CHEM 326: Biochemistry I
Fall 2021
TR 8-9:15 am
Brossman 102

Instructor: Melissa A. Mullen Davis  
Pronouns: she/her/hers

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Google Voice Phone: 302-307-1741

Office: Caputo 218  
Office Phone: 717-871-7439

Office Hours: Mon 9:30-11:30, Wed 11-12, Fri 9:30-11:30, and by appointment.  
In person or virtual (zoom)

Labs: Tues 1:10 – 4:00 pm (A)  Wed 2:00 – 4:50 pm (B)

Course Description: CHEM 326 provides an introduction to 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.

Pre-requisite or co-requisite: CHEM 232 or CHEM 235 (grade of C- or better).

Course Materials and Readings:
- Registration on D2L and access to course and laboratory materials posted on D2L.
- Achieve Access (available online with e-text Principles of Biochemistry, Nelson & Cox, 8th ed)
- Optional Hardcopy Text. Options include: Lehninger; Voet, Voet, and Pratt; Garrett & Grisham
- Laboratory notebook: permanently-bound composition notebook. A variety of colors and styles are available for purchase in lab for $1.

Course Overview:

This course is designed as an introduction to the chemistry that occurs in living systems. Course materials can be divided into sections that build on each other as outlined in the pyramid shown to the right.

We will start with foundational information in Biochemistry (Section 1) followed by application of the foundational knowledge to understand proteins (Section 2) and the chemistry they perform (Section 3). The last unit will apply knowledge of protein structure and function to metabolic biochemistry (Section 4).
Course Objectives:

The main goal of this course 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 relevance.
- Describe the key nucleotide and nucleic acid structures and recognize the processes responsible for the flow of genetic information within cells.
- Describe the key features of protein structure and recognize the major roles played by proteins and enzymes in biological systems.
- Apply structural and kinetic principles relevant to enzyme reactions and regulation.
- Describe characteristics that define lipids and recognize cellular and metabolic roles of the membrane.
- Understand carbohydrate metabolism in cells and the integration of related pathways for use, production, and storage of energy biomolecules.
- 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.

Evaluation of Learning:

Achieve Homework 10%
Engagement and Learning Activities 10%
Enzyme Project 10%
Laboratory Assignments 20%
Mid-Semester Exams (3) 35%
Comprehensive Final Exam 15%

NOTE: You must earn at least 60% in the lecture portion to pass CHEM 326. Your final grade will be assigned based on the combined lecture and laboratory scores.

Final letter grades will be assigned on a standard plus/minus scale:

- B+ 87.0 – 89.9
- C+ 77.0 – 79.9
- D+ 67.0 – 69.9
- A 93.0-100.0
- B 83.0 – 86.9
- C 73.0 – 76.9
- D 63.0 – 66.9
- F < 60.0
- A- 90.0 – 92.9
- B- 80.0 – 82.9
- C- 70.0 – 72.9
- D- 60.0 – 62.9
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<td>Electron Transport Chain</td>
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* subject to change
Homework (10%):
Mastery of chemical and biochemical principles is developed through practice. Opportunities for you to interact with course content is available online through Achieve. These problems will include required homework and practice/review problems or activities. While only scores on assigned homework will count towards the course grade, you are encouraged to use a variety of resources that are helpful for your learning. Homework deadlines will be 11:59 pm the day they are due, frequently on Sunday with occasional mid-week assignments as needed (such as before an exam).

Engagement and Learning Activities (10%):
In addition to online homework, we will also have a variety of assigned “Learning Activities” or quizzes designed to help you practice and gain mastery of course material. These will be assigned in-class, included on Road Maps, and posted on D2L. We will also have frequent short class surveys including post-exam surveys, reflection questions, etc. which you will be expected to complete.

Enzyme Project (10%):
During the second half of the semester you will work on an individual enzyme project that will apply your growing knowledge of enzyme function, structure, and kinetics to a unique enzyme, gain experience searching and reading scientific literature, and be inspired by enzymes. This project will be scaffolded through several assignments including

1) Choosing an enzyme and accompanying structure-based journal article
2) Completing a series of assignments related to your enzyme and its structure, function, mechanism, and kinetics.
3) Create art (broadly defined) inspired by your enzyme.

An official prompt and specific assignment questions will be provided at the start of the project. Guidance and assistance in navigating scientific literature will be provided.

Exams:
We will have three exams during the semester and one comprehensive final exam that will require the full class period and will test your ability to integrate fundamental course concepts on the applied, analytical, and synthetic levels.

