Chemistry 391 - Fall 2016 Arthur Glasfeld
http://people.reed.edu/~glasfeld/Chem391 C410, ext 7679

Office Hours: MTuW 2-3

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 catalysis and kinetics.

Readings

The principle textual sources for this course are my lecture notes, which I will post on the course web site in advance of the lecture in question. Secondarily, I will point you to review articles and research publications relevant to the lecture. I strongly recommend that you use at least one external reading source per week to help expand your view of the field.

There is no required textbook for this class, but I was really tempted to use "The Molecules of Life" by Kuriyan and co-authors. It is on 3-hr reserve in the library. Two other textbooks of note: Biochemistry by Voet & Voet is my favorite general text covering structural material. Kelly will use Lehninger's biochemistry text in Chem 392. Both are on reserve. There are many other general biochemistry texts in the library available for loan and inexpensively offered online, second hand. Find one you like and use it as often as needed.

Required Work and Evaluation

There will be one quiz, one midterm (in the seventh week), a final paper 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 quizzes and exams*, but you should always take care that the understanding you present in your work is your own.

Order of Topics

Covalent structure and information flow in biology
Intermolecular forces
Primary and secondary structure of proteins
Physical methods in structural biochemistry
Tertiary, quaternary structure in proteins, protein folding
Nucleic acids, chemistry and conformation
Molecular recognition & glycoconjugates
Membrane proteins: receptors and transport
Enzyme kinetics and catalysis
Examples of enzyme classes
Redox catalysis
Specificity in catalysis; replication, translation

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 that I am particularly fond of:

T. E. Creighton, *Proteins* 2nd Ed.
Branden and Tooze, *Introduction to Protein Structure*, 2nd Ed.
Petsko and Ringe, *Protein Structure and Function*
Kuriyan et al., *The Molecules of Life*
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):

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