

ENZYME REACTION MECHANISMS
Chemistry 572/MCB 553

Spring 2018

169 Davenport Hall
Tu, Th 2:00 - 3:20 pm

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On reserve in the Chemistry Library:
Enzymatic Reactions Mechanisms
Perry A. Frey and Adrian D. Hegeman, Oxford University Press, 2007
ISBN: 0195122585

Enzyme Kinetics and Mechanism
Paul F. Cook and W. W. Cleland, Garland Science, 2007

Lectures will be presented from PowerPoint/overheads that will be available for download at <https://compass2g.illinois.edu/>. Please print these and bring to class.

Lists of literature references will be distributed at the lectures. PDF files of selected articles also can be accessed at <https://compass2g.illinois.edu/>

Protein structure coordinates can be downloaded from the Protein Data Bank (PDB): <http://www.pdb.org/pdb/home/home.do>.

Protein structures can be visualized using Chimera (<http://www.cgl.ucsf.edu/chimera/>) that can be downloaded from <http://www.cgl.ucsf.edu/chimera/download.html>.

Sequence similarity networks (SSNs) and genome neighborhood networks (GNNs) can be generated using the EFI-EST and EFI-GNT web tools, respectively:

EFI-EST: <http://efi.igb.illinois.edu/efi-est/index.php>

EFI-GNT: <http://efi.igb.illinois.edu/efi-gnt/>

SSNs and GNNs are visualized using Cytoscape that can be downloaded from <http://www.cytoscape.org/download.php>

Exams: March 15 covers January 19 through March 1
 May 1 covers March 6 through April 26

Problem Sets: 4 take home problem sets that will be graded.

Grades: Exam 1 (30%), Exam 2 (30%), Problem Sets (40%)

Four credit option: Above, plus 10 page paper describing “new” experiments on an enzyme selected from a list to be provided before Spring Break or an individual project using SSNs and GNNs

Tentative Schedule of Lectures

January 16, 18, 23, January 25, 30	Introduction, Chimera, Sequence Similarity Networks Kinetics, Isotope Effects, Reaction Coordinates Triose Phosphate Isomerase, Pro Racemase
February 1	NO CLASS
February 6, 8, 13, 15	Rate Enhancements Ketosteroid Isomerase, PNPs, OMP Decarboxylase
February 20, 22	Carbon Acids, Enzyme Superfamilies Mandelate Racemase, Enolase Superfamily
February 27, March 1	Proteases
March 6, 8, 13	Phosphoryl Transfer
March 15	HOUR EXAM (30% of grade)
March 20, 22	SPRING BREAK
March 27, 29	Acetoacetate Decarboxylase , C-C Bond Formation (Aldolase, Claisen Condensation, and Prenyl Transfer)
April 3, 5	NAD ⁺ /NADP ⁺
April 10, 12	Flavins
April 17, 19	PLP γ -Aminobutyrate Transaminase
April 24, 26	Thiamin, Biotin
May 1	HOUR EXAM (30% of grade)