

TENTATIVE COURSE SCHEDULE & READING ASSIGNMENTS

Week	General Area	Specific topics, description	Reading
1	Statistical thermodyn.	Review concept of partition functions. Applications to binding equilibria, single- and multicomponent systems, phase transitions.	B: 586-613, 636-648; EC: 668-686
2-3	Statistical thermodyn.	Statistical mechanics of biomolecules as polymer chains, non-ideal chains, helix-coil transition, protein folding.	EC: 686-693; Dill 499-507
3	Statistical thermodyn.	Kinetic theory of gases. Maxwell-Boltzmann.	B: 651-671
3	Statistical thermodyn.	Review of solutions (non-ionic and ionic) and polyelectrolites. Applications in biochemistry: dialysis, liquid chromatography.	EC: 271-282,296-325
4	Statistical thermodyn.	Transport phenomena, channels, diffusion equation, Brownian motion. Applications in biochemistry: sedimentation and electrophoresis.	EC: 700-739
5	Kinetics	General kinetics. Differential and integrated rate laws.	B:680-696; EC:212-234
6	Kinetics	Mechanisms of chemical and biochemical reactions, enzyme kinetics. Transition state theory. Statistical mechanical treatment.	B: 702-725; EC:237-244
7	Kinetics	Liquid phase kinetics. Diffusion limited processes. Kinetics methods in Biochemistry, relaxation methods.	EC: 245-261
8	Quantum	Postulates of quantum mechanics. Observables and operators (+operator algebra), the uncertainty principle, wave functions and eigenvalues, Schrödinger equation.	B:273-287
9	Quantum	Quantization of energy, particle-in-a-box, harmonic oscillator, rigid rotor, separation of variables. Quantization of angular momentum.	B: 288-306,316-347
10	Quantum	Hydrogen atom. Electron spin, Pauli principle. Atomic states. Molecules, Born-Oppenheimer approximation. Molecular orbitals.	B: 352-365,371-382, 403-405
11	Quantum	Spectroscopy. Selection rules. Rotation and vibration. Electronic spectra. Optical spectroscopy.	B: 461-471, 481-516.
12	Quantum	Applications to biomolecules: absorption, circular dichroism, vibrational spectroscopy, fluorescence.	EC: 562-604
13	Quantum	Magnetic resonance spectroscopy (ESR, NMR). Applications to biomolecules.	B:560-582; EC: 605-636
14	Diffraction	Scattering. X-ray, electron, neutron diffraction, crystal structures, space symmetry groups. Methods for biomolecular structure determination.	EC: 798-841