

CHEMISTRY 323: BIOCHEMISTRY I

Fall 2019

Rachael Baker, PhD

Class time: M/W/Th/F 9:00 – 9:50 (CHEM323A) and 10:30 – 11:20 (CHEM323B) in SB302

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Office Hours: My scheduled office hours are Thursdays 12:30 pm - 2:30pm (DH231) and M/W/Th/F 10:00 am – 10:20 am (SB302). If you would like to meet outside these hours, I am happy to arrange another mutually convenient time.

PREREQUISITES

This course will be taught with the assumption that all students have successfully completed a course in organic chemistry (either CHEM 262 or 253) and are familiar with the basic foundations of cell biology (BIO 141 or 161). If you are concerned about either of these requirements, please talk to me soon.

REQUIRED MATERIALS

- Textbook: *Lehninger: Principles of Biochemistry, 6th or 7th Ed.* David Nelson & Michael Cox. W.H. Freeman & Company. New York.
- Additional articles and readings will be available on Moodle as they become relevant.

COURSE OBJECTIVES

The main goal of this course is to increase your understanding of the ways in which chemical principles play fundamental roles in biological systems. Key to this discussion is a mastery of content as well as an ability to use information to make informed decisions as scientists and Christians.

Student Learning Outcomes (SLOs)	Course Requirements Addressing SLOs	Assessment Strategies
Describe terms and concepts associated with biochemistry & physiological function	Reading, Lecture	Quizzes, Exams
Identify the qualitative & quantitative relationships between biomolecule structure and function, and the organizational principles of cellular structures	Reading, Lecture, Discussion	Quizzes, Exams
Sharpen individual and team critical thinking skills by predicting how perturbations lead to changes in a pathway or system	Discussion, Group Work	Group Work Assessments, Exams
Describe experimental approaches and methods and give examples of how they are used to address important biochemical questions	Lecture, Reading, Group Work	Group Work Assessments, Exams
Examine biochemistry or medicine as it relates to worship of the Creator and vocational service	Discussion, Writing	Journaling Assignments

Note: students may vary in their competency levels on these outcomes and they can expect to achieve these outcomes only if they honor all course policies, attend class regularly, complete all assigned work in good faith and on time, and meet all other course expectations of them as students.

COURSE FORMAT

The course is designed to optimize your long-term learning and ability to make connections between material presented throughout the semester. Content lectures will be interspersed with questions, problem solving, group work, and primary literature. Please feel free to ask questions at any point during class. When I ask questions, I may call on individual students to share their thoughts to ensure that we get the benefit of hearing from everyone.

COURSE NOTES

You will benefit greatly from reading the chapter before it is discussed in class. I will provide reading guides to help you extract the key principles and themes from each chapter. Quizzes may draw from material on the reading guide. The learning activities are designed to enhance your understanding of the material and appreciate connections between the various topics we discuss. ***Attendance and participation during class is critical for your mastery of the material.***

LEARNING ACTIVITIES

Quizzes: We will be covering a lot of material over the course of the semester and drawing connections between various key details and features. The purpose of the quizzes is to help you identify and remember key details throughout the semester. Quizzes will focus on content from recent course material. Most quizzes will also have at least one question from earlier material. Quizzes will be given at the start of class every day. You must be in class to take the quiz; no makeup quizzes will be allowed (excused absences will not count against you). I will drop your three lowest quiz grades.

Take Home Quizzes: Approximately once a week, I will ask you to respond to a short reading or answer a case study question. This work will be preparation for engaging in class during the class period after which the take home quiz is due. Take home quizzes will be due at the beginning of class. You must be in class to turn them in and receive credit.

Group Work: On some days, we will learn together by working through case studies or doing problem solving. Participation is expected of everyone. Details about participation will be provided the first time we do group work. At the end of each session, you will be given a chance to assess your participation and learning, which will factor into your participation grade. Please note that you will only be able to receive credit if you are present in class on a given day.

Faith Writing and Discussion: While themes of faith in relation to biochemistry will arise organically throughout the semester, we will also spend time throughout the semester thinking about the ways that Christian practices can improve outcomes when working to solve scientific problems. This project will run throughout the semester and will include a series of journaling exercises and class discussions. A detailed description of the assignment and key due dates are available on Moodle.

LEARNING ASSESSMENTS

Memorization Quizzes (3): Throughout the semester, you will take three quizzes demonstrating that you have memorized structures for (1) amino acid structures and abbreviations (Figure 3-5, **due September 13th**), common sugars (**due October 25th**), and (3) nucleic acids (Figure 8-4, **due November 22nd**). Quizzes can be taken at any time before the due date. You may take each quiz more than once.

Exams: There are three exams and a final. Each of the three mid-term exams will be cumulative closed-book, closed-note. *Exams will be designed to test your understanding of the course material – not just what you memorized!* For the final exam, you will be able to bring two pages (one-sided) of notes. The final exam will be composed mostly of questions that will require you to apply, analyze, and synthesize material you learned during the semester. The score on your final will replace your lowest exam score if you take all four exams and your final exam score is higher than your lowest exam score.

