course will focus on the use of Igor Pro as an extremely powerful and convenient package for data analysis/programming, and all of the required programming can be done on the Apple computers located in the undergraduate majors’ lounge (G29 Baker). Igor Pro is also available for Windows-based PCs; copies of the program are available to be installed on student’s personal computers.
“Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student’s own work.” Educational Policy Committee 3/5/02. See the Lab Notebook2009 handout for further clarification; the short version of the policy is that while we encourage you to work together in making many of the experimental measurements, those measurements “belong” only to the group actually making measurements (please ask Professor Zax for permission before providing anyone else with your data); and the interpretations should be yours and yours alone. Unauthorized sharing of Igor code, experimental data and/or final write-ups in whole or in part will be considered a violation of the code of academic integrity, by both the giver and the receiver.

课程提纲（Syllabus）
Lectures: Monday, Wednesday, and/or Friday, 12:20-1:10 pm, G135 Baker Lab
Laboratory Monday/Wednesday or Tuesday/Thursday, 1:25-4:20 pm Sections: or Tuesday/Thursday 9:00-12:00 noon, G16 to G31 Baker Lab Required A laboratory notebook which produces duplicate copies of your work, and Supplies: safety goggles. The use of a laboratory apron is optional, but encouraged.
Goggles and protective footwear must be worn while in the lab.
Due Dates: There will be nine formal lab reports (due one week after last assigned lab period). The final grade will be weighted in proportion to the lab periods assigned to each of the given projects.
During the course of the semester, we expect to cover the following topics (in rough chronologic order):
1. Rovibrational Spectrum of HCl and its Computer Simulation
The experimental work is to prepare a sample of HCl and then to accumulate its IR spectrum. A significant fraction of the lab is devoted to the development of vacuum line skills, and to introducing Igor as a method of programming leading to simulation of experimental data.
Laboratory Goals:
- Sample preparation using vacuum lines
- Igor Tutorials
- Programming and the waveform representation of data
- Curve fitting to an arbitrary function
- Generation of QuickTime movies
- Rotation and vibration of diatomic molecules
Chem 3030 Spring 2010
2. NMR Lineshape Analysis: Rotational Isomerization of Dimethylacetamide
The experimental work will focus on the use of high-resolution NMR instrumentation. IN its variable temperature implementation, NMR can also help probe relatively slow dynamical processes via lineshape analysis.
Laboratory Goals:
- Sample preparation on vacuum lines
- Operation of the variable temperature Bruker 300 MHz MNR
- Spectroscopic lineshape analysis
- Advanced curve fitting including weighted fits and numerical propagation of errors
3. Rovibrational Spectra of the Isotopomers of Acetylene (in two parts)
IR spectra can be interpreted with “trivial” models for diatomic molecules, where there are only very limited numbers of allowed transitions. For larger molecules, the analysis problem is much more complicated. Some of those complications are explored in our more model of the rovibrational spectrum of acetylene, including some isomeric forms.
Laboratory Goals:
- Sample preparation and measurement of high resolution spectra
- Normal modes of vibration
- Selection rules in rovibrational spectroscopy
- Isotope effects
- Nuclear spin statistics
- Advanced curve fitting
4. Fluorescence of Chlorophyll
Laboratory Goals:
- Electronic spectroscopy of polyatomic molecules
- Förster energy transfer
- Fluorescence quenching
6. Multi-component Kinetics: Hydrolysis of Benzyl Penicillin
Laboratory Goals:
- Lab View programming
- Analysis of reaction with multiple products and pathways
7. Chemical Kinetics of the Bromination of Cyclopentanone (in two parts)
Laboratory Goals:
- Kinetics of multi-step reactions and the steady-state approximation
- Empirical rate laws
- Integrated vs. differential rate laws
- Kinetic Isotope effect

课时信息（Totalhours）
16218 LEC 001 MWF
12:20PM - 01:10PM
BKL G19
Zax,D (dbz1)
Labs begin Mon Jan 18. If you are unable to register for a lab section, you need to sign-up on the Chemistry waiting list accessible only at http://chemlabs.arts.cornell.edu. Further information about the waiting list is available at the following link: <http://www.chem.cornell.edu/courses/WaitListFAQS.pd>

教参信息（Textbookinfo）
1 Laboratory manual for Chemistry S126, Experimental chemistry II, Honors - Unknown Binding (2000) by Dennis G Peters
2 Laboratory manual for Chemistry S125: Experimental Chemistry I, Honors - Unknown Binding (1994) by Dennis G Peters