Biochemistry I (CHEM326)
Spring 2022

Dr. Aimee L. Miller — **717-871-7414**

Lecture: Brossman 102 — **aimee.miller@millersville.edu**
Mon/Wed/Fri: 10:00 – 10:50 am — **Office Hours: Caputo 325**
Labs: Caputo 225 — **Mon: 11:00 - 1:00**
Mon: 1:00 - 3:50 pm *(Dr. Mullen Davis)* — **Tues: 9:30 - 10:30**
Tue: 1:10 - 4:00 pm *(Dr. Mullen Davis)* — **Thur: 9:30 - 11:30**
Thur: 1:00 - 3:50 pm *(Dr. Miller)* — ***Alternate times by appointment***

Course Description

Chemistry 326 provides an introduction the structure and properties, physical and chemical, of biological compounds (carbohydrates, lipids, nucleic acids, and proteins). Their metabolism and importance in life processes will be introduced. Laboratory studies explore the properties of biological molecules and techniques for their isolation, identification, and qualitative and quantitative analysis.

Prerequisite: CHEM232 or CHEM235 (grade of C- or better)

Course objectives:

The main goal is to understand the relevance of chemical principles within biological systems. Students actively engaged in this course should be able to:

- Integrate the essential chemical characteristics of major types of biochemical molecules with their biological function and metabolic relevance
- Describe the key nucleotide and nucleic acid structures and functions and understand the processes responsible for the flow of genetic information within cells
- Describe the key features of amino acid and protein structures and understand the major roles played by proteins and enzymes in biochemical pathways
- Apply structural and kinetic principles relevant to enzyme reactions and regulation
- Describe characteristics of lipids and membranes and recognize their cellular and metabolic roles
- Describe sugar structures and understand carbohydrate metabolism in cells for production and storage of energy
- Explain the integration of pathways that transform both common and diverse structures to support living systems
- Appreciate the dynamic nature of biochemical principles and how ongoing research expands our collective understanding
- Develop fundamental laboratory skills, understand their application to biochemical studies, and analyze data appropriately

Materials and Supplies

- ❑ D2L course access (Millersville University)
- ❑ Achieve access with e-text *Principles of Biochemistry,* Nelson & Cox 8th Ed. (Macmillan)
- ❑ Optional hard copy text suggestions: *Lehninger: Nelson & Cox; Voet, Voet, & Pratt; Garrett & Grisham*
- ❑ Laboratory notebook (bound composition book)

Course Policies

Class Attendance: Students are responsible for material presented in class or distributed via D2L and MU e-mail. Only work missed for an absence excused based on Millersville's approved guidelines may be made up. Please contact me in advance or as soon as possible to reschedule. Any graded work conducted outside the scheduled time may differ significantly in form and exact content from the in-class version.

Participation: Students are expected to come to class prepared to actively participate in the classroom. This includes asking questions, responding to questions, and contributing to activities and discussions in both the classroom and lab. A variety of **learning activities** will be used throughout the semester to promote active participation. Grades will reflect effort and engagement in applying course concepts more than just "right answers." Dialogue and questions about content are encouraged.

Homework: Mastery of chemical principles is developed through practice. In addition to the textbook, opportunities for students to interact with course content will be available online through **Achieve**. These problems will include both **required homework** and ungraded practice/review problems or activities. Students are encouraged to use diverse resources that are helpful to their learning. To promote use of homework as a learning tool, problems can be worked **repeatedly** to earn full credit. Deadlines will generally be **10 pm, Thursdays**. Late assignments can be completed for partial credit (-10% per day).

Peer Learning: There are Chemistry Peer Learning times scheduled for the semester that may provide a useful mechanism for working on biochemistry concepts, homework, and lab analysis. While the official chemistry tutors will primarily be serving general and organic chemistry students, all students are invited to participate in this shared learning structure. Students looking to collaborate on studying are encouraged to join in. Dr. Miller is available during some hours and is willing to visit the Peer Learning room as requested. Students are also encouraged to share their knowledge with others in that context.

Cooperative Environment: Students are expected to be actively engaged in the classroom, so questions and comments are encouraged. Repeated disruptive behavior (like tardiness, chatting, or cell phone noise/use) may be cause for dismissal from class and may affect final grade assignments. Students with special concerns are encouraged to speak with me or take advantage of student resources available on campus, including the Office of Learning Services, the Tutoring Center, or the Counseling Center. The safe and productive educational environment for this class includes commitment to Diversity, Equity, and Inclusion as well as compliance with Title IX as outlined by Millersville University.

