



Chemistry 4/6/8510 Biophysical Chemistry Spring 2021

The University of Toledo
College of Natural Sciences and Mathematics
Department of Chemistry & Biochemistry
Chem 4510-001, 6510, 8510

Instructor: Prof. Tim Mueser
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Office Hours: M, W 10:00 am – 11:30 am
Office Location: WO 4211
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Term: Spring 2021
Class Location: REMOTE during COVID-19
Class Day/Time: T & Th 2:30 pm - 4:20 pm
Credit Hours: 4

SPECIAL COURSE EXPECTATIONS DURING COVID-19

ATTENDANCE The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Students must perform a daily health assessment, based on based on [CDC guidelines](#), before coming to campus each day, which includes taking their temperature. Students who are symptomatic/sick should not come to class, and should contact the Main Campus Health Center at 419-530-3451. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences. Students should notify their instructors, and these absences may not require written documentation.

FACE COVERINGS All students must wear face coverings while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. NO students will be permitted in class without a face covering. If you have a medical reason that prevents you from wearing a face covering due to a health condition deemed high-risk for COVID-19 by the Centers for Disease Control and Prevention (CDC), you should submit a request for an accommodation through the Student Disability Services Office (SDS) by completing the [online application](#). Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. If a student is already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, s/he should contact their accessibility specialist to discuss their specific needs.

SOCIAL DISTANCING Students should practice social distancing inside and outside the classroom; please follow signage and pay attention to the seating arrangements. Do not remove stickers or tape from seats and/or tables, this is there to provide guidance on the appropriate classroom capacity based on the recommended 6 feet of social distancing between individuals. Please be conscious of your personal space and respectful of others. Also, be cognizant of how you enter and exit the room; always try to maintain at least 6 feet of distance between yourself and others.

DESKS AND WORK SPACES Students will need to sanitize their desks and/or work space before class with the University provided sanitizing spray and paper towels.

SPECIAL NOTES It's important to note that based on the unpredictability of the COVID-19 virus, things can change at any time. Please be patient and understanding as we move through the semester. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.



COURSE/CATALOG DESCRIPTION

A detailed analysis of the structure and function of proteins. Current methodology for the analysis of structure, the basis for molecular associations and relationships between structure and biological function.

COURSE OVERVIEW

Protein Chemistry incorporates the historical, theoretical, and practical aspects of the study of proteins. In Part 1, the origins and developments of modern techniques are discussed including an overview of post-translational modifications; their study and utilization in laboratory procedures. In Part 2, an overview of protein structure and analysis will be discussed including protein folds and structural motifs and modern proteomics. In Part 3, participants will discuss proteins within specific topics with structure/function analysis.

STUDENT LEARNING OUTCOMES

Upon successful completion of this course, students will be familiar with:

- The majority of the techniques necessary for employment as a protein chemist in academic, government, pharmaceutical, and biotechnology laboratories.
- The structure/function analysis of proteins with emphasis on human health and disease.
- The information available in “omic” databases including the proteome, metabolome, and interactome
- The requirements for presentation of information relevant to protein chemistry

TEACHING STRATEGIES

The lectures will include PowerPoint slides that will be annotated with additional material during class. The PowerPoint slides and additional reading material will be provided on Blackboard prior to class. A lecture schedule is provided and readings from the required textbook will be assigned for each lecture. Students are expected to complete the readings prior to lecture. Attendance in lecture and reading the text are both important for successful mastery of the material. Students are responsible for all material in both the readings and the lectures. Students can get additional help by visiting scheduled office hours, posting messages in the discussion board on Blackboard, or contacting the instructor by e-mail.

PREREQUISITES AND COREQUISITES

The prerequisites for CHEM 4510 are passing grades in CHEM 3510 (Biochemistry I). The prerequisites for CHEM 6/8510 are passing grades in CHEM 6/8500 (Advanced Biochemistry). Students not satisfying the prerequisite will be dropped from the course.

REQUIRED TEXTBOOK

Structure in Protein Chemistry ISBN-13: 978-0815338673 ISBN-10: 0815338678. The PDF will be available on Blackboard.

The entire book can be easily downloaded free of charge from website:

<https://cloudfront.escholarship.org/dist/prd/content/qt4kv007vf/qt4kv007vf.pdf?t=p95b1j>

The textbook has been made free courtesy the author, Jack Kyte.

Primary literature available through Carlson Library and additional materials will be posted on BlackBoard.



TECHNOLOGY REQUIREMENTS

A computer capable of accessing the internet is mandatory. Access to the Toledo Library is available through UTAD. <https://www.utoledo.edu/library/>

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA)

The University is an equal opportunity educational institution. Please read [The University's Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.](#))

ACADEMIC ACCOMMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the [Student Disability Services Office.](#)

ACADEMIC POLICIES

- The University of Toledo policy on academic honesty will be strictly enforced. Any student caught cheating in any way on an exam or facilitating the cheating of others on an exam will receive a grade of 0 for that exam and will be required to take any remaining exams in the Field House Testing Center. A second violation will result in an automatic F in the course and referral to the Dean's Office.
- Currently, the course may be dropped no later than **02 Feb 2021**, and you may withdraw from the course (with a grade of W) no later than **24 Mar 2021**.
- https://www.utoledo.edu/offices/registrar/registration_dates_spring.html
- See the appropriate sections under **Course Expectations** below for more details about policies regarding homework assignments and exams.

