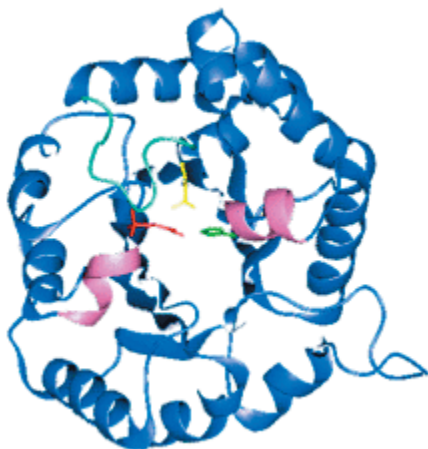


Chemistry 557

Bioorganic Phenomena



Mon/Wed 2:30–3:45
329 Chemistry Bldg

Prof. Eugene Mueller
346 BRB
852-5811

eugene.mueller@louisville.edu
office hours: Th 5:30-6:30p
or by appointment

Syllabus

Textbooks & Teaching Aids

Enzymatic Reaction Mechanisms
Perry A. Frey & Adrian D. Hegeman
Oxford University Press 2007
ISBN 978-0-19-512258-9

Blackboard and the Chem 557 website will have required material.

<http://blackboard.louisville.edu>

<http://louisville.edu/~egmuel01/pages/chem557/chem557.html>

You may also be required to download journal articles from the library website.

Prerequisites

One year of organic chemistry. A course in introductory biochemistry is recommended.

Assigned Reading

Reading will be assigned in advance of the lectures covering the topic. Material in the reading that was not explicitly covered in lecture may appear on the exams. You will be required to discuss the reading in class, so *come prepared*.

E-mail

By far the best way to contact me is by e-mail (eugene.mueller@louisville.edu). Please feel free to bombard me with questions electronically. I shall make extensive use of e-mail to contact you on non-class days with corrections to typographical errors, clarifications, *etc.* concerning lecture/discussions and problem sets. For example, I will forward questions to the whole class (with the name of the questioner deleted) if I think that others will find the questions and my responses useful.

If you regularly use an e-mail address other than your U of L address, send me an e-mail with your full name (*i.e.*, not just a nickname) somewhere in the message, and I will add your preferred address to the class e-mail list.

Assigned Problems

Problem sets will be assigned in the earlier weeks of the class. Your answers to those problems will be collected at the start of class the following Monday and perused to ensure that a good effort was put into working the problems. Failure to turn in answers or work that indicates insufficient effort will be deemed unacceptable. One unacceptable problem set is allowed without penalty; each subsequent unacceptable (or missed) problem set will result in a deduction of five points.

Problem sets and answer keys will be distributed through the Chem 557 web page (follow the **problems** link). The answer keys will be available Monday evening or early Tuesday, so *no late homework will be accepted*.

Goals and Grading

Three goals will dominate this class. First, you will attain a grasp of the concepts and practices involved in the investigation of how enzymes achieve their stunning acceleration of reaction rates. Second, you will learn to evaluate scientific papers with requisite severity. Third, you will practice "on your feet" formulation, presentation, and defense of ideas.

Midterm and final exams will measure your attainment of the first goal and, to some extent, the second goal. The problem sets and past exams will allow you to judge your understanding before the exams.

Class participation will measure all three goals. At any time, I may question you or ask you to respond to a classmate's question. You are *not* expected to answer correctly *all* of the time. However, you should be prepared to reason aloud or ask more questions that allow you to begin the formulation of an answer to the original question. Of course, being wrong or unable to answer consistently will hurt your grade.

During the first weeks, the lecture format will allow less participation than the latter part of the class, which will consist of roundtable discussion of papers from the literature. Once the switch is made, you will be expected to scrutinize the assigned

papers, *especially the experimental and results sections*. You will be expected to note weaknesses and strengths, to formulate the significance of the work, and to propose experiments that logically follow. The class will consist of discussion of the papers, and everyone will be called upon at least three times each class. You will be free to volunteer at any time (in fact, a sound strategy is to volunteer the first few things that you can comfortably answer each class session). Dominating individuals will be politely asked to hush. *You should also be prepared to go to the board to sketch structures, mechanisms, or expected graphical results.*

weight of grading components

midterm exam	100 points
participation	100 points
final exam (comprehensive)	<u>150 points</u>
TOTAL	350 points

Unacceptable problem sets result in deductions of five points each (see above).

Grading will be based on the distribution of scores.

The midterm exam will be on a Wednesday in mid-March (we'll vote in class) at the regular class meeting.

Grades will **not** include +/-.

Graduate and undergraduate students will have the same requirements.

Outline

The following is a rough guide to course content and order.

The Basics	background information
proteins	
amino acids (structures and pK_a values)	
primary, secondary, and tertiary structure	
enzyme nomenclature and basic techniques	
catalysis	Chapter 1
underlying concepts	
mechanisms	
catalytic devices of enzymes	
enzyme kinetics	primer; Chapter 2; Chapter 5
isotopes	
labeling	
kinetic and equilibrium isotope effects	
pH effects	
Classes of Enzyme-Catalyzed Reactions	
proteases	Chapter 6
phosphatases	Chapter 10
kinases	
dehydrogenases	Chapter 16
decarboxylases	Chapter 8
isomerases	Chapter 7
mutases	
transaminases	Chapter 13
dehydratases	Chapter 9
aldolases	Chapter 14
Detailed Examination of Individual Enzymes	
triosephosphate isomerase	literature
mandelate racemase and genomic information	literature
other enzymes [†]	literature

[†]If anyone has a specific request for material to be covered (either because you are planning to work with an enzyme or because an enzyme plays a role in a physical condition of interest to you), let me know in the first few weeks of class.