CHEM104: General, Organic and Biochemistry II
Spring 2024

Dr. Aimee L. Miller
717-871-7414
aimee.miller@millersville.edu

Lecture: Caputo 211
Mon & Wed: 8:00 - 8:50 am
Labs: Caputo 331
Wed: 2:00 - 3:50 pm

Office Hours: Caputo 325
Tue: 10:30 – 12:30
Thur: 10:30 – 12:30
Fri: 9:00 - 10:00
Alternate times by appointment

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 goal is the introduction of 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.
- 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 including access during class times
- ❑ 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)
- ❑ Laboratory Notebook: permanently-bound composition book
- ❑ Laboratory Instructions: distributed or available via D2L
- ❑ Safety Eyewear for lab work

Course Policies

Millersville University: *This class adheres to MU guidelines/policies (links to full text 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.

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 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. The safe and productive educational environment for this class includes compliance with Title IX as outlined in Millersville's policy.

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.

Molecule Presentation: Each student will research a pharmaceutical molecule and give a brief oral presentation during lab **April 17**. 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 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	**Exam 1: Monday, Feb 5**
Organic Chemistry Structures & Nomenclature	
Functional Group Structures & Reactions	**Exam 2: Monday, Feb 26**
Carbohydrates	
Lipids	**Exam 3: Monday, Mar 25**
Amino Acids, Proteins & Enzymes	
Nucleotides & Nucleic Acids	**Exam 4: Monday, Apr 15**
Energy and Metabolism	**Final Exam: Fri, May 3: 2:45 – 4:45 pm** *(comprehensive content)*

Grading

Homework & Activities	15 %
Molecule Project	5 %
Unit Exams	45 %
Final Exam	13 %
Lab Work	22 %
Total	**100 %**

NOTE: You must earn at least 60% in the lecture portion to pass Chem104. Your final grade will be assigned based on the combined lecture and lab scores.

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 a 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 **noon 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 **before leaving lab** unless arrangements are made with the instructor.

Laboratory Schedule (tentative)

Jan 17	Check In, Organic Lab Safety & Compounds
Jan 24	Solutions
Jan 31	Buffers & pH
Feb 7	Organic Molecule Naming & Drawing
Feb 14	Organic Molecule Structures & Reactions
Feb 21	Limonene & Vitamin C Analysis
Feb 28	Aspirin Synthesis
Mar 6	*Spring break (no lab)*
Mar 13	Analgesic Separation
Mar 20	Carbohydrates
Mar 27	Soap: Lipid Saponification
Apr 3	Amino Acids & Proteins
Apr 10	DNA Extraction
Apr 17	Molecule Presentations
Apr 24	Metabolism & Check Out

Lab Grading

Weekly Labs 15 pts (x13)

(generally, 3 pts Pre-Lab Questions & 12 pts Notebook Report)