

# Biochemistry

## Concepts students need to know for lecture

Understand and discuss acid-base reactions  
Understand and discuss redox reactions  
Understand kinetic theory of reactions  
Understand principles of reaction equilibria  
Carry out equilibria calculations  
Understand entropy, enthalpy, free energy  
Calculate free energy  
Classify organic functional groups  
Describe stereochemical structure of substances  
Understand and apply reaction mechanisms  
Give theoretical explanations for reactions results  
Understand basic cellular structure

## Concepts students need to know for laboratory

Measure mass, volume, and temperature  
Measure pH  
Know basics of chromatographic techniques  
Quantitatively transfer materials  
Acquire uv-visible absorption spectra  
Use safe laboratory techniques  
Properly dispose of laboratory wastes  
Use word processing software  
Use spreadsheet software  
Use graphing software  
Write formal lab reports

## Lecture Objectives

Apply pH theories to concepts of biochemical buffers  
Learn detailed aspects of protein structure  
Learn protein chemistry  
Study strategies of protein purification  
Relate structure to function of proteins  
Learn chemical characteristics of lipids and carbohydrates

Apply theories of thermodynamics to enzyme reactions  
Apply theories of kinetics to enzyme reactions  
Learn enzyme mechanism strategies  
Learn to interpret biochemical experimental results  
Learn to search the internet for biochemical information  
Learn how to approach reading scientific journal articles  
Write a paper on a chosen enzyme, integrating class theories into the paper  
Use thermodynamics, kinetics, and mechanisms to learn key metabolic pathways

## **Laboratory Objectives**

Learn to make hypotheses and design experiments to test those hypotheses  
Apply pH principles to make buffers  
Learn and apply dilution principles for making solutions  
Learn to transfer accurately micro-volumes of solutions  
Learn and apply principles of Beer's Law  
Learn to critically keep a laboratory notebook  
Apply strategies of purification to purify an enzyme  
Learn biochemical techniques to determine the size of a protein  
Learn to conduct enzyme assays  
Prepare poster for presentation of experimental results