Introduction to Enzyme Mechanisms
CHM 4308 Spring 2019

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Office hours: Tuesdays 9-10 and Thursdays 2-3 or by appointment (email).

Course Description: This course will survey the chemical mechanism and function of biological catalysis, with a primary focus on enzymes.

Prerequisites: CHM 3218 or BCH4024

Course Requirements:

Exam #1	1/29/18
Exam #2	2/26/18
Exam #3	3/26/18
Exam #4	4/23/18

Out of the three exams, the lowest grade will be dropped and the remainder will each count 30% of the final grade. Since one exam is dropped, there will be no makeup exams. The problem sets will count as 10% of the final grade.

Course objectives: Upon completion of this course, students are expected to understand the following: the chemical mechanisms behind enzyme catalyzed reactions, the experimental methodology used to decipher enzyme chemistry and the mechanisms of action of common pharmaceuticals. This course will also provide an introduction to biological molecules other than proteins that carry out biological catalysis, such as catalytic antibodies and ribozymes.

Recommended reference textbook (not required): Organic Chemistry of Enzyme-Catalyzed Reactions, Richard B. Silverman, revised edition, 2002.
Handouts, journal articles and additional course material will be posted online on Canvas. We will also make extensive use of the primary literature and references will be provided in class and posted on the course website.

Attendance: Successful performance in the course requires regular attendance, though no formal monitoring of attendance will occur. Exams that are missed due to an excused absence can be taken at an arranged time. An absence is considered excused if there is an acceptable reason according to UF policy (http://www.registrar.ufl.edu/catalog/policies/regulationattendance.html). Otherwise, the absence will be considered unexcused and will result no credit.

Academic Honesty: Any act of academic dishonesty will be reported to the Dean of Students, and may result in failure of the assignment in question and/or the course. For University of Florida's honor code, see http://www.dso.ufl.edu/sccr/ honorcodes/honorcode.php.

Accommodations for Students with Disabilities Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Contact the Disability Resources Center (http://www.dso.ufl.edu/drc/) for information about available resources for students with disabilities.

Grading scheme: The exams and problem sets will consist of a series of essay-type questions related to the lecture material and directly relevant to the content of the exams and be graded as percentages. Course grades will be assigned on a curve with the following percentages used for guidance:100-85% A, 84-72% B, 71-60% C, 59-50% D, 50-00% F.

For information on UF's Grading Policy, see:
http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html
http://www.isis.ufl.edu/minusgrades.html

Selection of topics to be covered in the course:

- Introduction to enzyme catalysis
- General themes of how enzymes work
- The perfect enzyme: triosephosphate isomerase
- Catalytic antibodies
- Mechanism of proteases, especially HIV protease
- Design and development of HIV protease inhibitors
- Aminotransferases and other enzymes utilizing small diffusable reactants
- Chemistry of phosphatases/kinases
- Regulation and role in systems biology
- Development of kinase inhibitors and chemical genetics
- Cofactor chemistry: redox chemistry of NADH
- DHQ synthase
- Cofactor chemistry of flavins.
- Radical clocks as mechanistic probes
- Baeyer-Villiger monooxygenase
- Cofactor chemistry: PLP
- Diversity of PLP chemistry
- Cofactor chemistry: thiamin
- Benzoin condensation / Baylis Hillman, pyruvate dehydrogenase
- Cofactor chemistry: methylations
- Metalloenzymes
    - Introduction to heme and nonheme iron/cobalt
    - Cytochrome P450s
    - Vitamin C and non-heme iron enzymes
    - Proline hydrolase and scurvy
- Cobalamin / vitamin B12
- Complex non-heme metalloenzymes
    - Methane monooxygenase, Isopenicillin synthase, ACC oxidase
- Prostaglandins and the enzymology of pain killers
- Biosynthesis and function of alkaloid opiates
- Enzymology of Viagra
    - NO synthase
- Multicomponent, complex metallocluster enzymes.
- Biosynthesis of cofactors/vitamins