

**Colorado State University Department of Biochemistry**  
**BC 351-002 Principles of Biochemistry**  
Fall Semester 2017

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Study Sessions: TBD  
Office: TBA

Schedule: Yates 104 MTRF 1:00PM-1:50 PM

Prerequisites: CHEM 245 or CHEM 341 or CHEM 345; LIFE 102 or BZ 110 or BZ 120

Textbook: The **REQUIRED TEXT** is Principles of Biochemistry, 1<sup>st</sup> edition, by Aaron J. Sholders and Brian Kalet, Great Rivers Technology Publishers. An access code for the book can be purchased at the bookstore or at this URL: <http://www.grtep.com>

Objectives: Principles of Biochemistry is designed to introduce you to major topics in the field of biochemistry. The class is broken into three major units: Structural Biology, Protein Function, and Metabolism. In the first unit, we will focus exclusively on chemical concepts and protein structure. In the 2<sup>nd</sup> unit we will focus on enzymology, ligand binding, and membrane transport. The final unit will focus on carbohydrate metabolism and cellular respiration. Upon completion of the class students, at a minimum, should be able to:

1. Outline the major features of protein structure.
2. Explain the role that atomic hybridization and molecular configurations play in the development of protein structure.
3. Explain the role noncovalent forces play in stabilizing macromolecular structure.
4. Understand and describe the role pH plays in the development of macromolecular structure.
5. Describe the thermodynamic parameters that mediate biological reactions including: protein folding, membrane transport, carbohydrate catabolism and anabolism, redox chemistry, and ATP synthesis.

6. Explain the thermodynamic and molecular basis of enzymatic catalysis.
7. Define the main kinetic parameters that impact the rate of an enzyme that follows Michaelis-Menten kinetics.
8. Understand protein affinity for a ligand and predict how this is impacted by noncovalent interactions.
9. Define and recognize the major types of membrane transport and membrane transporters.
10. Outline the salient features of the central metabolic pathways of glycolysis, gluconeogenesis, and the citric acid cycle.
11. Understand how energy is conserved, utilized, and transformed throughout metabolic processes.
12. Recognize major features of metabolic regulation and apply these principles to glycolytic and gluconeogenic flux.
13. Discuss the principles of electron transport and ATP synthesis within the mitochondria.

Canvas:

I will be using Canvas this semester to make available to you lecture notes, exam study materials, and lecture recordings. On Canvas, you will find the following:

- a. Course home page:
  - i. When you login to this course this will be the default page.
- b. Announcements:
  - i. I will make periodic announcements within Canvas to keep you abreast with the “happenings” of the course.
- c. Modules:
  - i. There are 19 modules in this class. The 1<sup>st</sup> module is the syllabus module that contains:
    1. Syllabus and Course schedule
    2. eBook introductory recording
    3. How to use the ebook’s grade book
    4. Student Guide to Polleverywhere
  - ii. There are 14 modules that correspond directly to a chapter within the book. In each of these modules you will find:
    1. A PowerPoint file for the module’s set of lectures.
  - iii. There are 4 exam study materials modules:
    1. These modules contain: study guides, practice exams. They are found immediately following the last chapter for that exam.
- d. Assignments
  - i. A list of all your assignments (discussed below) with due dates.

- e. Grades:
  - i. I will report the grades on all your assignments in this tool as well as your final grade.
- f. People
  - i. A list of all the people currently enrolled in the course. This can be used to develop study groups if you like.
- g. Echo360
  - i. This page will take you to recordings of each days lecture.
- h. Media Gallery
  - i. This page contains media (mostly Youtube videos) that I have spent time researching and feel they will help you understand the material.

Attendance: Attendance to every class is strongly encouraged and will be a determining factor for your success in this class. If you miss a class, you will be held responsible for all material covered. Attendance to exams is mandatory. Obvious exceptions, such as a death in the family, hospitalization and extreme illnesses will be accepted and dealt with appropriately on a case-by-case basis.

Assignments: This class consists of 14 chapter quizzes (5 points each) and 4 exams (100 points each) as detailed below:

1. Chapter Quizzes – 70 points
  - a. These will be presented through the book. There will be a total of 14 quizzes equaling 70 points. You will have two opportunities to take the quizzes. Your highest score of the two attempts will be recorded. Due dates for the final attempt on each quiz are listed on the schedule.
2. Exams - 400 points
  - a. I am going to give four exams. Each one will be worth 100 points.

How to Study: The question I am most often asked by students is “How do I study for this class?” As such I have decided to provide the answer up front so you can get started right away!

