

Biophysical Chemistry  
Chem 440  
Fall 2009

"The value of an education in a liberal arts college is not the learning of many facts, but the training of the mind to think something that cannot be learned from textbooks."

- Albert Einstein

Class meets MWF 1:40 – 2:40 PM in JSC 374  
Final Exam: 8:30-11:30, Friday, December 18, 2009

Professor: Sharon Crary  
Office: Julian Science Center Room 328  
Website: available through the chem dept website

**Office hours:**

Please contact me by email to set up an office appointment.

**Text:**

The main text for this class is Thermodynamics and Kinetics for the Biological Sciences, by Gordon Hammes. It will be supplemented with readings from Structure and Mechanism in Protein Science: A Guide to Enzyme catalysis and protein folding by Alan Fersht (provided as handouts for which you will be charged any relevant copyright permissions). Perhaps the most critical component of this course will be the additional readings of primary literature, all of which are available free of charge to you, online.

**The Key Concept of this Course:**

This course is concerned with developing your ability to engage in biophysical thinking.

Our course material will focus on practical thermodynamics and kinetics as they are employed in biochemistry. Because biophysical chemistry is such a large, encompassing field it would be impossible, but more importantly, not valuable to cover all aspects of biophysics. It is infinitely more important to understand how to think critically about biophysical studies and to have the confidence to tackle thinking about such studies.

There are two methods we often employ to learn things. In one, we start with details and move towards the big picture. An example of this might be the way we learn to read. We learned the letters of the alphabet first, and later conquered the complete works of Dostoevsky. In another method, we start with the big picture and later learn to fill in the details. Learning our first spoken language is something like this. Before we have mastered much else in life, and certainly before we understand the significance of letters and words, we learn to communicate verbally. In this course, we will use both of these tactics. Sometimes we will be concerned with learning the details of a subject so that later you can understand the big picture. At other times we will dive into the big picture, in which case you may feel that you have not yet mastered all of the relevant terminology. In either case you should focus on using good scientific critical thinking skills.

Throughout this course, you should be developing your ability to analyze and to convey scientific material in a logical, precise manner. In all things pertaining to this course, you should focus on precision, clarity, logic, and analytical thought. You may find that it will be easiest to master these concepts first in your writing. When writing, do not leave your work open to multiple interpretations; do not display vague thinking; do not make statements that are not based on scientific reasoning. Make clear the logical progression of your ideas with the proper use of biophysical vocabulary and examples. As you are mastering the clarity and logic of scientific thought in your writing, you should try to bring the same thoughtfulness to your scientific listening and speaking. When a classmate is talking, you should practice keeping track of the logical progression of stated ideas and practice formulating reasonable questions and responses to these ideas.

Reading and analyzing primary literature will constitute a major component of this course.

**Grading:**

*Your understanding of the material covered in this class will be evaluated through exams, homework, and class participation.*

Exams (70%) – Each of two 50 minute exams will be worth 18% of your final grade. The final exam will be worth 34%. This exam will be cumulative.

Homework (25%) – Homework will take many forms, including problem sets, essays, and other evidence of critical reading of primary literature. These assignments will be given throughout the semester to help you to focus your studying on the material we are covering. While I encourage you to form study groups to work on these assignments, make sure you write up your final answers independently when I have assigned individual work. All of your calculations, words, and phrasings must be your own. One way to ensure this is to work through difficult questions together and then to write your answers when you are alone starting with a blank sheet of paper.

Active, Skilled Participation (5%) – It is essential that you come to each class period completely prepared, having read and studied the assigned readings for that day. I will guide you through thinking about the information from the readings, but you will be responsible for knowing the basic terminology and being generally aware of the material we are covering. When participating in class, aim at using scientific, logical language as is discussed above.

### **The Quantitative Reasoning Center**

The Q-center is a valuable resource for *any* chemistry course at DePauw. Professor Martoglio, who is the head of the Q-center, is also a chemistry professor and therefore truly understands the needs of students in our department. The Q-center is located in Room 115, Asbury. You can link to the tutoring schedule from the web site (<http://www.depauw.edu/admin/arc/Q-center/qconsult.asp>) and schedule appointments at x4039. You can also drop by the Q-center for assistance without an appointment.

### **Important class policies:**

1. All three exams are mandatory.
2. Grades on a borderline may be moved up or down by a maximum of 1 point to account for intangible factors. Intangible factors that may affect your grade include, but are not limited to: a particularly strong or weak final exam, a steady improvement or decline in performance during the term or a particularly strong or weak contribution to the class. Such adjustments are not common.
3. Questions about grading must be held until one day after you have received graded material back from me. In addition, such questions must be posed to me within one week of receipt of the graded material. After this time, I will not be able to review graded material; as more time passes it becomes too difficult to remain maintain equality of grading between papers.

### **Academic integrity is the single most important point to me in any course.**

Scientific progress occurs only when ideas, experiments, and results are shared among the scientific community. This process depends absolutely on honesty and trust among scientists. We should be modeling such scientific and academic integrity whenever we are engaged in scientific pursuits.

Furthermore, academic dishonesty serves no educational purpose and is damaging to the entire class and to me. Please be sure you are familiar with the university's academic integrity policy as stated in your current *DePauw University Student Handbook*. If you choose not to talk to me about an ethical issue about which you have misgivings, I suggest that you err on the side of caution. There is really no such thing as being too honest when it comes to academics.