CHEM C130/MCB C100A - BIOPHYSICAL CHEMISTRY: PHYSICAL PRINCIPLES AND THE MOLECULES OF LIFE (4 UNITS)

COURSE OVERVIEW

SUMMARY

(From the syllabus) “Thermodynamic and kinetic concepts applied to understanding the chemistry and structure of biomolecules (proteins, DNA, and RNA). Molecular distributions, reaction kinetics, enzyme kinetics. Bioenergetics, energy transduction, and motor proteins. Electrochemical potential, membranes, and ion channels.”

PREREQUISITES

Official Prereqs

Additional Notes

TOPICS COVERED

- Introduction to biophysical chemistry, protein and DNA structure, and intermolecular forces.
- Intermolecular forces. Protein primary and secondary structure.
- Protein primary and secondary structure.
- Protein tertiary structure.
- Membrane proteins, evolutionary variation.
- Protein structure/function relationships.

- Nucleic acids.
- Cryo-electron microscopy
- Heat capacity and Boltzmann distribution
- Intermolecular energy and forces
- Thermodynamics and entropy
- Energy multiplicity; Boltzmann distribution
- The Boltzmann Game
- Helmholtz Free Energy
- Gibbs Free Energy
- Standard Free Energy Changes
- Free Energy and Work
- Chemical Potential
- Equilibrium constants
- Acid-Base Equilibrium
- Binding equilibrium
- Molecular recognition; Free energy of binding
- Chemical Kinetics
- Arrhenius and Transition State Theory
- Catalysis, Enzymes, Michaelis-Menton Kinetics
- Competitive Inhibitors
- Non-competitive inhibitors

WORKLOAD

COURSEWORK

- ~ 10 problem sets
- ~ 6 quizzes during discussion sessions
- 3 midterms
- 1 final

TIME COMMITMENT

3 hours of lecture and 1 hour of discussion per week. Be prepared to spend your time on readings and problem sets.

CHOOSING THE COURSE

WHEN TO TAKE

This class is offered every semester but with different instructors.

This course fulfills the Chem/ChemBio allied subject, and the ChemE scienc elective.

WHAT NEXT?

- CHEM 130B - Biophysical Chemistry (chem130b.html)

ADDITIONAL COMMENTS AND TIPS

I found the first 1/3 of Chem C130 a continuation of Chem 4B ChemBio part and a good introduction for Chem 135 and Chem 120B as a whole.

I found reading the textbook could become handy

There was a tutor team designated for this course but there are resources at CAEE

We could drop one out of the three midterms and the second one was the evening on the Friday before the spring break weekend (plan travel accordingly) and the third one was the evening on the Friday before dead week.

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advising