CHEM 3831: Advanced Protein Biochemistry

FALL 2013

Instructor: Dr. Martin Margittai
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Class hours: MWF 11:00 AM – 11:50 AM, Olin Hall 103

Office hours: Tuesdays 11:00 AM –11:50 AM, or by appointment

Course description:
This advanced biochemistry course provides fundamental insights into the chemistry and physics of proteins. It will investigate how amino acids form proteins with highly complex three dimensional structures and how these stuctures mediate function. Topics will range from protein folding to enzyme kinetics and will emphasize basic principles. We will examine key research articles and their contribution to our current understanding of proteins. The course bridges the gap between the research literature and introductory Protein-Biochemistry. Students will learn how to extract important information out of primary research articles and how to place this information into the larger context of protein science.

Grading: Exams 1-3 (20% each), group assignment (20%), presentation (20%).

Exams: There are two 1-hour midterm exams during the quarter, plus a 2-hour cumulative final exam. Each exam is worth 100 points. Exam questions will be non-multiple choice.

Group assignment: Students in groups of 2 will write a 1 page critique on a primary research paper. The paper will be posted on Blackboard in the second week of the quarter. The critique is due October 21, 2013. Only one submission is permitted. This assignment is worth 100 points.

Presentation: Students in groups of 2 will present a primary research paper. These papers and additional information on presentation time and grading will be provided during the quarter. Presentations are worth 100 points.

Suggested readings:
Lehninger Principles of Biochemistry (6^{th} edition) by Nelson and Cox
Primary research articles and classic review articles will be posted on Blackboard and complement the main text.

Dates	Topics Covered	Reading Chapters
09/09/13	Water: Weak Interactions and Solvation	2
09/12/13	Water: Weak Acids and Bases	2
09/13/13	Water: Buffers and Hydrolysis	2
09/16/13	Amino Acids	3
09/18/13	Protein Primary Structure	3
09/20/13	Protein Purification	3
09/23/13	Protein Sequencing and Synthesis	3
09/25/13	Sequence Analysis	3
09/27/13	Overview of Protein Structure	4
09/30/13	Secondary Structure	4
10/02/13	Tertiary Structure	4
10/04/13	Tertiary Structure/ Quaternary Structure	4
10/07/13	**Exam 1**	
10/09/13	Protein Denaturation and Folding	4
10/11/13	Assisted Protein Folding	4
10/14/13	Assisted Protein Folding and Degradation	4
10/16/13	Protein Dynamics, Misfolding and Disease	4
10/18/13	**No Class (makeup on 11/15)**	
10/21/13	Protein Function: Myoglobin	5
10/23/13	Protein Function: Hemoglobin	5
10/25/13	Protein Function: Immune System/Actin, Myosin	5
10/28/13	How Enzymes Work	6
10/30/13	Enzyme Kinetics 1	6
11/01/13	Enzyme Kinetics 2	6
11/04/13	**Exam 2**	
11/06/13	Enzymatic Reactions 1	6
11/08/13	Enzymatic Reactions 2	6
11/11/13	Regulatory Enzymes	6
11/13/13	Presentations	
11/15/13	Presentations, 10:00 am – 12:50 pm	
11/20/13	**Final Exam** (comprehensive), 10:00 am – 11:50 am, Olin 103	