

**Fall 2016: MCB C100A / Chem C130 *Biophysical Chemistry: The Molecules of Life***

Instructors: John Kuriyan and David Savage

Lecture Schedule and Course Outline

Textbook for the course:

"The Molecules of Life" by Kuriyan, Konforti &amp; Wemmer (Garland Publishing)

Lecture: Tu/Thur 3:30 - 5:00 pm in 145 Dwinelle

	Date	Lecturer	Topic	Textbook Reading	Problem Sets
1	August 25, Thursday	DS-1	The genetic code. Introduction to protein and DNA structure. Qualitative description of intermolecular forces.	Chapter 1	
2	August 30, Tuesday	DS-2	Principles of nucleic acid structure. Part 1.	Chapter 2	
3	September 1, Thursday	DS-3	Principles of nucleic acid structure. Part 2.	Chapter 2	
4	September 6, Tuesday	JK-1	Principles of protein structure. Part 1.	Chapter 4	
5	September 8, Thursday	JK-2	Principles of protein structure. Part 2.		DS PS1: Forces / nucleic acids (Lectures 1-3)
6	September 13, Tuesday	JK-3	Continue protein structure. Sequence-structure comparisons. Diversity in protein structure.	Chapter 4	
7	September 15, Thursday	JK-4	BLOSUM matrix and evolution of proteins	Chapter 5	JK PS2: Protein structure (Lectures 4-5)
8	September 20, Tuesday	JK-5	Start discussion of energy.	Chapter 6	
9	September 22, Thursday	JK-6	Energy. The first law of thermodynamics.	Chapter 6	
-	September 22, Thursday	-	<b>MIDTERM 1 (evening) 7 - 9 PM in 1 Pimentel (Lectures 1-7)</b>		JK PS3: Protein evolution (Lectures 6-7)

	Date	Lecturer	Topic	Textbook Reading	Problem Sets
10	September 27 Tuesday	JK-7	Heat capacity. Introduction to the Boltzmann Distribution. Molecular Energy function	Chapter 6	
11	September 29 Thursday	JK-8	Entropy. Calculation of multiplicity of coin tosses. Entropy is the logarithm of the multiplicity. The second law of thermodynamics.	Chapter 7	JK PS4: Energy (Lectures 8-10)
12	October 4, Tuesday	JK-9	Energy Levels and Entropy.	Chapter 8	
13	October 6, Thursday	JK-10	More on the Boltzmann Distribution. Temperature and heat flow.		JK PS5: Entropy (Lectures 11-12)
14	October 11, Tuesday	JK-11	Free Energy, predicting spontaneous reactions, relationship to work	Chapter 9 Section A,B	
15	October 13, Thursday	JK-12	Chemical Potential, concentration dependence, equilibrium	Chapter 9C Chapter 10	JK PS6: Boltzmann Distribution and free energy (Lectures 13-14)
16	October 18, Tuesday	JK-13	Equilibria, temperature dependence, acid/base equilibria	Chapter 10	
17	October 20, Thursday	JK-14	Equilibria continued.	Chapter 10	
**	<i>October 20, Thursday</i>	-	<b>MIDTERM 2 (evening)</b> <i>7 - 9 PM in 1 Pimentel (lectures 8-14)</i>		
18	October 25, Tuesday	DS-4	Finish equilibria discussion, protein folding	Chapter 10	
19	October 27, Thursday	DS-5	Oxidation-reduction: reactions in biology	Chapter 11	JK PS7: Free energy and chemical potential (Lectures 15-17)

	Date	Lecturer	Topic	Textbook Reading	Problem Sets
20	November 1, Tuesday	DS-6	Oxidation-reduction: reduction potential and free energy	Chapter 11	
21	November 3, Thursday	DS-7	Ligand binding equilibria 1	Chapter 12	DS PS8: Chemical equilibrium and oxidation reduction (Lectures 17-20)
22	November 8, Tuesday	DS-8	Ligand binding equilibria 2	Chapter 12	
23	November 10, Thursday	DS-9	Chemical Kinetics: Order of reactions	Chapter 15	DS PS9: Ligand binding (lectures 21,22)
24	November 15, Tuesday	DS-10	Chemical Kinetics: Arrhenius and Transition-state theory	Chapter 15	
**	November 17, Thursday	-	<b>MIDTERM 3 (evening)</b> 7 - 9 PM in 1 Pimentel (lectures 15-22)		
25	November 17, Thursday	DS-11	Principles of Enzyme Catalysis: Michaelis-Menten kinetics	Chapter 16	
26	November 22, Tuesday	DS-12	Principles of Enzyme Catalysis: Inhibition	Chapter 16	DS PS10: Chemical kinetics (Lectures 23-24)
-	November 24	--	Thanksgiving break		
27	November 29, Tuesday	DS-13	Principles of Enzyme Catalysis: Mechanisms	Chapter 16	
28	December 1, Thursday	DS-14	Allostery (Course evaluations)	Chapter 14	DS PS11: Enzymes and Allostery. (Lectures 25-28)
**	TBA	8 - 11 AM	<b>FINAL EXAMINATION (comprehensive); location TBA</b>	full course reading	