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BMB 508- Principles of Macromolecular Biophysics. 2022 Schedule

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Time: Tues, Wed, **1.45-3.15pm**, 255 Anatomy-Chemistry Building (note new new UPenn calendar compliant times)

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 part of the course examines, through a case study approach, how novel, yet still **rigorous and reproducible** research is conducted. For each case 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!)

There is no textbook that covers all of the class, as much of the material is based on current research and is too new for textbooks. However Van Holde, K. E. et al. *Principles of Physical Biochemistry*, 2nd Edition, covers much of the material. A copy will be placed on reserved at the Biomeidcal Library. A copy is also available from KAS.

Lecture notes and other class material, include topics/papers for the case studies will be posted as the course progresses

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

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Date	Topic		Lecturer
	Part 1: The Physics of Macromolecules		
T sep 6	Molecular Interactions: Bonding, Nonpolar, Polar, Electrostatics		Sharp
W sep 7	Equilibria: Folding, Structure and Stability		Sharp
T sep 13	Equilibria: Binding and Allostery		Sharp
W sep 14	Kinetics: Theory		Sharp
T sep 20	Kinetics: Experimental		Kohli
W sep 21	Kinetics: Enzymes, Inhibitors and more		Kohli
	Part 2: Biophysical methods for studying macromolecules		
T sep 27	No Class: Rosh Hashanah		
W sep 28	Optical Spectroscopy (UV, Fluorescence, CD)		Vinogradov
T oct 4	No Class: Yom Kippur		
W oct 5	No Class: Yom Kippur		
T oct 11	Optical Spectroscopy (UV, Fluorescence, CD)		Vinogradov
W oct 12	Single Molecule techniques		Goldman
T oct 18	Single Molecule techniques		Goldman
W oct 19	Hydrogen Exchange		Black
T oct 25	Scattering: Determination of structure		Gupta
W oct 26	Diffraction 1: Determination of Structure		van Duyne
T nov 1	Diffraction 2: Determination of Structure		van Duyne
W nov 2	Cryo Electron Microscopy: Principles of EM imaging		Murakami
T Nov 8	Cryo Electron Microscopy: Single Particle		Murakami
W Nov 9	Cryo Electron Microscopy Tomography		Chang
T nov 15	NMR		Sgourakis
W nov 16	NMR		Sgourakis
	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 22			Pair 1, 2
W nov 23	Thanksgiving- no class		
T nov 29			Pair 3, 4
W nov 30			Pair 5, 6
T dec 6			Pair 7, 8
W dec 7	Final Exam (Take home)		Pair 9, 10 (If necessary)
W dec 14	Final Exam Due		