The objective of studying is to learn the material that is being presented. Exams are designed to assess whether you have learned. So really the question is “How do I learn in this class?” I think the best way to do this is to come to class prepared. Do this by answering the questions I have given you in the study guides and your initial chapter quiz attempt **PRIOR TO THE DAY THAT YOU LISTEN TO THE MATERIAL.** To do this

you can use the text, the internet, my skeleton notes, and whatever other resource you find helpful. If you can't come to an answer you are satisfied with, no big deal, at least you have thought about the material before listening to the recording. Now when you listen to the recording your mind will be better prepared to understand the material I am presenting and you will be much more able to pick out the important points in my lecture. Once the lecture is done, review your notes, review the chapter, and maybe even listen to the lecture again and then reattempt to answer the questions in the study guide. After this take, the quiz a 2<sup>nd</sup> time.

In addition to this I also am providing several short answer questions and practice multiple-choice questions for each chapter. Attempt to answer these questions using your notes and the chapter content. Once you are satisfied that you have the correct answer submit it and the correct answer will then be displayed. After all this if you still feel confused then come and see me and I will hopefully set you straight.

Grades:

<u>Grade</u>	<u>Percentage</u>
A+	97-100%
A	90 - < 97%
B+	87 - < 90%
B	80 - < 87%
C+	77 - < 80%
C	70 - < 77%
D	60 - < 70%
F	below 60%

Grade Breakdown:

<u>Assignment</u>	<u>Points Counted</u>
4 Exams (100 points each)	400
14 Quizzes (5 points each)	70
Total	470

Poll Everywhere:

I have decided to use "Poll Everywhere" this semester. Poll everywhere is an alternative to iclickers with significantly more flexibility in the type of questions I can ask. The **program costs you nothing** but you will need to make a user account at the following URL:

[www.poll everywhere.com/register?p=418k3-94wk&pg=oifHZX&u=FEhSiCqW](http://www.poll everywhere.com/register?p=418k3-94wk&pg=oifHZX&u=FEhSiCqW)

I have posted a "Student Guide to Polleverywhere" on Canvas in the "Syllabus" module that you will want to look over. Once you make your user account you will be able to participate in a wide variety of questions I plan to present using this system. Questions can be responded to from any mobile device (smart phone, ipads or other tablets), laptop or computer.

From these devices, you can either text answers or login from a browser and respond to polls from that format as well. You can also respond via SMS text messaging on a standard flip-phone. If text messaging is your mode of choice understand that your plans standard text messaging rates will apply.

I am going to give only **participation points** for the use of Poll Everywhere. If you participate in **80%** of the polls I will give you 5 points of extra credit. Poll everywhere will be used essentially every day in class, and you are responsible for bringing a device that allows you to respond each day.

In addition to Poll Everywhere over the course of the semester you will find “practice quizzes” in the book for each chapter. These quizzes are comprised of multiple choice and short answer questions. They are optional however, I feel that they will be very helpful in preparing you for the exams. As an incentive to do this I will give 5 points extra credit to any student that completes **85% or more** of these questions. Keep in mind that you do not have to get the questions correct to get the extra credit, you simply need to do them.

Academic Integrity: This course will adhere to the Academic Integrity Policy found in the Colorado State University [General Catalog](#).

End of the Semester: I know that there will be a handful of people at the end of the semester that need “just a few points” to get the grade they desire. The extra credit assignments listed above will be designated as THE mechanism to get these points. **I WILL NOT NEGOTIATE GRADES AT THE END OF THE SEMESTER.** It is my expectation that you will accept the grade assigned to you and take responsibility for YOUR work throughout the semester. Grade negotiation always leads to someone receiving special treatment and is a policy that I cannot abide as I desire to maintain an atmosphere of academic honesty and integrity. If you are concerned about your grade please come and talk to me **DURING** the semester when something **can be done** about it.

**Lecture Schedule**  
**SUBJECT TO CHANGE**

DATE	DAY	TOPIC	TEXT	QUIZ (DUE DATE)
8/21	M	Introduction & Laying Foundations – <b>Lecture 1</b>	Chapter 1	
8/22	T	Laying Foundations – <b>Lecture 1</b>	Chapter 1	
8/24	R	Laying Foundations – <b>Lecture 1</b>	Chapter 1	
8/25	F	Laying Foundations – <b>Lecture 1</b>	Chapter 1	<b><i>1 (8/29)</i></b>

