9-2014

BCH 582.01: Proteins and Enzymes

Michele A. McGuirl
University of Montana - Missoula, michele.mcguirl@umontana.edu

Biochemistry 582: Proteins and Enzymes Fall 2014
Syllabus

Michele McGuirl CHCB 204 x4404 cell: 546-1456
michele.mcguirl@umontana.edu

Class Hours/Room :
Texts: Creighton, The Biophysical Properties of Nucleic Acids and Proteins (2010), available on amazon.com. The course will also use primary literature. A bookshelf of supplemental reference texts is available in CHCB 203. Some of these are listed below. All may be signed out from Clapp room 203 for overnight use.

Abelson: Biochemical Spectroscopy (Methods in Enzymology)
Albani: Principles and Applications of Fluorescence Spectroscopy
Augen: Bioinformatics in the Post-Genomic Era: Genome, Transcriptome, Proteome, and Information-Based Medicine
Brown: An Introduction to Spectroscopy for Biochemists
Fersht: Structure and Mechanism in Protein Science
Ingle: Spectrochemical Analysis
Larijani: Chemical Biology: Techniques and Applications
Palmer: Understanding Enzymes
Segel: Enzyme Kinetics
Silverman: The Organic Chemistry of Enzyme-Catalyzed Reactions
Van Holde: Principles of Physical Biochemistry

We will use the required text, reserve books and current literature to explore the following topics: Basic Bioinformatics, Protein Structure, Biological Spectroscopy, Enzyme Kinetics and the Biological Applications of Stable Isotopes, Intrinsically Disordered Proteins and Disease

Class time will consist of some traditional lecture teaching and group discussion of current papers. There will be two exams with both in-class questions and take-home sections, and four homework assignments. Each exam is worth 30% and each homework is worth 10%. Students have the opportunity to present a recent (5 years) peer-reviewed journal article and earn 5 additional points that will be added to their lowest exam score.

You will need a free academic PyMol account – see http://www.pymol.org/educational

General Policies
University policies on drops, adds, changes of grade option, or change to audit status will be strictly enforced in this course see http://www.umt.edu/catalog/academics/academic-policy-procedure.php for the policies in the current catalog. Students should specifically note that after the 7th day (9/3/14) and the 15th day (9/15/14), changes require the signature of the instructor and/or advisor. After the 45th day (10/27/14), changes must be requested by petition. Note that not all petitions are approved, and that documented justification is required. Some examples of documented circumstances that may merit approval are: accident or illness, family emergency, or other circumstances beyond the student's control. Instructors and advisors have the right to indicate they do not recommend the drop. However, it is the decision of the Dean of the student's major to approve or deny the request to drop courses.,

• If you are taking the course for a non-traditional grade (credit/no credit), university policy states that a "CR" grade is given in lieu of A through D- grade; an "NCR" grade is given in lieu of an F grade. From the 16th day of classes to the last day prior to finals, changing from traditional grade to credit/no credit, or the reverse, requires the use of an add/drop slip and consent of the instructor, and may not be approved.

The use of any electronic devices (calculators, translators, etc) during class or for exams requires the advanced approval of the instructor. Please note that while Wikipedia is most often a reliable source of information, it is NOT considered an adequate for this course. So while using Wiki for background info is certainly quick and will probably *not* mislead you, please check and read the original references found on the Wiki page before you trust or cite the material.

In working through assignments, students are encouraged to work together to solve problems, to share information or resources, and to test one's understanding of the material. Those are all acceptable forms of collaboration. However, the written work that each student turns in must be his or her own. Only in this way can faculty judge individual understanding of concepts or information. A good rule of thumb for students to follow is to work together up to the point of committing words to paper. At that stage, each student must work independently. A second key guideline is that once a student has written an out-of-class assignment, it must not be shown to another student in the course. Assignments from two or more students that have significant overlap, in the professional judgment of the faculty member, will be regarded as reflecting a violation of the expectation that students turn in independent assignments. **Please note that direct copying of sentences from any published source without proper citation is considered plagiarism.** THIS INCLUDES THE INTERNET. Be sure to put the information in your own words and be aware that the instructor will check literary and internet resources. It is also important not to paraphrase extended sections (a paragraph) of someone else's ideas without proper citation. See http://www.northwestern.edu/uacc/plagiar.html for examples and guidelines and UM's own Academic Conduct Code.

Violations will be dealt with according to the Student Conduct Code. *All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University.*
All students need to be familiar with the Student Conduct Code. The Code is available for review at http://www.umt.edu/vpsa/policies/student_conduct.php

Special accommodations: If you are registered with Disability Student Services and require special accommodations, please contact Dr. McGuirl to make arrangements. If a class occurs on a religious holiday and you wish to reschedule, please contact Dr. McGuirl.

Tentative Schedule

Month	Date	Day	Topic	Reading
August	28	Th	Review of Amino Acids and Protein Structure	-
September	2	Tu	Hydrophobicity	7
	4	Th	Protein sequencing/Mass spectrometry	7
	9	Tu	Primary sequence alignment and evolution	7
	11	Th	Smith-Waterman, Needleman-Wunsch, ClustalW **(HW 1)**	7
	16	Tu	Protein backbone conformation: Ramachandran plot, random coil, chain dynamics	8
	18	Th	Pro isomerization/Secondary structure (**HW 1 due**)	8
	23	Tu	Helix propensity/fibrous proteins (**HW 2**)	8/9
	25	Th	Turns, super-secondary structure motifs	9
	29	Tu	Structural databases/Quaternary structure	9
October	2	Th	Membrane protein structure (**HW 2 due**)	9
	7	Tu	Spectroscopy – absorption and emission	Hammes
	9	Th	**Mid-term exam (Protein structure, properties, and related bioinformatics)**	
	14	Tu	Structure determination X-ray crystallography	Literature
	16	Th	Structure determination X-ray crystallography	Literature
	21	Tu	FRET and distance measurement (**HW 3)**	Hammes
	23	Th	Single molecule fluorescence spectroscopy	Schwille
	28	Tu	Circular dichroism	Hammes
	30	Th	CD applications (**HW 3 due**)	Hammes
November	4	Tu	**No Class, Election Day**	
	6	Th	Michaelis-Menten kinetics	14
	11	Tu	**No class, Veterans' day**	
	13	Th	Multi-substrate enzymes (**HW 4**)	14
	18	Tu	Enzyme inhibition	14
	20	Th	Substrate/Product inhibition	14
	25	Tu	Enzyme mechanisms (**HW 4 due**)	14
	27	Th	**Thanksgiving Holiday, no class**	
December	2	Tu	Intrinsically disordered proteins	Literature
	4	Th	Intrinsically disordered proteins	Literature
	9	Tu	**Final exam (Spectroscopy, enzymology, intrinsically disordered proteins)**	