CHEM104: General, Organic and Biochemistry II
Spring 2026

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Office Hours: Caputo 325 *(alt by appt)*

Lecture: Caputo 211
Mon & Wed: 8:00 - 8:50 am

Lab: Caputo 331 or 332
Wed: 2:00 - 3:50 pm

Mon:	**9 – 10**
Tues:	**12 – 1**
Wed:	**11 – 12**
Fri:	**9 – 10 & 12 – 1**

Course Description

CHEM104 is the second semester course of General, Organic and Biochemistry (CHEM103 is prerequisite). Content in CHEM104 includes solutions, molecular structures, and fundamental language and nomenclature of organic and biochemistry. Study of acid-base behavior, oxidation-reduction relationships, and organic reactivity will be used to understand biochemical pathways. Appropriate for non-science majors and satisfies General Education requirements. (2 hrs lecture/2 hrs lab)

Necessary Background

CHEM103 or CHEM111

Course Objectives

The main course goal is to build on general chemistry concepts with organic and biochemistry basics. Students actively engaging in this course should be able to:

- Apply the fundamental ideas developed in general chemistry of bonding, molecular structure, acid-base theory, equilibrium, and thermodynamics to the systematic study of organic and biochemical molecules.
- Recognize, describe, and name the major functional groups found in organic and biochemical molecules.
- Describe physical and chemical properties related to common functional groups and explain their relevance in biological systems.
- Describe and illustrate chemical and functional group changes in common organic reactions and biochemical pathways.
- Develop hands-on skills needed to work safely in an organic chemical laboratory using common laboratory equipment and materials.
- Accurately record and effectively evaluate lab experimentation and data.
- Appreciate the relevance of organic and biochemical molecules for life and modern living.

Required Materials and Supplies

- ❑ D2L Course access (Millersville University)
- ❑ Aktiv Chemistry subscription
- ❑ Choice of access to related chemistry content via Open Source pdf texts (free in D2L) or any textbook titled something like *General, Organic, and Biochemistry*
- ❑ Calculator: Scientific calculator capable of performing logarithmic (log, ln) and exponential (10^x, e^x, y^x) functions (cell phones may NOT be used during assessments)
- ❑ Laboratory Notebook: permanently-bound composition book
- ❑ Laboratory Instructions: distributed and available via D2L
- ❑ Safety Eyewear for lab work

Course Policies

Course conducted according to all Millersville policies/guidelines (links to full info in D2L).

Class Participation: Students are responsible for material presented in class or distributed via D2L. Only graded work missed for an absence excused based on Millersville's Approved Guidelines will 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 exam.

Academic Honesty: Students are expected to conduct all course work in an honest and ethical manner, consistent with Millersville's 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.

Homework & Activities: Practicing exercises related to the material we discuss in class is essential for mastering concepts and developing critical skills. There will be **required online assignments** in Aktiv. Exercises may be worked multiple times if necessary to learn the concept and earn full credit. **Graded in-class activities** will also be used to encourage interaction with concepts. Students are urged to work independently on a broader range of examples, problems, and exercises in Aktiv, a textbook, or other online sites as we cover material.

Cooperative Environment: Students are expected to be respectfully and actively engaged in the classroom. Questions and discussions are encouraged. Repeated disruptive behavior (like tardiness, chatting, or electronic 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.

- *Millersville University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University's Title IX Coordinator. 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 sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of ag) when the abuse allegedly occurred, to the person designated in the University Protection of Minors policy.

  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

- *If you have a disability that requires accommodations under the Americans with Disabilities Act, please discuss your preferences for related strategies with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively.*

Molecule Presentation: Each student will research a pharmaceutical molecule and give a brief oral presentation during lab **April 28**. Information about the structure, functional groups, and biochemical impact will be assembled into a PowerPoint file. Files must be submitted to D2L **at least 2 hrs BEFORE** the lab period that day. Deductions will be made: **1 pt** for late submissions online, **2 pts** for files only brought to class in person, and **5 pts** for an unexcused absence requiring presentation on another date. Detailed instructions, a template, and resources are available in D2L.

