PHYS 48M: Sel. Topics in Physics: Biophysics - Spring 2014

(February 18, 2014)

Instructor: Deniz Sezer
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Lectures: Tue 15:00-16:50 YD 04
Thr 16:00-16:50 YD 204

Office hours: Tue 9:30-10:30 KB 410E

Evaluation:

Quizzes & homework	20 %
Exam 1	25 %
Exam 2	25 %
Final exam	30 %

Textbooks and reference books:

PBoC Phillips, Kondev, Theriot & Garcia, *Physical Biology of the Cell*, 2nd edn., Garland Science, 2012.
BP Nelson, *Biological Physics*, updated 1st edn., Freeman, 2008. Garland Science, 2010.

R1 Bialek, *Biophysics: Searching for Principles*, Princeton University Press, 2012.
R2 Dill & Bromberg, *Molecular Driving Forces*, 2nd edn., Garland Science, 2010.

Detailed Course Content:

Date	Topic	
Feb 18	General information about the course	Introduction to the molecules of life
Feb 20	Molecular interactions	
Feb 25	Amino acids and protein structure	Multiplicity and entropy
Feb 27	Hydrophobic effect and protein folding	
Mar 4	Binding of two molecules	Statistical mechanics of binding
Mar 6	Thermodynamic models of transcription	
Mar 11	Myoglobin and hemoglobin	Pauling model of hemoglobin binding
Mar 13	WMC model of cooperative binding	
Mar 18	Thermal and chemical equilibrium	Chemical potential and binding
Mar 20	Osmotic pressure	
Mar 25	**First Exam**	
Mar 27	Molecular dynamics simulations	
Apr 1	Diffusion and friction	Diffusion equation and its applications
Apr 3	Diffusion in the presence of force	
Apr 8	Electrostatics and biomolecules	Ion channels and membrane potential
Apr 10	DNA packing in viral capsids	
Apr 15	Chemical kinetics and catalysis	Kinetics of binding
Apr 17	Michaelis-Menten model of enzyme kinetics	
Apr 22 Apr 24	Spring Break	
Apr 29	**Second Exam**	
May 1	Labor Day	
May 6	Models of cytoskeletal polymerization	(PBoC Sec. 15.4)
May 8	Cytoskeletal polymerization (cont.)	
May 13	Molecular machines as ratchets	(PBoC Sec. 16.2)
May 15	Polymerization and translocation	
May 20	Hodgkin-Huxley model of action potential	(PBoC Sec. 17.4)
May 22	Kinetic proofreading (PBoC Sec. 21.5)	