Make-up Policy: If you know you will miss an exam ahead of time (for an absence excused based on Millersville’s approved guidelines), you must inform me one week in advance, ideally in person. You will be expected to take the exam before the scheduled date. If you are sick on the day of an exam, we will work together for you to make up the exam as soon as possible. Any unexcused absence from an exam will result in a zero.

Testing Accommodations: Any student who meets the eligibility requirements to receive academic accommodations through learning services should speak with the Office of Learning Services in Lyle Hall as early in the semester as possible. You should give me a Testing Accommodation request form (“green sheet”) as soon as possible and plan to take quiz/exams on the same day and time at the Office of Learning Services. For more information see: http://www.millersville.edu/learningservices
Laboratory
Please refer to the Lab Syllabus for more specific details.

- Lab Evaluation for each experiment will consist of:
  - Pre-Lab Questions 5 pts
  - Post-lab Assignment 15 pts
  - Laboratory Notebook 5 pts
- Please notify me if you have any special circumstances (allergies, sensitivities, or pregnancy) that might require alternative lab arrangements.
- Students are expected to respect and follow all safety instructions given in lab.
- Students are expected to access lab information via D2L where I will post background info, protocols, and information or representative data if necessary.
- Pre-lab questions will be completed in D2L and will be due **8 am the day of the lab**.
- Lab assignments (D2L data and quizzes) should be submitted to D2L by **11:59 pm** three days following your experiment.
  
  | Tuesday Lab | Assignment due | Fri 11:59 pm |
  | Wednesday Lab | Assignment due | Sat 11:59 pm |

Course Policies:

**Class Attendance and Participation**
You are expected to attend all classes prepared to actively participate in the classroom, including asking questions, responding to questions, and contributing to group, class, and laboratory discussion. You are responsible for all material presented in class and distributed via D2L. You are also expected to complete all of the Laboratory Experiments. Only graded work missed for an absence excused based on Millersville’s approved guidelines (found online and at the end of the syllabus) may be made up. Please contact me 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.

**COVID Policy**
Despite hopes to the contrary we are still in the middle of the COVID-19 pandemic with new COVID variants and young children that still are not able to be vaccinated. We must continue to operate under unusual and constantly changing conditions.

- Please take great precautions and follow recommendations including wearing a mask especially in enclosed spaces and get vaccinated if you are not already. If you have any signs of illness or exposure to someone who is COVID-positive, stay home and get tested.
- I highly recommend that students come to class to maximize learning of Biochemistry. However, if you feel unwell please stay home. If you have been exposed to someone who tested positive for COVID-19 or are awaiting COVID test results after being symptomatic please stay home.
- If you are unable to attend class, please contact a classmate to obtain notes. I will also post Biochemistry content videos that cover the basics of material discussed in class. Any handouts or mid-class activities will also be posted on D2L.
- If you are unable to attend lab, please contact me for a suitable alternative assignment.
- Office hours will be held virtually via Zoom and in-person. You may attend in any modality you prefer. I am also able to schedule in-person or virtual meetings to discuss course content.
- If you are experiencing a prolonged illness (more than two (2) weeks), please contact me.
- It is possible that students and instructor might have frequent and unexpected childcare or school closures. If you are a primary caregiver of a child (e.g. parent or guardian), please contact me and we can set up a custom plan for how to manage attendance and assignments if there are closures. Likewise, I will share plans if I am unable to attend in person.
- If there are other situations that will impact a student’s ability to participate in this course, please contact me as soon as possible.

Use of Electronic Equipment:
Studies show that learning in a classroom is enhanced in a personal screen-free environment. Therefore, the use of cell phones, laptops, tablets, etc. is strongly discouraged in class unless otherwise approved by me in advance. Distractibility is real and puppy videos are adorable.

Computer Resources
Students are expected to use D2L for CHEM 326. This provides mechanisms for contact, distribution of information, and data, submission of written work, completion of peer reviews, etc. Students are also responsible for all course information sent to their campus email address.

Diversity, Inclusion, and Anti-Racism Policy
This course is a judgement free and anti-racist learning environment. Our class includes students from a wide variety of social identities and life circumstances. Everyone will treat one another with respect and consideration at all times or be asked to leave the classroom.

As your instructor I will:
- Learn and correctly pronounce everyone’s name
- Use correct pronouns for those who wish to indicate this to me/the class
- Work to accommodate/prevent English language related challenges

If you tell me that you are having trouble, I will not judge you or think less of you. You do not owe me an explanation of your health (physical or mental) or the health of your loved ones; but you are welcome to tell me and I will listen. If I cannot help you, I will find someone who can. If you need help or more information, please ask and I will work with you.

