

Chemistry 425/525: Statistical Thermodynamics and Kinetics

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Spring 2019, Mondays and Wednesdays, 8:40 to 10am, CCB 1203

This is a one-semester physical chemistry course with an emphasis on applications of thermodynamics and statistical mechanics to chemical and biochemical systems. It is an advanced course, and will build on the introduction to chemical thermodynamics you may have received in physical chemistry courses like CCB 327, 341, or 541.

The course text is *Molecular Driving Forces, 2nd ed*, by Ken Dill and Sarina Bromberg. We will skip around some in this book, and there will be additional handouts for most topics. The table below gives an approximate time schedule; detailed reading assignments will be made as the class proceeds.

Note: Although there will be some overlap with material that Prof. Khare used for Chemistry 541 in the Fall, I will try to keep that to a minimum. Chem 541 is *not* a pre-requisite for this course. Even where there is necessarily some overlap with Chem 541, you will be getting a different perspective here.

Week starting	Subject	Chapter
Jan 23, 28	Quick review of classical of thermodynamics	3,5,6,8
Feb 4	Fundamentals of statistical thermodynamics	10,11
Feb 11, 18	Microscopic dynamics	18,24
Feb 25, Mar 4	Microscopic electrostatics	20,21,23
Mar 11	Mixtures: salt-water in biophysics	30,31
Mar 25, Apr 1	Chemical reaction rates	19, (27)
Apr 8	Cooperativity and allostery	26,28,29
Apr 15, 22	Biomolecular simulations; connections to experiment	
Apr 29, May 6	Student project presentations	

The course website is <http://casegroup.rutgers.edu/lnotes.html>. Reading and homework assignments and additional course materials will be posted there. Final grades in the class will be based on assigned homework/problem sets (30%), projects/presentations (40%) and exams (30%). Midway through the semester, each student will choose a project, which can be related to research you are carrying out, or to some facet of thermodynamics or kinetics that interests you. Students will be expected to make a short oral presentations to the rest of the class, as well as to attend and provide feedback to other student presentations. A written summary of the project will also be required. Two take-home exams will be given during the course of the semester and announced as least one week beforehand; there will not be an exam during the Final Exam period.

Please note: Students are expected to adhere the university policies on academic integrity and student conduct in all assignments, assessments and other matters regarding this course. These policies can be found online: <http://studentconduct.rutgers.edu/academic-integrity/>. You may consult with fellow students on homework and on class projects, but you must personally prepare and understand any written material you hand in. You may *not* consult with fellow students on the exams.