

BME n 2101
Biomedical Thermodynamics
Spring 2008

Instructor: Jonathan N. Sachs, Ph.D.
 Department of Biomedical Engineering, University of Minnesota
 Room 7-126, Nils Hasselmo Hall

Lecture Time:

Lecture Place:

Discussion Sections:

Office Hour: TBA

Web Page: webct.umn.edu

TAs: Jason

TA Office Hours: TBA

Textbook: Molecular Driving Forces. K.A. Dill and S. Bromberg

<u>Week</u>	<u>Date</u>	<u>Lecture Topic</u>	<u>Reading</u>
1	Jan. 22	Principles of probability	Ch. 1
	Jan. 24	Extremum principles predict equilibrium	Ch. 2
2	Jan. 29	Heat, Work & Energy	Ch. 3
	Jan. 31	Entropy & the Boltzmann distribution law	Ch. 4-6
3	Feb. 5	Thermodynamic driving forces	Ch. 7
	Feb. 7	Free energies	Ch. 8
4	Feb. 12	Maxwell's relations & mixtures	Ch. 9
	Feb. 14	Boltzmann distribution law	Ch. 10
5	Feb. 19	EXAM 1	
	Feb. 21	Statistical mechanics of simple gases & liquids	Ch. 11
6	Feb. 26	Temperature, heat capacity	Ch. 12
	Feb. 28	Chemical equilibria	Ch. 13
7	Mar. 4	Equilibria between liquids, solids & gases	Ch. 14
	Mar. 6	Solutions & mixtures	Ch. 15
8	Mar. 11	Solvation & transfer of molecules between phases	Ch. 16
	Mar. 13	Physical kinetics	Ch. 17-18
9	Mar. 25	Review	
	Mar. 27	EXAM 2	
10	Apr. 1	Chemical kinetics & transition states	Ch. 19
	Apr. 3	Coulomb's law & the electrostatic potential	Ch. 20-21
11	Apr. 8	Electrochemical equilibria & salt shielding	Ch. 22-23
	Apr. 10	Intermolecular interactions	Ch. 24
12	Apr. 15	Phase transitions	Ch. 25
	Apr. 17	Cooperativity	Ch. 26
13	Apr. 22	Adsorption, binding & catalysis	Ch. 27
	Apr. 24	Multi-site cooperative ligand binding	Ch. 28
14	Apr. 29	Water & water as a solvent	Ch. 29-30
	May 1	Polymer solutions	Ch. 31
15	May 6	Polymer Elasticity	Ch. 32
	May 8	Polymers resist confinement and deformation	Ch. 33
	May 14	FINAL EXAM 8-10 a.m.	

Lectures: Lecture is twice weekly and covers the fundamental principles from the text.

Discussion Sections: These sections are mandatory, attendance is taken and unexcused absence will be taken into account in the assignment of a final grade. These sections are TA led problem solving sessions.

Grading Policy

Exams (30% each)	30%
Homework	10%

Homework:

You are to work out solutions in groups of no more than four and no less than two and turn in a single copy of the homework. Regardless of which subset of homework problems from the book are assigned, you would benefit greatly from working all problems and examples in the book.

Exams

Exams will be closed book and closed notes and are all cumulative, though heavily weighted to the material covered during that section of the course. It is expected that students will behave in a manner consistent with the Regents' Student Conduct policy (www1.umn.edu/regents/policies/academic). Unless instructed otherwise, submitted work must be done without assistance from others. Academic misconduct will be grounds for failure in the course. Remember that engineering is a profession that is trusted by society to conduct its work honestly.

Students with disabilities

The instructor will make all reasonable accommodations necessary for students with disabilities.