

**Course & Laboratory Instructor**

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Office Hours: TBD & posted on Blackboard

**Course Meeting Times**

- Class meetings: M,W&F at 11:45-12:55 in PPHAC 335
- Laboratory: Thurs at 8:30-11:30am OR 12:45pm-3:45pm in HOSCI 209

**Course Description**

This course focuses on the structural features of the four major classes of biomolecules and the basic functions of these molecules in cells. Coverage of the fundamentals of information flow in biological systems, enzyme kinetics and catalytic mechanisms will set the stage for BIOL/CHEM 328 (Biochemistry II). Students will also be introduced to many of the techniques used in biochemistry laboratories and begin to learn how to investigate biochemical problems.

**Course Goals**

- To understand the chemical basis of the structure and function of the four main groups of biological molecules responsible for cellular function
- To become proficient in the visual rendering of biological macromolecules using common biochemical visualization programs to understand how structure informs function
- To gain hands-on experience with (and understand the basic theory behind) some of the laboratory methods used to isolate and investigate these biological molecules
- To become familiar with a variety of data bases that contain information about the structure and function of these biological molecules (bioinformatics)
- To gain more experience in scientific writing
- To develop more problem-solving and critical thinking in class and in the laboratory

**Required and Suggested Resources**

- Required Text: Lehninger's Principles of Biochemistry 6<sup>th</sup> Edition, ISBN-13: 978-1-4292-X by David Nelson and Michael Cox. (2013), W.H.Freeman and Company.
- Blackboard course site at <http://blackboard.moravian.edu>: You should already be enrolled in the course page for CHEM327/BIOL327. Access this site early and often for semester announcements, laboratory procedures, problem sets, answer keys, reminders and other pertinent material. I highly recommend that you check email that I send via this site, so be sure your Bb account is set up with an email address that you receive AND check!
- Textbook website at <http://bcs.whfreeman.com/lehninger6e/>
- Recommended "Study Guide and Solutions Manual" to accompany the 6<sup>th</sup> ed (can be purchased in the bookstore or a copy will be in the Superlab Commons for your access)
- A USB memory stick to save copies of lab data and other pertinent electronic course files
- A bound composition book for lab (if you do NOT want to keep an electronic lab notebook)

Students who wish to request accommodations in this class for a learning difference or disability should contact Elaine Mara, Assistant Director of Learning Services for Academic and Disability Support in the lower level of Monocacy Hall, or by calling 610-861-1401. Accommodations cannot be provided until authorization is received from the Academic Support Center.

### Attendance Policy

Your presence is expected at all course meetings. As a reminder, the college policy on attendance can be found in the student handbook<sup>1</sup>. If you anticipate an unavoidable absence (due to an extenuating and documented<sup>2</sup> circumstance), please notify the instructor as soon as possible, particularly since makeup laboratories or exams are likely not an option.

### Academic Honesty Policy

Please be familiar with the college policy on academic honesty<sup>3</sup> that applies to this course. In addition to this general policy, for this Biochemistry I course you are allowed (and encouraged!) to discuss work with other current students in this class on problem sets, writing assignments, and laboratory data analysis but any work submitted in your name is to be your work alone (unless the instructor explicitly states that a student group may submit a single document for assessment). Merely copying answers (or electronic spreadsheets) from another student is not acceptable and will, at the very least, result in a zero for the assignment.

### Policy on Use of Cell Phones/Mobile Devices

Please have the courtesy to turn off, not use, and not answer your cell phone during course meeting times (this includes lab!). Use of the devices may be recognized by your instructor as disruptive classroom behavior<sup>4</sup> and responded to as such. For timed experiences (quizzes and exams) communication devices MUST be put away out of sight (in your backpack, NOT your pocket) or else a score of zero will be assigned by your instructor.