If we have any virtual sessions children and pets are welcome to attend live sessions as long as you are considerate of other learners. In general, I suggest keeping your microphone muted when not speaking to avoid outside noise for the rest of the class.

Academic Honesty
Students are expected to abide by the policy outlined by Millersville University shown below. Students will collaborate on collecting, interpreting, and reporting data. Students are expected to contribute equally on collaborative work. Fabrication of data or plagiarism in preparing reports will NOT be tolerated in this course. Students should not post course material on online study sites such as Chegg. Anyone caught cheating in these ways will be assigned a score of zero on the work.
According to Millersville University’s Academic Honesty Policy: “Students of the University are expected to be honest and forthright in their academic endeavors.” If you break the academic honesty policy, there are severe penalties. A failing grade will be assigned and you may be prosecuted by an Academic Review board. Actions that violate the Academic Honesty Policy are:

1. Plagarism: inclusion of someone else's words, ideas, or data as one's own work.
2. Fabrication: falsification of research or other findings.
3. Cheating: the act or attempted act of deception by which an individual tries to misrepresent that the individual has mastered subject matter in an academic project or the attempt to gain an advantage by the use of illegal or illegitimate means. Submitting in-class participation cards for another student is considered cheating.
4. Academic Misconduct: violation of University policies by tampering with grades or participating in the distribution of any part of a test before its administration.

Official Attendance Policy

1. Students are expected to attend all classes. It is the student’s responsibility to complete all course requirements even if a class is missed. If a student misses class for an officially excused reason, then the student is entitled to make up the missed work but only at the convenience of the faculty member. Responsibility for materials presented in, assignments made for, and tests/quizzes given in regularly scheduled classes lies solely with the student.
2. The Millersville University policy states that faculty will excuse absence for the following reasons:
   a. personal illness
   b. death or critical illness in the family
   c. participation in a university-sponsored activity
   d. jury duty
   e. military duties
   f. religious holidays
3. Faculty judge the validity of student absences from class within the University's approved guidelines and may require documentation for excuse absences. Faculty will evaluate any reason, other than those listed above, for a student missing class and determine whether the absence is justified. In these circumstances, a student may make up missed work at the discretion of the instructor.
4. In the case of foreseeable absences, students are encouraged to notify the faculty member in advance. A student who will miss class due to participation in an official University activity must notify the instructor well in advance of the activity to assure that the absence is excused.
5. For more information: [www.millersville.edu/registrar/faculty/attendance_policy.php](http://www.millersville.edu/registrar/faculty/attendance_policy.php)

Title IX Statement

Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to comply with the requirements of Title IX of the Education Amendments of 1972 and the University’s commitment to offering supportive measures in accordance with the new regulations issued under Title IX, the University requires faculty members to report to the University’s Title IX Coordinator incidents of sexual violence shared by students. The only exceptions to the faculty member’s reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing
assignment for a class, or as part of a University-approved research project. **Faculty members are obligated to report to the person designated in the University Protection of Minors policy** sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred.

Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: [www.millersville.edu/titleix](http://www.millersville.edu/titleix)

**Counseling Reminder**
Students sometimes face mental health or drug/alcohol challenges in their academic careers that interfere with their academic performance and goals. Millersville University is a caring community and resources are available to assist students who are dealing with problems. The Counseling Center (717-871-7821) is an important resource for both mental health and substance abuse issues. Additional resources include: Health Services (717-871-5250), Center for Health Education and Promotion (717-871-4141), Campus Ministries, and Learning Services (717-871-5554).

**Americans with Disabilities Act**
Millersville University is committed to equality of opportunity and freedom from discrimination for all students, employees, applicants for admission or employment, and all participants in public University-sponsored activities. In keeping with this commitment, and in accordance with the Americans with Disabilities Act (ADA) the University will make every effort to provide equality of opportunity and freedom from discrimination for all members of the University community and visitors to the University, regardless of any disability an individual may have. Accordingly, the University has taken positive steps to make University facilities accessible to individuals with disabilities and has established procedures to provide reasonable accommodations to allow individuals with disabilities to participate in University programs. The University administration and management are obligated to report any allegation of discrimination to the appropriate office as defined in this policy.

**Please let me know how I may make accommodations in the classroom setting that will enhance and support your learning.**