CHEM.256: Physical Chemistry for the Biological Sciences.

Prof. Addison, 12-418.  215-895-2646.  AddisonA@duvm.ocs.drexel.edu

Lab: Mr. Michael Prushan, 12-402.  sg964u8e@dunx1.ocs.drexel.edu.  215-895-1697.

Syllabus:
• Simple statistics for data: mean, standard deviation. Linear regression.
• Titrations, amino-acids, polyprotic acids, isoelectric focusing.
• Behaviour of gases. Energy, heat and temperature - 0th Law.
• 1st Law: work, internal energy.
• Thermochemistry: heat capacities, enthalpy, Hess' law.
• Entropy, 2nd & 3rd Laws, Gibb's free energy.
• Dependences of $\Delta H$, $\Delta G$, K on T, P.
• Donnan equilibrium, osmotic pressure.
• Dispersions, diffusion, sedimentation.
• Electrochemical cells; $E^\circ$-values. Non-ideality & ion activity coefficients.
• Phosphate transfer potentials.
• Rates of reactions: 0, 1st & nth order rate equations.
• Half-life, pseudo-order, flooding. The steady state.
• Models for dependence of $k$ on $T$.
• Michaelis-Menten model.
• Lineweaver-Burke methods.

Objectives:
Be able to make estimates of the reliability and deviance of experimental data. Know about the acidic and/or basic properties of molecules and be able to compute equilibrium concentrations of various species in aqueous media under a variety of conditions. Be able to predict the distributions of polyprotic species. Understand the meaning of a state function, and the relationships amongst thermodynamic quantities such as $U$, $H$, $S$, $G$, $q$, $K$, $E$ & $w$ and be able to interrelate changes in their values. Be able to relate changes in thermodynamic quantities to the progress and direction of physical and chemical changes. Be able to deduce the responses of thermodynamic quantities to external influences such as $T$ & $P$. Know which thermodynamic relationships are appropriate to the conditions at hand, and when various approximations are or are not appropriate. Be able to apply thermodynamic principles to simple biochemical systems and processes. Understand the concept of a rate law, and know how to analyze kinetic data in order to extract numerical and mechanistic information. Be able to design kinetic experiments in order to uncover fundamental properties of the reaction system in an efficiently way, utilizing appropriate experimental "tricks".
Text:


Another good source is:


Relationship to other courses:
CHEM.256 starts off by reviewing and enlarging on material from CHEM.102, which is the Chemistry pre-requisite. Some calculus is needed; it's useful, but not essential for you to be able to solve differential equations.

Other stuff: Be sure that I have your correct Email address for my exploder. Attempt to solve the homework problems as soon as we have covered the material in class. There is no grade given for attendance or for homework. If you do not do the homework, you will find it hard to pass the exams, and virtually impossible to get a good grade. For help with problem sets, I may be found in my office or lab most weekdays. Answers are provided for some homework problems, while others require a descriptive/essay answer. You are encouraged to discuss these with me at our mutual convenience.

Your grade is based on the lab (15%), plus (usually three) exams: two midterms (10%, 20%) plus a final exam (55%; most likely on May 27th.) If you are not officially registered in the course, no exams or labs will be graded or returned.

Graduating Seniors?
Drexel applies certain constraints in Spring quarter, in regard to the scheduling of final exams and make-up exams for Seniors. The obvious consequences of this are an accelerated rate of coverage and early scheduling of exams. You don't need an excuse to take the make-up exam if you miss a midterm or the final. But you must then attend the make-up (most likely June 2nd or May 28th) or take a zero on it. Drexel Rules: Final on Exam Week Monday, Makeup Finals on Tuesday. !!!!!!!!

The 10-Minute Rule: If I'm more than ten minutes late, consider the class cancelled. If you need to leave early, or are going to be more than ten minutes late for a class, please let me know beforehand (otherwise, please don't enter).