

CHEMISTRY 6571  
ADVANCED ENZYMOLOGY AND METABOLISM  
Spring

**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.