Academic Honesty: Students are expected to conduct all course work in an honest and ethical manner, consistent with Millersville policy. Cheating on coursework bypasses the learning process and will **NOT** be tolerated. Anyone caught cheating will be assigned a score of zero on the work and may be reported.

Laboratory: Laboratory provides a place where learning is enhanced by application. Planned projects provide experience with basic techniques relevant to understanding and working with biological molecules and samples. Students MUST complete every experiment. Please keep your instructor informed of any special circumstances (like allergies or pregnancy) that might require alternate experimental arrangements. Students are expected to respect and follow all safety instructions given in lab. If an excused absence conflicts with your scheduled lab work, please contact your instructor as soon as possible to make alternate arrangements.

Links to full Millersville policies/guidelines referred to above are available within our D2L course.

Grading

Lecture	Homework & Learning Activities	14 %
	Exams	46 %
	Final Exam	18 %
Lab	Notebook/Reports	22 %

NOTE: You must earn at least 60% in the lecture portion to pass Chem326. Your final grade will be assigned based on the combined lecture and lab scores.

Letter Grade Correlation

Grade	*%*				
B+	87.0 - 89.9	A	93.0 - 100.0	A-	90.0 - 92.9
C+	77.0 - 79.9	B	83.0 - 86.9	B-	80.0 - 82.9
D+	67.0 - 69.9	C	73.0 - 76.9	C-	70.0 - 72.9
F	< 60.0	D	63.0 - 66.9	D-	60.0 - 62.9

Lecture Schedule (tentative)

Topic Order:	***Testing Schedule:***
Chapter 1: Foundations of Biochemistry	
Chapter 2: Water	
Chapter 3: Amino Acids, Peptides & Proteins	
Chapters 4 & 5: Protein Structure & Function	**Exam 1: Fri, Feb 18**
Chapter 6: Enzymes	
Chapter 8 (& parts of 25/26/27): Nucleotides & Nucleic Acids	
Chapters 10 & 11: Lipids, Membranes & Transport	
Chapter 7: Carbohydrates	**Exam 2: Fri, Mar 25**
Chapters 15 & 13: Metabolism Principles	
Chapter 14: Glycolysis, Gluconeogenesis & Pentose Phos Path	
Chapter 16: Citric Acid Cycle	**Exam 3: Fri, Apr 22**
Chapter 19: Oxidative Phosphorylation	

Final Exam: Thu, May 5; 8:00 - 10:00 am
(including comprehensive content)

Laboratory Policies

- Students **MUST** complete every lab. Please notify the lab instructor if you have any special circumstances (allergies, sensitivities, or pregnancy) that might require alternate lab arrangements.
- Students are expected to respect and follow all safety instructions given in lab.
- Students are expected to access lab information via D2L. This will provide a mechanism for contact and distribution of information or representative data, if necessary. *(Your lab instructor will provide printed protocols used to complete each experiment.)*
- Bound notebooks **MUST** hold all experimental work**.** Please refer to the separate **Lab Syllabus** from your instructor for more detailed instructions regarding expectations for lab work and notebooks.
- Late submissions may incur penalties of 10% per day.

Lab Evaluation:

Each experiment will include:

- Pre-Lab: questions based on background material completed as a D2L quiz *(unlimited attempts)*. **Due: 8 am on your lab day**
- Notebook: pages showing purpose statement and all recorded data & observations submitted as a single file in D2L *(scanned to pdf or pictures combined into one file; your lab instructor can assist with this as needed)*. **Due: on your lab day**
- Post-Lab: data analysis, interpretation, and related questions or calculations completed as a D2L quiz *(unlimited attempts on auto-graded questions; supporting files must be submitted as jpg/png/pdf format)*. **Due: 8 am on your lab day the next week**

Laboratory Schedule (tentative)

Jan 18 - 20	Notebook/Lab prep *(No Labs meet)*
Jan 24 - 27	Solutions, Dilutions, and Spectrophotometry & Check-In
Jan 31 – Feb 3	Buffers. pH, and pKa
Feb 7 - 10	Amino Acid Properties
Feb 14 - 17	Native Protein Gel
Feb 21 - 24	Protein Chromatography
Feb 28 – Mar 3	Enzyme Kinetics
Mar 7 - 10	*No Lab: Spring Break*
Mar 14 - 17	Nucleic Acid Structures
Mar 21 - 24	Western Blot (begin) & Protein Assay Calcs
Mar 28 - 31	Western Blot (complete)
Apr 4 - 7	Soap & Lipids
Apr 11 - 14	Protein Assays
Apr 18 - 21	Carbohydrates
Apr 25 - 28	Respiration & Check-Out
May 2	*No Lab*