Chemistry 391 - Fall 2015 Arthur Glasfeld
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Office Hours: Mon/Wed 2-3:30, or whenever the door is open

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.

Reading

The web page for this course is where you can find lecture notes for the course, and 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. In the recent past, I have used three textbooks with this course: Biochemistry by Voet & Voet, Fundamentals of Biochemistry by Voet & Voet & Pratt and Biochemistry by Garrett & Grisham. My preference has been V&V for 391, but G&G is my preference in Chem 392. Choose one if you like, or any other large biochemistry text, but note that they are valuable as reference tools, not as materials that define the syllabus. Several textbooks are on 2 hr reserve in the library. Many more are available for check out.

Required Work and Evaluation

There will be two quizzes, one midterm (in the seventh week) 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

Intermolecular forces
Lipids, micelles and vesicles
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