CHEM 3831: Advanced Protein Biochemistry

FALL 2021

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

Office hours: Tuesdays 3:00 PM – 4:00 PM on zoom, 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.

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.

Paper Critique: Students will write a 1-page critique (Font: Arial, Size: 11, Margin: 1 inch) of a primary research paper. A link to the paper will be posted on Canvas. The critique should be submitted electronically to above email address and is due November 12 at 11:59 PM. Only one submission is permitted. This assignment is worth 50 points.

Group Assignments: There will be two in-class group assignments. These activities are worth 25 points each.

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.

Grading:	exams 1-3	300 points
	presentation	100 points
	group assignments	50 points
	paper critique	50 points

Suggested readings:
Lehninger Principles of Biochemistry (8th edition) by Nelson and Cox
Links to primary research papers and classic review articles will be posted on Canvas and complement the main text.

COVID-RELATED POLICIES

Class Attendance: It is the expectation that you attend class in person as required unless you have made alternative arrangements with me prior to the start of class due to illness, medical reasons, or the need to isolate or quarantine due to COVID-19. As in any in-person course, attendance and participation are crucial for a complete understanding of course material. In choosing to attend the University of Denver, you've chosen to join a larger Community of Care, which means you've chosen specific responsibilities—including in this class. By enrolling in the University of Denver and in this course, you have agreed:

- Not to attend class when you're sick.
- Not to attend class when you've been exposed to people who have or may have COVID-19.
- To follow the university's masking policy.

When the University places you in isolation or quarantine, you will receive documentation within your MyHealth record to provide to instructors regarding the duration of your quarantine or isolation and when and under what conditions you may return to in-person activities. It is your responsibility to provide this documentation to me. If you receive a positive COVID-19 test off-campus or are notified by a public health authority about the need to quarantine, you must provide this notification at reportCOVID@du.edu or by calling 303-871-COVD. The University will then place you in isolation and quarantine pursuant to University protocols.

Accessing Course Materials and Contingency Plans: This course has been designed to transition to entirely online, should the need arise due to tightening local, state, or federal guidelines or campus closure. To that end, Canvas will be utilized to support this course. It is recommended that you familiarize yourself with the Canvas container for this course as soon as the term begins. If you are self-quarantining/isolating, you can access all in-person materials on Canvas.

General Masking: University of Denver continues to use an alert level system from clear (low risk, high vaccination) to purple (severe risk). See here for details. At certain levels, mask requirements vary depending on your vaccination status.
As we begin the fall term with level green, the following guidelines are in place based on vaccination status.

Unvaccinated Individuals
In level green, people without verified full vaccination must wear face coverings at all times except in private offices or residential rooms or while actively eating or drinking.

Vaccinated Individuals
Face coverings also are required for fully vaccinated individuals indoors for all classes and all in-person meetings/events with 5 or more people, except while actively speaking/performing at six feet or more distance from others or while actively eating or drinking.

Should the university transition to level "clear", campus policy states, "all DU personnel and students without verified full vaccination records must wear face coverings/masks at all times while indoors. Anyone may choose to wear a face-covering/mask at any time for any reason. While individuals with specific health risks or vulnerabilities may ask coworkers or classmates to wear a mask, because the University policy does not require individuals who are fully vaccinated to wear face coverings/masks, this cannot be required."

No Eating in Class: To assist in COVID mitigation, students are not permitted to eat during classes, except where a student has an approved accommodation through the Disability Support Program (DSP). Please plan accordingly.

Dates	Topics Covered	Reading Chapters
09/13/21	Water: Weak Interactions and Solvation	2
09/15/21	Water: Weak Acids and Bases/Buffers and Hydrolysis	2
09/17/21	Amino Acids	3
09/20/21	Protein Primary Structure	3
09/22/21	Protein Purification	3
09/24/21	Protein Sequencing and Synthesis	3
09/27/21	Secondary Structure	4
09/29/21	Tertiary Structure/Fibrous Proteins	4
10/01/21	Tertiary Structure/Soluble Proteins	4
10/04/21	**Exam 1**	
10/06/21	Quaternary Structure	4
10/08/21	Protein Denaturation and Folding	4
10/11/21	Assisted Protein Folding	4
10/13/21	Protein Dynamics and Degradation	4
10/15/21	Protein Misfolding and Disease	4
10/18/21	Intrinsically Disordered Proteins and Phase Separation 1	
10/20/21	Intrinsically Disordered Proteins and Phase Separation 2	
10/22/21	Protein Function: Myoglobin	5
10/25/21	Protein Function: Hemoglobin 1	5
10/27/21	Protein Function: Hemoglobin 2	5
10/29/21	How Enzymes Work, Asynchronous Zoom	6
10/01/21	**Exam 2**	
10/03/21	Enzyme Kinetics 1	6
11/05/21	Enzyme Kinetics 2	6
11/08/21	Enzyme Kinetics 3	6
11/10/21	Enzymatic Reactions 1	6
11/12/21	Enzymatic Reactions 2 **(Paper Critique Due)**	6
11/15/21	Discussion of critiqued paper	
11/17/21	Presentations	
11/19/21	Presentations	
11/22/21	**Final Exam** (comprehensive), 10:00 am – 11:50 am, Olin 103	