### Grading

Your grade in this course does not depend on the grade of any other student in the class. Instead, your letter grade will be determined by the total number of points you earn in this course, according to the following scale:

Total points	Letter Grade
930-1000	A
900-929	A-
870-899	B+
830-869	B
800-829	B-
770-799	C+

Total points	Letter Grade
730-769	C
700-729	C-
670-699	D+
630-669	D
600-629	D-
< 600	F

The total number of possible points in this course is *anticipated* to be distributed as follows:

I.	Exams (2@125pts each)	250pts
II.	Quizzes (~5@10pts each)	50pts
III.	Problem Sets (~8@25pts each)	200pts
IV.	Laboratory (~11@16pts each) <i>Prelab, Performance &amp; Notebook</i>	175pts
V.	Scientific Writing & Presentations	200pts
VI.	Final Exam	125pts
	<b>Total for Course</b>	<b>1000pts</b>

<sup>1</sup> <http://www.moravian.edu/studentLife/handbook/academic/academic.html>

<sup>2</sup> Your instructor will expect documentation from a health professional or academic dean regarding missed exams or laboratories.

<sup>3</sup> <http://www.moravian.edu/studentLife/handbook/academic/academic2.html>

<sup>4</sup> <http://www.moravian.edu/studentLife/handbook/academic/academic3.html>

**I. Exams:** Two semester exams will be given during class time on **Monday September 29<sup>th</sup>** and **Monday November 3<sup>rd</sup>**. A cumulative final exam will be given on **Tuesday December 9<sup>th</sup>** at 1:30 pm in PPHAC 335. **MAKE-UP EXAMS WILL NOT BE GIVEN.** At the discretion of the instructor, a portion of each exam may be take-home.

**II. Quizzes:** Short in-class quizzes will be given periodically during the semester. These quizzes will cover structures, naming, and properties of key biomolecular building blocks.

### **III. Problem Sets**

Problem sets (~weekly) on material covered in class/lab/problem sessions will be assigned, collected, and graded. Due dates and times for each problem set will be posted on the blackboard course page and clearly indicated on each assignment. Late assignments may be accepted but with a penalty to be decided by the instructor (~10% per day deduction until the key is posted).

### **IV. Laboratory**

Your performance in, analysis of, and scientific writing about laboratory experiments are the basis for a significant portion of your assessment in this course (>35% of your course grade). Since your work in the laboratory can only be assessed if you are present, and you will only have writing material for your research assignments if you actually perform the experiments, you should be present for and intellectually active every laboratory meeting of this course. Regarding laboratory absences, please see the attendance policy above.

All of the following are fair game for assessment in the laboratory:

Be prepared: Read each experimental procedure, including any posted references/resources, before coming to the laboratory. Most weeks there will be pre-lab questions to help you focus on these readings, and your own individual answers to these questions should be recorded (either in an electronic file or in a hard-copy bound notebook) and a copy submitted to your instructor by 5pm on the Wednesday preceeding lab.

- Have a plan for what you will do in lab that day (and in what sequence)
- Look up the MSDS (see blackboard link) for each potentially hazardous chemical that you have not worked with before

Be there: You need to show up to do chemistry. But that means more than just physically being in the room on time and for the entire time. You need to really “be there” mentally as well, so this means minimizing distractions and working hard to share tasks equally with your lab partner. **Be an engaged lab partner, stay on task, be efficient, and use safe practices** (see the Laboratory Safety Agreement).

Be organized: You need to keep a record of what you do during lab. This means more than just cutting-and-pasting the procedure into your notebook and saving electronic data. Record what you DID in lab, not what you should have done. You do not need to rewrite the entire procedure, but in all experiments there will be decisions you will need to make for the preparation of samples, the collection data, and when dealing with unforeseen obstacles – these are IMPORTANT and you need to record the details of your decisions. **Another scientist needs to be able to read your notebook, understand what you did, see/find your data, and follow your data analysis.**

Be thoughtful and reflective: You don't need to write a tome each week. Even bulleted phrases about interesting observations are great additions to your notebook record. You will do a lot of thoughtful reflecting (hopefully) in the analyses of data for your writing assignments.