Recommendations for Success

- As we cover a topic in class, work practice exercises and the related online problems. Starting early gives you time to review, learn, and earn full credit.
- Read/review reference materials corresponding to class content to find additional explanations and example problems. Use supporting materials in Aktiv or D2L to help guide your learning.
- Ask questions in class, by e-mail, or in person. Remember, if you don't understand something, others probably don't either.
- Take advantage of the Chemistry Peer Learning hours where you can work with others or get help

from a chemistry tutor. Getting help early is the most effective approach.

- Find a group of other students to study with so you can help each other.
- Take advantage of Dr. Miller's office hours, review sessions, or connect electronically.
- Use Course Objectives available in D2L to check that you are comfortable with all the material for each test.
- Review returned exams and correct any mistakes to make sure you learn all the concepts for future applications.
- Review lab instructions online and complete the online pre-lab questions before coming to lab. Make a habit of doing this each week at a time well before lab begins.
- Record lab notes and data directly into your notebook, label all information clearly, and complete all post-lab questions before submitting your work.

Lecture Schedule (tentative)

Topic Order:	***Testing Schedule:***
Acids, Bases & Buffers	
Organic Chemistry Structures & Nomenclature	**Exam 1: Wednesday, Feb 11**
Functional Group Structures & Reactions	
Carbohydrates	
Lipids	**Exam 2: Wednesday, Mar 18**
Amino Acids, Proteins & Enzymes	
Nucleotides & Nucleic Acids	
Energy and Metabolism	**Exam 3: Wednesday, Apr 22**
	Final Exam: Thus, May 7: 2:45 – 4:45 *(comprehensive content)*

Grading

Homework & Activities	15 %
Molecule Project	5 %
Unit Exams	45 %
Final Exam	13 %
Lab Work	22 %

Letter Grade Correlation

Grade	*Total %*				
A	93.0-100	**A-**	90.0-92.9		
B+	87.0-89.9	**B**	83.0-86.9	**B-**	80.0-82.9
C+	77.0-79.9	**C**	73.0-76.9	**C-**	70.0-72.9
D+	67.0-69.9	**D**	63.0-66.9	**D-**	60.0-62.9
F	<60.0				

Laboratory Policies

The laboratory component of CHEM104 is designed to give you hands-on experience with molecules and reactions discussed in class. ***Students MUST prepare for, carry out, and report on ALL lab experiments or activities in CHEM104.***

Attendance: Students must attend and complete **every** lab as scheduled. If an excused absence conflicts with your scheduled lab time, please contact the instructor as soon as possible to make alternate arrangements. Except for unavoidable, approved excuses, a missed lab may earn **NO credit** even though the work and report must still be made up. *Students with repeated lab attendance issues may not be able to make up the work needed to pass CHEM104.*

Safe & Cooperative Environment: Students are expected to follow all directions regarding safety precautions and lab attire. More complete lab safety rules are posted in D2L and should be taped into your lab notebook for quick reference. Please notify the instructor about any special concerns (allergies, pregnancy etc.) that might require alternate arrangements for you to work safely in lab. You must also keep lab equipment and general lab areas clean and tidy. Failure to follow instructions or clean up may result in a penalty on your lab score.

Instructions & Pre-Labs: Students are expected to come to lab each week with an understanding of the planned experiment/work. You should review the lab protocol/instructions posted in D2L and complete the **Pre-Lab Quiz** in D2L by **8 am Wednesday** each week.

Notebooks & Reports: Students must record **ALL** lab work directly into their notebook during lab. Calculations or analysis, a brief summary report, and answers to lab questions should also be written directly into the notebook. Failure to properly record data during lab may result in a lab score penalty. Notebooks and reports are due **when leaving lab** unless arrangements are made with the instructor.

Laboratory Schedule (tentative)

Jan 21	Organic Lab Safety & Check-In
Jan 28	Solutions & Dilutions
Feb 4	Buffers & pH
Feb 11	Organic Molecule Naming & Drawing
Feb 18	Organic Structures & Reactions
Feb 25	Limonene & Vitamin C Analysis
Mar 4	Aspirin Synthesis
Mar 11	*Spring break (no lab)*
Mar 18	Analgesic Separation
Mar 25	Amino Acids & Proteins
Apr 1	DNA Extraction
Apr 8	Soap: Lipid Saponification
Apr 15	Carbohydrates
Apr 22	Respiration & Check-Out
Apr 29	Molecule Presentations

Lab Grading

Weekly Labs	15 pts *(generally, 3 pts Pre-Lab Questions & 12 pts Notebook Report)*