Chemistry 391 - Fall 2006 Arthur Glasfeld
http://academic.reed.edu/chemistry/courses/chem391 C410, ext 7679

Office Hours: Mon: 2-3, Wednesday 2-4

Overview

This course has two purposes: (1) To develop a structural and thermodynamic understanding of biochemical interactions and catalysis, and (2) to provide the tools to independently investigate and understand the structural basis of biochemical function. The first quarter will focus on the fundamentals of biochemical structure and properties, with attention to equilibrium phenomena. The 2nd quarter will center on catalytic function.

Reading

The textbook for this class is *Biochemistry* (3rd Edition) by Voet & Voet. This is an excellent text and should be a useful reference throughout the semester. Note that I don't intend you to read this book cover to cover. The text supports the lecture material, and should be used to help you understand what takes place in lecture. Although I will typically assign full chapters, I expect you to be selective in identifying those sections of the text that are pertinent to what has happened in lecture.

Other resources will be made available on reserve in the library and on-line. As a secondary resource, Metzler's 2 volume *Biochemistry* (available on reserve) is a particular favorite. I strongly recommend that you use at least one additional reading source per week to help expand your view of the field.

Required Work and Evaluation

There will be one quiz, two midterm exams (in the 6th and 11th weeks of class) and a final exam. In addition, there will be weekly written assignments that will frequently include computer modeling exercises. Collaboration is encouraged in all work, *except for the exams*, but you should always take care that the understanding you present in your work is your own.

Order of Topics

Intermolecular Forces & Lipids
The subunits of life, central dogma and primary structure
Physical methods in structural biochemistry- CD, NMR, Xtallography
Nucleic acids, chemistry and conformation
Tertiary, quaternary structure in proteins, protein folding
Membranes and membrane proteins
Molecular recognition
Enzyme kinetics and catalysis
Examples of enzyme classes
RNA-mediated catalysis
Specificity in protein synthesis

Library Resources

While the textbook is an excellent place to learn about any topic, it is limited in trying to present everything in biochemistry in a limited space. My recommendation is to look beyond the textbook on a weekly basis and search for alternative and more specialized sources of information. Some books on reserve in the library that I am particularly fond of:

T. E. Creighton, *Proteins* 2nd Ed.
Branden and Tooze, *Introduction to Protein Structure*, 2nd Ed.
W. Saenger, *Principles of Nucleic Acid Structure*
A. Fersht, *Structure and Mechanism in Protein Science*
S. Lippard and J. Berg, *Principles of Bioinorganic Chemistry*

Also, this course makes extensive use of the journal literature, and I recommend that, once a week, you hunt down a literature reference, or simply pull an issue of one of the following journals off the shelf and read an interesting review or research article:

My favorite sources of review articles:

Annual Reviews in Biochemistry
Annual Reviews in Biophysics and Biomolecular Structure
Current Opinion in Structural Biology
Trends in the Biochemical Sciences

The two big journals that you should get used to checking up on each week (both reviews and research articles), and even get a cut-rate subscription to:

Nature
Science

The more specialized journals, several of which run review articles to accompany research articles:

Biochemistry
Cell
EMBO Journal
The Journal of the American Chemical Society (JACS)
The Journal of Biological Chemistry (JBC)
The Journal of Molecular Biology (JMB)
Nature Structural and Molecular Biology (NSMB)
Proceedings of the National Academy of Sciences USA (PNAS)
Structure