8/28	M	Molecular Interactions in a Biological Context – <b>Lecture 2</b>	Chapter 2	
8/29	T	Molecular Interactions in a Biological Context – <b>Lecture 2</b>	Chapter 2	<b>2 (8/29)</b>
8/31	R	Acid/Base Chemistry and the Limits of Biological Life – <b>Lecture 3</b>	Chapter 3	
9/1	F	Acid/Base Chemistry and the Limits of Biological Life – <b>Lecture 3</b>	Chapter 3	<b>3 (9/5)</b>
9/5	T	Amino Acids: The Building Blocks of Proteins – <b>Lecture 4</b>	Chapter 4	
9/7	R	Amino Acids: The Building Blocks of Proteins – <b>Lecture 4</b>	Chapter 4	<b>4 (9/12)</b>
9/8	F	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/11	M	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/12	T	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/14	R	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/15	F	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/18	M	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/19	T	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	
9/21	R	The Three-Dimensional Structure of Proteins – <b>Lecture 5</b>	Chapter 5	<b>5 (9/22)</b>
9/22	F	Enzymes: The Catalyst of Biological Life – <b>Lecture 6</b>	Chapter 6	
9/25	M	<b>Exam I (Lectures 1-5)</b>		
9/26	T	Enzymes: The Catalyst of Biological Life – <b>Lecture 6</b>	Chapter 6	
9/28	R	Enzymes: The Catalyst of Biological Life – <b>Lecture 6</b>	Chapter 6	<b>6 (10/3)</b>
9/29	F	Enzyme Kinetics: Measuring and Comparing Enzyme's Abilities – <b>Lecture 7</b>	Chapter 7	
10/2	M	Enzyme Kinetics: Measuring and Comparing Enzyme's Abilities – <b>Lecture 7</b>	Chapter 7	<b>7 (10/3)</b>
10/3	T	Ligand Binding, Allostery, and Cooperativity – <b>Lecture 8</b>	Chapter 8	
10/5	R	Ligand Binding, Allostery, and Cooperativity – <b>Lecture 8</b>	Chapter 8	
10/6	F	Ligand Binding, Allostery, and Cooperativity – <b>Lecture 8</b>	Chapter 8	
10/9	M	Ligand Binding, Allostery, and Cooperativity – <b>Lecture 8</b>	Chapter 8	
10/10	T	Ligand Binding, Allostery, and Cooperativity – <b>Lecture 8</b>	Chapter 8	
10/12	R	Ligand Binding, Allostery, and Cooperativity – <b>Lecture 8</b>	Chapter 8	<b>8 (10/13)</b>
10/13	F	Membrane Proteins and Transport – <b>Lecture 9</b>	Chapter 9	
10/16	M	<b>Exam II (Lectures 6-8)</b> <b>LAST DAY TO WITHDRAW</b>		

10/17	T	Membrane Proteins and Transport – <b>Lecture 9</b>	Chapter 9	
10/19	R	Membrane Proteins and Transport – <b>Lecture 9</b>	Chapter 9	
10/20	F	Membrane Proteins and Transport – <b>Lecture 9</b>	Chapter 9	<b>9 (10/24)</b>
10/23	M	Bioenergetics and Metabolic Themes – <b>Lecture 10</b>	Chapter 10	
10/24	T	Bioenergetics and Metabolic Themes – <b>Lecture 10</b>	Chapter 10	
10/26	R	Bioenergetics and Metabolic Themes – <b>Lecture 10</b>	Chapter 10	
10/27	F	Bioenergetics and Metabolic Themes – <b>Lecture 10</b>	Chapter 10	
10/30	M	Bioenergetics and Metabolic Themes – <b>Lecture 10</b>	Chapter 10	<b>10 (10/31)</b>
10/31	T	Carbohydrate Metabolism – <b>Lecture 11</b>	Chapter 11	
11/2	R	Carbohydrate Metabolism – <b>Lecture 11</b>	Chapter 11	
11/3	F	Carbohydrate Metabolism – <b>Lecture 11</b>	Chapter 11	
11/6	M	Carbohydrate Metabolism – <b>Lecture 11</b>	Chapter 11	
11/7	T	Carbohydrate Metabolism – <b>Lecture 11</b>	Chapter 11	<b>11 (11/10)</b>
11/9	R	Metabolic Control - <b>Lecture 12</b>	Chapter 12	
11/10	F	Metabolic Control - <b>Lecture 12</b>	Chapter 12	
11/13	M	<b>Exam III (Lectures 9-11)</b>		
11/14	T	Metabolic Control - <b>Lecture 12</b>	Chapter 12	
11/16	R	Metabolic Control - <b>Lecture 12</b>	Chapter 12	
11/17	F	Metabolic Control - <b>Lecture 12</b>	Chapter 12	<b>12 (11/28)</b>
11/18-26		<b>Fall Break</b>		
11/27	M	The Citric Acid Cycle- <b>Lecture 13</b>	Chapter 13	
11/28	T	The Citric Acid Cycle- <b>Lecture 13</b>	Chapter 13	<b>13 (12/5)</b>
11/30	R	Oxidative Phosphorylation – <b>Lecture 14</b>	Chapter 14	
12/1	F	Oxidative Phosphorylation – <b>Lecture 14</b>	Chapter 14	
12/4	M	Oxidative Phosphorylation – <b>Lecture 14</b>	Chapter 14	
12/5	T	Oxidative Phosphorylation – <b>Lecture 14</b>	Chapter 14	
12/7	R	Oxidative Phosphorylation – <b>Lecture 14</b>	Chapter 14	
12/8	F	Oxidative Phosphorylation – <b>Lecture 14</b>	Chapter 14	<b>14 (12/8)</b>
12/15	F	<b>Final Exam (Lectures 12-14) – 9:40AM-11:40AM Yates 104</b>		