Laboratory Notebook: You can keep either a hardcopy bound lab notebook or an **electronic laboratory notebook (ELN)**. An ELN will be a collection of organized files in a space that can be accessed by your instructor (e.g. the laboratory journal in BlackBoard or on your Google Drive). Your lab notebook serves many purposes. It is a diary of your time spent in lab, and a complete record of your experimental procedure, data, observations and ideas. Proper documentation of your work could provide the information needed for publishing a paper, writing a thesis, obtaining an award (NOBEL ! \$), getting a raise from your employer (\$), or receiving a patent (\$ \$). While experiments in this lab are unlikely to result in any of the above, we must practice! Please observe the following in your laboratory record-keeping (any of these aspects are fair game for assessment):

- For an ELN, you can type or digitally ink on your Word documents.
- Write legibly with the stylus. Do not erase any mistakes. You may cross-out erroneous entries but they must remain legible. Be sure to explain any such errors.
- Write directly into your notebook. When preparing for lab, reading literature for lab, and during lab, be sure to take notes directly into your bound notebook or MS-Word document. A clear outline format, without full sentences, is just fine. Be concise!
- Include references. If you find an important/pertinent piece of information somewhere else (such as in a book, catalogue, journal article, or on a reputable web site) copy the reference information directly into your MS-Word document or write it into your bound notebook – Include enough information so you could find it again if you had to!
- Format. The notebook entry for an experiment write up will generally include:
  - TITLE, DATE, LAB PARTNER.
  - OBJECTIVES/GOALS. Outline the important aspects behind the experiment, its design, and what you hope to accomplish. **This should be original work from each lab partner.**
  - PROCEDURE. Outline what you DID in lab, not what you SHOULD HAVE done. For procedure details you may cut and paste the lab handout, but be sure to note any modifications of the procedure.
  - RAW DATA. Record all data directly into your bound notebook or MS-Word document and never on loose paper. Data should be clearly and neatly labeled. If raw data are in Excel or another program, then reference the file names in your Word document and update raw data files to your BlackBoard notebook.
  - RESULTS. Show sample calculations for all spreadsheets. Label all data tables and graphs clearly, including relevant units. When possible, insert images of all spectra obtained on other instruments. **This should almost always be original work from each lab partner. If you are unsure, then ask the instructor.**
  - DISCUSSION. This is the section for critical analysis. You can list the main conclusions (full sentences not necessary!) and support them by referring back to specific results. Where appropriate, identify potential sources of error and predict how each would affect your results, and indicate further work that could be done and briefly explain its impact on the study. **This should be original work from each lab partner.**

## V. Scientific Writing and Presentations

Short **scientific writing assignments** will be given (~weekly) throughout the semester. These assignments will be done in the format required by the journal *Biochemistry* (see the journal's "Guidelines for Authors" PDF posted on the BlackBoard page), will be based on data you collect in the laboratory portion of this course, and will be submitted electronically as described by your instructor. Following feedback on these short assignments, you will be asked to prepare and give presentations (a scientific talk and a scientific poster) based upon two multi-week experiments. Use of the primary literature (scientific journals, NOT web pages) is crucial to set the context of your work. Details and timelines for these scientific presentations will be posted and discussed later in the semester.

## TENTATIVE Lecture/ Reading/Exam/Lab Schedule

<u>Week of....</u>	<u>Lecture Topic</u>	<u>Chapters in Text</u>	<u>Laboratory</u>
8/25	Introduction&Water	1&2	Pipettors & EXCEL
9/1	Water, Buffers, Acids/Bases	2	Buffers
9/8	Lipids and AAs	10,3	Amino Acids
9/15	AAs, peptides & proteins	3	Amino Acids
9/22	Protein 2° structure	4	Protein Conc.
<b>**EXAM#1 – Mon 9/29**</b>			
10/1	Protein 3° and 4° structure	4	Lysozyme #1
<b>“Middle” of term -- Fri 10/3</b>			
10/6	Structure methods, Pro Function	4,5	Lysozyme #2
<b>FALL BREAK</b>			
10/15	Reversible Ligand Binding	5	Lysozyme #3
10/20	Globins	5	PPT Presentations
10/27	Enzymes-Intro&Kinetics	6	Kinetics#1
<b>Withdrawal Deadline--Fri 10/31</b>			
<b>**EXAM#2 – Mon 11/3**</b>			
11/5	Enzymes-Inhib/Mech/Reg	6	Kinetics#2
11/10	Carbohydrates	7	Kinetics#3
11/17	Carbs, Nucleic Acids	7,8	Carbohydrates
11/24	Nucleic Acids	8	NONE (TG Break)
12/1	Membranes	11	Poster Presentations
<b>**FINAL EXAM – 12/9, 1:30pm**</b>			