

**Physical Chemistry for the Life Sciences**  
**Chem 30337, Fall 2007, University of Notre Dame**

**Instructor:** Jeff W. Peng ([jpeng@nd.edu](mailto:jpeng@nd.edu)), 631-2983

**Office Hours:** Tuesdays, 2-4 pm in Stepan 434

**Summary:** Advances in 21<sup>st</sup> century life science rely increasingly on an understanding of physical science. This calls for a basic foundation in physical chemistry to prepare for careers in biology-related disciplines. In 30337, we build this foundation by exploring the key concepts of physical chemistry relevant to the molecules of life. The emphases are on thermodynamics and statistical mechanics.

**Text:** *Biological Physics: Energy, Information, Life* by Philip Nelson, 2004 (W.H. Freeman & Company)

**Grading:** Your total grade will be calculated as follows:

- a.) 15 % Homework (problem sets)
- b.) 85 % Exams (Two mid-terms and a final)

To help compensate for a potential 'bad day', I'll weight the above as follows:

- 35% to your best exam score, and 25% to the other two exams.
- Also, there will be an optional extra-credit problem set at the end of the semester that can boost your problem set grade

**Class Policy:**

- M,W, F 11:45 am – 12:35 pm, DBRT 141
- Cell phones off

**Homework Policy:**

- Earnestly trying the problem sets is totally the path to success in this class. I urge you to first wrestle with the problems on your own. After that, it's OK to work with others. Why do I say this? Because the exams will be based on the problem sets and you'll be operating solo. So, it's to your advantage to master the material as independently as possible!
- Problem sets are handed out on **Wednesday**, and due the following **Wednesday**. I will get the graded sets back to you on Friday. Note I have no TAs; sadly, it's just me. So, late problem sets will not be accepted. The exception is the last problem set, which will be a Monday to Monday affair.
- Do not copy or paraphrase anyone else's work, or use renegade copies of solution manuals. *Suspected violations will be handled in accordance with the academic honor code.*

**Course Plan:**

Below is a table that gives an *approximate* plan for the course. It is subject to change based on our collective progress.

Week	Dates	Exams/ Problems	Nelson Reading	What's Covered
1	Wed, 29 Aug		Chap 1,2	1: Intro and Overview; molecules in the cell
"	Fri, 31 Aug		"	2: Molecules in the Cell/Drug Design

2	Mon, 3 Sep		Chap 3	3: Probability: basic concepts
"	Wed, 5 Sep	PS-1 Handed Out	"	4: Probability : Perfect Gases and kinetic theory
"	Fri, 7 Sep		"	5: Boltzmann's Distribution
3	Mon, 10 Sep		Chap 4	6: Boltzmann's Distribution
"	Wed, 12 Sep	PS-1 Due, PS-2 Out	"	7: Random Walks 1
"	Fri, 14 Sep		"	8: Random Walks 2
4	Mon, 17 Sep		"	9: Diffusion and Fick's Laws
"	Wed, 19 Sep	PS-2 Due, PS-3 Out	"	10: Diffusion and Transport
"	Fri, 21 Sep		"	11: Measuring Diffusion
5	Mon, 24 Sep		Chap 5	12: Reynolds and Flow 1
"	Wed, 26 Sep	PS-3 Due, Practice Exam out	"	13: Reynolds and Flow 2
"	Fri, 28 Sep	<i>no class: jwp at conference</i>		<i>No class</i>
6	Mon, 1 Oct	"		<i>No class</i>
"	Wed, 3 Oct	"		<i>No class</i>
"	Fri, 5 Oct	Q & A		<b>Review for Exam 1</b>
7	Mon, 8 Oct	<b>EXAM 1</b>		<b>Exam1 in-class (50 minutes)</b>
"	Wed, 10 Oct	PS-4 handed out	Chap 6	14: 1 <sup>st</sup> and 2 <sup>nd</sup> Laws of Thermo
"	Fri, 12 Oct		"	15: Entropy and Disorder
8	Mon, 15 Oct			
"	Wed, 17 Oct	PS-4 due, PS-5 out		16: Entropy and Disorder
"	Fri, 19 Oct		my notes	17: Special Topix
9	Mon, 22 Oct	fall break		fall break
"	Wed, 24 Oct			"
"	Fri, 26 Oct			"
10	Mon, 29 Oct		Chap 7	18: Entropic Forces
"	Wed, 31 Oct	PS-5 due, PS-6 handed out; Halloween	"	19: Entropic Forces
"	Fri, 2 Nov		"	20: Entropic Forces
11	Mon, 5 Nov		"	21: Entropic Forces
"	Wed, 7 Nov	PS-6 due, PS-7 handed out	Chap 8	22: Chemical Equil
"	Fri, 9 Nov		"	23: Chemical Equil
12	Mon, 12 Nov		"	24: Chemical Equil
"	Wed, 14 Nov	PS-7 due, Practice Exam out	"	25: Chemical Equil
"	Fri, 16 Nov	Q & A	"	<b>Review for Exam 2</b>
13	Mon, 19 Nov	<b>EXAM 2</b>		<b>Exam 2 in class 50 minutes</b>

	Nov			
"	Wed, 21 Nov		my notes	Special Topix
"	Fri, 23 Nov			<b>T-giving</b>
14	Mon, 26 Nov		10	26: Molecular Machines
"	Wed, 28 Nov	PS 8 and extra-credit PS out	"	27: Molecular Machines
"	Fri, 30 Nov		"	28: Molecular Machines
15	Mon, 3 Dec		"	29: Molecular Machines
"	Wed, 5 Dec	PS 8 and extra-credit due	my notes	30: Special Topix
"	Fri, 7 Dec		my notes	31: Special Topix
16	Mon, 10 Dec	<i>LAST LECTURE</i> , PS8 due	my notes	<b>Review for Final</b>
"	Wed, 12 Dec			
		<b>FINALS</b>		