TENTATIVE ASSESSMENT RUBRIC

Quizzes	12 %
Take Home Quizzes	8 %
Memorization Quizzes (3)	6 %
Group Participation	8 %
Faith Writing and Discussion	8 %
Exams (3)	36 %
Final Exam	22 %

TENTATIVE GRADING SCALE*

93.0 – 100.0	A
90.0 – 92.9	A-
87.0 – 89.9	B+
83.0 – 86.9	B
80.0 – 82.9	B-
77.0 – 79.9	C+
73.0 – 76.9	C
70.0 – 72.9	C-
67.0 – 69.9	D+
63.0 – 66.9	D
60.0 – 62.9	D-
0.0 – 59.9	F

*Extra credit is not available. The average grade in this course is usually a B+. I may curve the class at the end of the semester. However, your grade will not be lower than that dictated by the tentative grading scale.

TENTATIVE COURSE OUTLINE*

Question	Date	Book	Assessments
<i>What is Biochemistry?</i>	Sept 4	1.1- 1.5	
	Sept 5 - 6	2.1 – 2.5	
<i>How Does Protein Sequence Determine Function?</i>			
Proteins	Sept 9 - 13	3.1 – 3.4	Amino Acid Quiz (Sept 13)
	Sept 16 – 20	4.1 - 4.4	
	Sept 23 - 30	5.2, 5.3, 5.1	<i>Humility Journaling (Sept 27)</i>
<i>Why do some enzymes exhibit faster than diffusion kinetics?</i>			
Enzymes	Sept 30 – Oct 14	6.1 – 6.5	EXAM 1 (Oct 4) <i>Listening Journaling (Oct 11)</i>
<i>How many proteins are there in humans?</i>			
Carbohydrates and Glycoproteins	Oct 14 – Oct 18	7.1 -7.4	Sugar Quiz (Oct 18)
Storage and Structural Lipids	Oct 21 - 25	10.1 – 10.3	<i>Sabbath Journaling (Oct 24)</i>
<i>How do proteins find their binding partners?</i>			
Membranes	Oct 25 – Nov 7	11.1 – 11.3	EXAM 2 (Nov 1)
Signaling	Nov 8 – 20	12.1, 12.2, 12.4, 12.6, 12.7, 12.11	<i>Hospitality Journaling (Nov 18)</i>
<i>What does all this extra DNA do?</i>			
Nucleic Acids	Nov 21 – Dec 5	8.1 – 8.4 and 9.1 – 9.2	Nucleic Acid Quiz (Nov 22) EXAM 3 (Dec 6)
Final Exam	CHEM323A (9:00 am) – Thursday, December 12 th at 1:30 pm CHEM323B (10:30 am) – Monday, December 16 th at 9:00 am		

**your learning is my principal concern, so I may modify the schedule to facilitate better learning*

ADDITIONAL COURSE NOTES

Attendance: Daily attendance is expected. It is very hard to be successful in this course if you are not present in class, which is where we highlight the key primary themes from the text and delve into complicated details. If you are not able to make it to class on a given day, please let me know so I can communicate any necessary information you may be missing, in particular about any take home material for upcoming quizzes. Repeated absences will factor into my ability to accommodate requests for extensions or altered exam dates and will significantly affect your quiz grades.

Rescheduling Assignments and Exams: You are expected to turn in material on time and take the tests at the scheduled time. If there are special circumstances preventing the completion of a particular assignment or exam, other arrangements should be made prior to the scheduled due date. I am happy to work with you on reasonable alternative arrangements as long as you discuss it with me before the due date. Failure to make arrangements prior to the due date will result in a late penalty of 10% per day.

Method of Communication: Students are expected to be present in class and check Moodle with reasonable frequency. Changes to the syllabus as well as information about upcoming assignments and exams will be communicated in class as well as posted on Moodle throughout the semester.

Accommodations: Calvin University is committed to providing access to all students. If you are a student with a documented disability, please notify a disability coordinator in the Center for Student Success (located in Spoelhof University Center 360). If you have an accommodation memo, please come talk to me in the first two weeks of class.

Drop Policy: Students must initiate all course drops by or before November 1. For a full semester refund, drops must be initiated by September 12. A 40% refund will be given for drops initiated by October 10.

Academic Dishonesty: It is perfectly acceptable to help each other. I encourage you to work together on any assignment unless I explicitly say otherwise. However, plagiarism and cheating will not be tolerated and may result in an F on the assignment or possible expulsion from the course. Plagiarism includes passing off others ideas and insights as your own without giving them credit. If you are in doubt about whether some form of assistance or use of materials constitutes academic dishonesty, please *ask me first*.

Questions: While I check email regularly, email isn't very useful for answering the more technical questions that might come up. If you are having trouble with the course, if you do not understand something important, if you have some special circumstance that is getting in the way of performing well in this course, or if you just want to talk about the course, come see me!

Classroom Environment: You can expect me, as the instructor, to be concerned for the educational experience of each student in the class, respectful of individual differences, encouraging of creativity, knowledgeable of and enthusiastic about the course material, prepared for class, reasonably open and accessible to discuss material and assignments, thorough and prompt in evaluating assignments, and rigorous yet supportive in maintaining high standards for performance. Students are expected to work, individually and together, to create an atmosphere that is safe, valuing of one another, and open to diverse perspectives. Students are expected to show courtesy, civility, and respect for one another and for the instructor. Comments that degrade or ridicule another, whether based on individual or cultural differences, are unacceptable.

Final Note: The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.