

CHM 637: Molecular Spectroscopy

Instructor: Dr. Madhav Ranaganathan

Office: SL 302, Southern Labs

Tel: 6037

Email: madhavr@iitk.ac.in

Course description: Properties of matter, matrix representation of quantum mechanics, properties of light, time-dependent perturbation theory of radiation-matter interaction, molecular symmetry, general features of instruments, analyzing vibrational, rotational and electronic spectroscopy applied to small molecules, modern topics in spectroscopy (if time permits).

Prerequisites: Basic knowledge of quantum mechanics, statistical mechanics and mathematics. Additionally, it is imperative that you get used to learning things on your own from different sources.

Books: There is no prescribed book for this course. I will be using a few of the books below and will give you information and sources online as we go along. I found a few very good books/online resources

1. Peter Bernath *Spectra of Atoms and Molecules*
2. J. M. Hollas *Modern Spectroscopy*
3. Ira N. Levine *Molecular Spectroscopy*
4. P.W. Atkins and J. De Paula, *Atkins Physical Chemistry*
5. <https://ocw.mit.edu/courses/chemistry/5-80-small-molecule-spectroscopy-and-dynamics-fall-2008/index.htm> : Course on Small-molecule spectroscopy and dynamics by Robert W. Field (MIT)

Grading System

1. Homework Assignments: (50 points total) : If you do all the assignments sincerely and understand the problems asked, you will not have a problem doing well in the course. You are encouraged to speak to each other and work together on assignments, but each person has to submit their own hand written assignments. If you do not understand anything in the assignment, you can discuss with me.
2. Mid Semester 1 : (20 points): 2 hour exam. One 2-sided A4 paper with hand-written information can be used.
3. Final Exam : (30 points): 3 hour exam. One 2-sided A4 paper with hand-written information can be used.

Letter Grades: Letter grades will be awarded based on the total marks out of 100. Passing Mark for the course = 40/100.