COURSE EXPECTATIONS

- Students are responsible for all material covered in lecture, the assigned readings, and assignments.
- Students with challenges that require special assistance should contact the Student Disability Services Office and follow up with me by e-mail to arrange the accommodations specified by the electronic memo.
- Students should access the course site on Blackboard regularly. Lecture slides will be posted on Blackboard as a note-taking and study guide.
- I am available outside of class to answer questions during posted office hours, and other at other times by appointment (please contact me via e-mail to arrange a meeting). When e-mailing, please be sure to include your full name (especially if you are not using your Rocket e-mail account).
- **Exams**
 - There will be two exams. Due dates are **Tuesday 23 Feb 2021, and Thursday 01 Apr 2021**. Each exam will be worth 100 points. **An excused absence will only allow delay of the due date.**
 - An excused absence from an exam will be granted **only** for **documented** circumstances meeting the criteria of the UT Missed Class Policy (personal emergencies, including, but not limited to, illness of the student or of a dependent of the student or death in the family; religious observances that prevent the student from attending class; participation in University-sponsored activities, approved by the appropriate University authority, such as intercollegiate athletic competitions, activities approved by academic units, including artistic performances, R.O.T.C. functions, academic field trips, and special events connected with coursework; government-



required activities, such as military assignments, jury duty, or court appearances) Appropriate documentation must be provided before an excuse will be considered. See http://www.utoledo.edu/facsenate/missed_class_policy.html.

- If you have a conflict for an approved student activity or other obligation that meets the criteria of the missed class policy, inform me as soon as you are aware of the conflict with documentation and arrangements will be made for you to take the exam *early*. It is your responsibility to contact me to make these arrangements as soon as you are aware of the conflict.
- For other legal absences that arise without prior notice (such as medical emergencies), acceptable documentation will be required if an excused absence is requested.
- Missing an exam for **any reason other than a qualified legal absence** according to the UT Missed Class policy (including but not limited to lack of preparation, travel, transportation difficulties, oversleeping, job conflicts, etc.) will ***result in a grade of 0 for the missed exam with no opportunity to make it up. Plan accordingly.***
- Exam questions will be discussed and assigned two weeks prior to the due date and will be graded on completeness and conciseness of the answers.
- The exams are to be submitted as a single PDF document submitted to the course BlackBoard site.
- **Presentation and Project**
 - An individual final project topic will be assigned. Graduate students will present a one-hour literature review of their final topic. Undergraduate students will present a 40 min literature review. The presentation is worth 50 pts, the final project is worth 150 pts.
- **Proper procedures for Exams Presentations and Projects must be followed**
 - You are responsible for an awareness and usage of proper scientific communication
 - Including the materials available at:
 - <https://www.nature.com/scitable/ebooks/english-communication-for-scientists-14053993/>
 - <https://www.plagiarism.org/>

Grading:

Two exams (100 points each)	200 points
In-class Presentation	50 points
Final Project	150 points
Total	400 points

Final course grades will be assigned based on the following cutoffs for percentage of total possible points:

	A ≥93%	92%> A- ≥90%	
89%> B+ ≥87%	86%> B ≥82%	81%> B- ≥79%	
78%> C+ ≥76%	75%> C ≥71%	70%> C- ≥68%	
67%> D+ ≥65%	64%> D ≥60%	60%> D- ≥58%	57% > F

Midterm grades (for advisory purposes and to officially track course participation) will be assigned in Mid-March (after Exam 1).

COURSE SCHEDULE

Lecture #	Date	Topic	Source
1	19 Jan	History of Proteins	Natures Robots
2	21 Jan	Protein Purification and Characterization	JK Ch.1, BP Chrom.
3	26 Jan	Protein Purification and Characterization (cont)	GE Handbook
4	28 Jan	Protein Sequencing	JK Ch.3, Ref & Guides
5	02 Feb	Proteins of Recombinant DNA Technology	JK Ch.3, Ref & Guides
	04 Feb	Lecture 5 cont., Preparation for Examination #1	
6	09 Feb	Posttranslational Modifications	JK Ch. 10
7	11 Feb	Posttranslational Modifications, Tags	JK Ch. 11, Review
	16 Feb	<i>Instructional Break</i>	
8	18 Feb	Tags and Immunological Probes	JK Ch. 11, Review
	23 Feb	Exam #1	
9	25 Feb	Chemical Modifications, Project Assignments	JK Ch. 10
10	02 Mar	Protein Structure XRay NMR EM	JK Ch. 4 & 12
11	04 Mar	Evolution of Structural Motifs	JK Ch. 7,
12	09 Mar	Structural Motifs SCOP	Branden & Tooze, SCOP
13	11 Mar	Protein Interactions and Directed Evolution	Smith & Winters, Arnold
14	16 Mar	Overview of Computational Chemistry - Drago	
15	18 Mar	Introduction to Omics	
16	23 Mar	Overview of Proteins in Infectious Diseases	
17	25 Mar	Overview of Drug Targets	
18	30 Mar	Recent Large EM Structures	
	01 Apr	Exam #2	
	06 Apr	Graduate Presentations	
	08 Apr	Graduate Presentations	
	13 Apr	Undergraduate Presentations	
	15 Apr	Undergraduate Presentations	
	20 Apr	Undergraduate Presentations	
	22 Apr	Undergraduate Presentations	
	27 Apr	Undergraduate Presentations	
	04 May	<i>Final Projects Due</i>	