CHEMISTRY 6571
ADVANCED ENZYMOLOGY AND METABOLISM
Spring 2011 (Room: MSE-1222)
Professor Sheldon W. May (IBB 3307)

Important: Students are expected to have taken previous courses dealing with basic biochemical topics, and to have had some exposure to the major metabolic pathways.

Textbooks: You will need access (but probably not have to buy) to the following two books:

- Fersht, Structure and Mechanism in Protein Science, W.H. Freeman (1999)
- Access to Voet & Voet, Biochemistry (4th edition is current; 3rd edition is OK) **or** to Voet & Voet, Fundamentals of Biochemistry, 3rd Edition

Note: The above books are on Reserve at the Library

- You will be expected to make use of the literature, including SciFinder Scholar and other databases.

GENERAL INFORMATION

This course will have many elements of a "tutorial", and it will be a different experience than the "Lectures/Examinations" format typical of most other courses. **Attendance at every class is mandatory**. Your classroom participation will count substantially toward your grade.

There will be written and oral assignments & discussions. There will be two Exams plus an Assigned Oral Presentation and Written Report in lieu of the Final Exam.

There will be three extended class sessions for oral presentations; these are **tentatively** scheduled for **April 7, 12 and 14**.

TOPICS

1. Metabolic Pathways, Mechanisms & Case Studies (some overlap with #2 below)

Glycolysis, Gluconeogenesis, Glycogen metabolism
Citric Acid Cycle & Glyoxylate Pathway
Pentose phosphate pathway
Metabolism of Fatty Acids, Lipids and Cholesterol
Metabolism of Amino Acids & the urea cycle
Metabolism of Nucleotides (including Ribonucleotide reductase; Thymidylate synthase & Dihydrofolate reductase; Purine and Pyrimidine pathways; Adenosine deaminase, Uric acid & Gout, and related topics)

2. Kinetic Analysis of Enzymatic Pathways (Fersht Chapters 1 through 7)

Steady state patterns; King and Altman algorithm
Cleland nomenclature and groupings
Partition Analysis and net rate constants
"Apparent" vs "true" kinetic parameters
Complex mechanisms; Prediction of kinetic patterns by inspection
Selected case studies and applications

3. Enzyme-Substrate vs Enzyme-Transition State Complimentarity

In class presentations and discussions on Fersht Chapter 12 and related literature.

4. Stereochemistry of Enzymatic Reactions

In class presentations and discussions on Fersht Chapter 8 and related literature.

5. Enzyme Reaction Intermediates and Mechanistic Enzymology

In class presentations and discussions on material from Fersht Chapters 13, 15, 16 and 9, and related literature.