

kk

## Chemistry 538, (16:160:538) Spring 2013

### Biophysical Chemistry II: Methods in Molecular Biophysics

Joe Marcotrigiano and David A. Case, instructors

Spring 2013, Mon/Wed, 5-6:20pm, Proteomics 206

This course will cover basic features of experimental and computational methods in common use in molecular biophysics. It will cover the theory and practice of basic biochemical approaches, structural biology techniques such as crystallography, NMR, and cryo-EM, calorimetry, hydrodynamics (including fluorescence and light scattering), optical spectroscopy, and molecular dynamics simulations. It can serve as a follow-on course to Biophysical Chemistry I (Chem 437/537), but that course is not a prerequisite.

The course text is *Methods in Molecular Biophysics: Structure, Dynamics, Function*, by I.N. Serkyuk, N.R. Zaccai and J. Zaccai, (Cambridge University Press, 2007). You might wish to consider getting the Kindle edition from Amazon, which is cheaper than the hardback version.

Instructors: Joe Marcotrigiano (<http://marcotrigiano.cabm.rutgers.edu>) and David Case (<http://casegroup.rutgers.edu>)

Date	Subject	Text Chapter	Instructor
Jan 22,27	Introduction; recombinant DNA; protein expression, purification and detection	A	JM
Jan 29	Thermodynamics and calorimetry	C	DAC
Feb 3,5	Hydrodynamics: macromolecular diffusion, electrophoresis and centrifugation; dynamic light scattering.	D,E	DAC
Feb 10,12 Feb 17,19	Optical microscopy: light, fluorescence and atomic force microscopy; single molecule detection and manipulation	F	JM
Feb 24,26 Mar 3,5,10,12	Crystallography, cryo-electron microscopy; SAXS	G,H	JM
Mar 24	Mid-term exam		
Mar 26,31 Apr 2,7	Molecular dynamics simulations. Theory and practice of carrying force-field based studies of macromolecules	I	DAC
Apr 9,14	Introduction to magnetic resonance: chemical shielding, spin-spin coupling, dipolar interactions	J1	DAC
Apr 16,21	Experimental NMR: multi-dimensional spectroscopy, pulse sequences, assignment strategies	J2	DAC
Apr 23,28	Protein structure determination; NMR studies of dynamics and chemical exchange; ESR	J2, J3	DAC
Apr 30, May 5	Mass spectroscopy; proteomics	B	JM