MEDCH 528 ~ Biophysical Enzymology and Biopharmaceuticals

Winter Quarter, 2018

Lectures Wednesday, Friday
3:00 pm – 4:30 pm
South Campus Center 308

Instructors: Atkins, Nath, Lee, Sumida, Lyon, Guttman, Hill, Conner

Bill Atkins, Ph.D.
Room: H172Q
Phone: 206/685-0379
winky@u.washington.edu

Course Information. This course consists of approximately seventeen 60-90 minute lectures and three 1.5 hr classes for student presentations. The first part of the course includes in-depth treatment of thermodynamics and kinetics of protein-ligand interactions and protein-protein-interactions. This section also includes an introduction to the structure and function of therapeutic antibodies. The second part of the course includes theoretical and practical aspects of biophysical methods not covered in most other courses, including surface plasmon resonance, scanning and titrating calorimetry, cryoEM, H/D exchange Mass spectrometry and other specialized methods with particular utility in modern drug discovery. The third part of this course provides examples of theory and methods from the first two parts, with particular emphasis on therapeutic proteins discussed, including viruses, therapeutic antibodies, bispecific antibodies,Fc-fusion proteins, and drug targets. Students are responsible for all of the material presented in the lecture notes, the classroom lectures and, in addition, any reading material assigned by the instructors. Students will directly interact with industry scientists with expertise in biophysical analyses.

The students will understand the theoretical basis of protein-ligand interactions and current methods for their characterization. Students will be knowledgeable about current topics in the biopharmaceutical industry and the role of kinetic and thermodynamic information in the drug design process. Students will be able to critique current literature concerning therapeutically relevant proteins.

The class will be limited to 20 students.

Grading: will be based on a combination of take home problem sets (30%), student presentations (50%), and in-class participation (20%).

***Tentative* Lecture Schedule**

Lecture	Instructor	Date	Lecture Topic
Part I: Protein-Ligand Interactions			
1	Atkins	January 5	Ligand Binding at Equilibrium
2	Atkins	January 10	Ligand Binding at Equilibrium/Regulation
3	Atkins	January 12	Ligand Binding Dynamics/Allostery
4	Guttman	January 17	Antibody Structure/Function
5	Atkins		Engineered Antibody Platforms: Bispecific, ADCs, others
Part II: Methods			
6	Nath	January 19	UV-Vis, CD, Fluorescence, Light Scattering
7	Nath	January 24	Optical Methods, Single Molecule
8	Sumida	January 26	Calorimetry (ITC/Thermodynamics and Drug Design)
9	Lee	January 31	Structural Analysis: SAXS, EM
10	Sumida	February 2	Calorimetry (DSC, protein stability)
11	Guttman	February 7	H/DX MS Protein Dynamics
12	Sumida	February 9	Surface Plasmon Resonance
Part III: Applications in Biopharmaceuticals			
13	Lyon (Seattle Genetics)	February 14	Antibody Drug Conjugates
14	Conner (Amgen)	February 16	Antibody Clearance and Disposition
15	Hill (Biotech Consultant)	February 21	Examples from Protein Therapeutic Development
16	-	February 23	*Student presentations*
17	-	February 28	*Student presentations*
18	-	March 2	*Student presentations*