8/26/2019 kas

BMB 508- Principles of Macromolecular Biophysics. 2019 Schedule

Director: Kim Sharp, sharpk@upenn.edu
Co-director: Sergei Vinogradov, vinograd.upenn@gmail.com
Time: Tues, 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		
T sep 3	Molecular Interactions: Bonding, Nonpolar, Polar, Electrostatics	C&S Ch5	Sharp
W sep 4	Equilibria: Folding, Structure and Stability	C&S Ch15,17	Sharp
T sep 10	Equilibria: Binding and Allostery	C&S Ch15,17	Sharp
W sep 11	Kinetics: Experimental	C&S Ch16	Kohli
T sep 17	Kinetics: Enzymes, Inhibitors and more	C&S Ch16	Kohli
	Part 2: Biophysical methods for studying macromolecules		
W sep 18	Optical Spectroscopy (UV, Fluorescence, CD)	C&S Ch7	Vinogradov
T sep 24	Optical Spectroscopy (UV, Fluorescence, CD)	C&S Ch7	Vinogradov
W sep 25	Single Molecule techniques		Goldman
T oct 1	Single Molecule techniques		Goldman
W oct 2	Scattering: Determination of structure	C&S Ch11,12	Gupta
T oct 8	Hydrogen Exchange		Black
W oct 9	Diffraction 1: Determination of Structure	C&S Ch13	Skordalakes
T oct 15	Diffraction 2: Determination of Structure	C&S Ch13	Skordalakes
W oct 16	Cryo Electron Microscopy: Principles of EM imaging		Murakami
T oct 22	Cryo Electron Microscopy: Single Particle		Murakami
W oct 23	Cryo Electron Microscopy Tomography		Chang
T oct 29			Pair 1
W oct 30			Pair 2
	Part 3: Rigor and Reproducibility in Biophysical Research: Examination of Current Scientific Controversies		
	See list in separate document handed out at first class		
T nov 5			Pair 3
W nov 6			Pair 4
T Nov 12			Pair 5
W nov 13			Pair 6
T nov 19			Pair 7
W nov 20			Pair 8
T nov 26			Pair 9
W nov 27	Thanksgiving- no class		
T dec 3			Pair 10
W dec 4			Pair 11
T dec 10	Final Exam		
W dec 11			