

8/19/2020

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BMB 508- Principles of Macromolecular Biophysics. 2020 Schedule

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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 Assignments: 40%, Exam 30%, Presentations/Participation 30%.

Date	Topic		Lecturer
	Part 1: The Physics of Macromolecules		
T sep 1	Molecular Interactions: Bonding, Nonpolar, Polar, Electrostatics	C&S Ch5	Sharp
W sep 2	Equilibria: Folding, Structure and Stability	C&S Ch15,17	Sharp
T sep 8	Equilibria: Binding and Allostery	C&S Ch15,17	Sharp
W sep 9	Kinetics: Experimental	C&S Ch16	Kohli
T sep 15	Kinetics: Enzymes, Inhibitors and more	C&S Ch16	Kohli
	Part 2: Biophysical methods for studying macromolecules		
W sep 16	Scattering: Determination of structure	C&S Ch11,12	Gupta
T sep 22	Optical Spectroscopy (UV, Fluorescence, CD)	C&S Ch7	Vinogradov
W sep 23	Optical Spectroscopy (UV, Fluorescence, CD)	C&S Ch7	Vinogradov
T sep 29	Single Molecule techniques		Goldman
W sep 30	Single Molecule techniques		Goldman
T oct 6	Hydrogen Exchange		Black
W oct 7	Diffraction 1: Determination of Structure	C&S Ch13	Skordalakes
T oct 13	Diffraction 2: Determination of Structure	C&S Ch13	Skordalakes
W oct 14	Cryo Electron Microscopy: Principles of EM imaging		Murakami
T oct 20	Cryo Electron Microscopy: Single Particle		Murakami
W oct 21	Cryo Electron Microscopy Tomography		Chang
T oct 27			Pair 1, 2
W oct 28			Pair 2, 3
	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 3	Election Day. No Class		
W nov 4			Pair 4,5
T Nov 10			Pair 6,7
W nov 11			Pair 8,9
T nov 17			Pair 10,11
W nov 18			Pair 12, 13 (if necessary)
T nov 24			Review Session
W nov 25	Thanksgiving- no class		
T dec 1	Final Exam (Take home)		
W dec 2			
T dec 8	Final Exam Due		