9/12/2016 kas

BMB 508- Principles of Macromolecular Biophysics. 2016 Schedule

Director: Kim Sharp, sharpk@mail.med.upenn.edu
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Time: Mon, Wed, 1.30-3.00pm, 255 Anatomy-Chemistry Building

This is an introductory course on Macromolecular Biophysics. The first part of the course covers the physical fundamentals underlying the structure and behavior of macromolecules necessary for biological function. The second part of the course covers the principle biophysical methods used to study macromolecules. The third and final part of the course examines, through a case study approach, how novel, yet still **rigorous and reproducible** research is conducted. Each period 2 students will present a small set of papers (usually 2 to 3) representing different sides of a scientifically controversial, possibly unsolved, topic in macromolecular biophysics. Students can choose from a set of pre-selected topics, or from their own suggestions (with approval from the director). The presentations will emphasize the dynamic, often uncertain dialogue of experiment, interpretation and critique involved in rigorous and reproducible scientific discovery. The presentation will be 'contemporaneously historical', i.e. based on the state of knowledge at the time of the papers. It can use knowledge of earlier literature, but not of research that was unknown at the time. Most typically draw from papers and letters in general journals like Science or Nature. They thus are written to be understood by people outside the specific area of the articles, and without extensive background literature reading, (like BMB508 students!)

Textbooks:Cantor & Schimmel. Vol II, Techniques for the study of biological structure and function. Van Holde: Physical Biochemistry (On reserve at the Biomed Library)

Lecture notes and other class information will be posted on PennBox as the course progresses

Grade: Homework: 40%, midterm 30%, Presentations/Participation 30%.

Date	Topic		Lecturer
	Part 1: The Physics of Macromolecules		
W sep 7	Molecular Interaction Energies: Bonding, Nonbonding: Nonpolar	C&S Ch5	Sharp
M sep 12	Molecular Interaction Energies: Nonbonding: Polar/Electrostatic	C&S Ch5	Sharp
W sep 14	Equilibria: Folding, Structure and Stability	C&S Ch15,17	Sharp
M sep 19	Equilibria: Binding and Allostery		Sharp
W sep 21	Molecular Forces: Fundamentals of Rates and Dynamics		Sharp
	Part 2: Biophysical methods for studying macromolecules		
M sep 26	Optical Spectroscopy (UV, Fluorescence, CD)	C&S Ch7	Vinogradov
W sep 28	Optical Spectroscopy (UV, Fluorescence, CD)	C&S Ch7	Vinogradov
M oct 3	Single Molecule techniques		Goldman
W oct 5	Single Molecule techniques		Goldman
M oct 10	Scattering: Determination of structure	C&S Ch11,12	Gupta
W oct 12	Diffraction 1: Determination of Structure	C&S Ch13	Skordalakes
M oct 17	Diffraction 2: Determination of Structure	C&S Ch13	Skordalakes
W oct 19	Cryo Electron Microscopy		Murakami
M oct 24	Magnetic Resonance 1: Determination of structure and dynamics	C&S Ch9	Wand
W oct 26	Magnetic Resonance 2 "	C&S Ch9	Wand
M oct 31	Magnetic Resonance 3 "	C&S Ch9	Wand
W nov 2	Kinetics: Experimental	C&S Ch16	Kohli
M nov 7	Kinetics: Enzymes, Inhibitors and more	C&S Ch16	Kohli
	Part 3: Rigor and Reproducibility in Biophysical Research: Examination of Current Scientific Controversies		
	See list in separate document handed out at first class		
W nov 9			Pair 1
M nov 14			Pair 2
W Nov 16			Pair 3
M nov 21			Pair 4
W nov 23	no class		
M nov 28			Pair 5
W nov 30			Pair 6
M dec 5			Pair 7
W dec 7			Pair 8
M dec 12			Pair 9