

COURSE BC 351 SYLLABUS

INSTRUCTOR INFORMATION

Instructor: Paul Laybourn, Ph.D., Professor of Biochemistry and Molecular Biology
Office: 279 Molecular and Radiological Biosciences building (not the Microbiology building)
Email: paul.laybourn@colostate.edu Phone: 970-491-5100
Office hours: Mondays and Wednesdays 3-4 PM

LEARNING ASSISTANT INFORMATION

Yaqoob Al Aamri - yalaamri@rams.colostate.edu
Hannah Backiel - hbackiel@gmail.com
Caleb Dorsey - calebd1837@gmail.com
Simbi Umwali - simbi.umwali@gmail.com

TECHNICAL SUPPORT

Need technical assistance with your online course? Try the following:

- Visit the [Canvas Student Resources](#) for guides and videos.
- Visit [Central I.T. Technical Support Helpdesk](#) for technical support.
- Call 970-491-7276.
- Email [Help Desk Support](#).

COURSE DESCRIPTION

A complete understanding of living systems rests on a foundation consisting of three core areas or key concepts. These areas are 1) the parts of cells – macromolecules, 2) cellular processes – biological chemical reactions, catalysis, energy transformations, and 3) cellular driving forces – chemistry of biological molecules, diffusion/random events, dynamic equilibrium, bioenergetics. These key concepts are central to understanding normal cell function and behavior and how they go awry in cancer cells. These key concepts provide a framework for making sense of cells and organisms. Living systems are very complex and learning all the cellular parts and processes can be overwhelming. Focusing at this “10,000 foot level” first before learning the myriad details can make learning biochemistry more approachable.

Students will learn core concepts and definitions in biochemistry. Understanding and critical thinking are most important and lasting, but knowing a certain amount of content knowledge and learning the biochemistry “language” is required for hanging that understanding on. I hope that you come away from this class thinking that biochemistry is cool and become excited to learn more and in greater depth. This course will only give you the tip of the iceberg, but I hope it will provide a springboard for delving into your future areas of interest in greater detail.

COURSE PREREQUISITES AND COREQUISITES

BZ 110 or BZ 120 or LIFE 102; CHEM 245 or CHEM 341 or CHEM 345.

COURSE GOALS

Upon the completion of BC 351, a successful student will be able to:

- Apply biochemical principles in living systems and advocate for their centrality;
- Illustrate and analyze protein structure and function and cellular metabolism in terms of biochemical principles – the chemical properties of the molecular components (parts) and the biophysical driving forces;
- Name, categorize and explain the composition and structure of proteins and cell membranes in biochemical terms;
- Define, outline and sketch the function of proteins in intermolecular interactions, catalysis and transmembrane transport;
- Describe, illustrate and differentiate the stages, pathways and steps in cellular metabolism (glycolysis, citric acid cycle, β -oxidation and oxidative phosphorylation);
- Restate, examine and interpret the key aspects of metabolic regulation;
- Review, inform, demonstrate and justify how the biochemical core concepts and big ideas inform the current understanding of cancer biology.

REQUIRED TEXTS

Lehninger Principles of Biochemistry, 5th, 6th or 7th edition, by Nelson and Cox, W. H. Freeman Publishers, ISBN-13: 978-0716771081 SBN-10: 071677108X ISBN-13: 978-1429234146 ISBN-10: 1429234148

OTHER REQUIRED AND SUPPLEMENTAL MATERIALS

Assignments

How will you know that you have learned and understood the BC 351 core concepts and ideas? What will your grade be based upon?

1. **12 Module Quizzes** – maximum 50 points total possible

The quizzes will be administered on Canvas. Quizzes will be available on Fridays at 9:00 AM and will be due (must be completed) the following Monday at 8:00 AM (see course schedule). There will be 12 quizzes. You will be allowed unlimited attempts and you will receive your highest score. Therefore, you can take the quiz until you get all the questions correct.

2. **4 Exams** – 400 points total possible

There will be four exams worth 100 points apiece. The exams will be administered in class. You will have one hour and 50 minutes to complete each exam (Exams 1-3 7:00-8:50 AM). Exams will consist of two matching questions (1 point per match, 10 points total), 50 grouped true/false questions (1.4 points per question, 70 points total) and one four or five-part free response question (4 or 5 points per part, 20 points total). The exams will only cover what I talk about in class and emphasize in the study guides and quizzes. Exams are closed notes, text, Internet, etc.

3. **iClickers** – 20 points total maximum

You will want to purchase an iClicker remote for in-class participation. iClicker is a response system that allows you to respond to questions I pose during class; you will receive points for participation for half points for correct answers. To receive this credit, you will need to register your iClicker remote by the first Friday of the semester (January 25, 2019).

[For iClicker Web Registration:](#)

Register your iClicker remote, a one-time registration, in the BC 351 Canvas course to sync your iClicker with the Canvas gradebook. iClickers will be used every day in class, and you are responsible for bringing your remote daily.

In-class iClicker questions will be worth 1 point for answering and an additional 0.5 points for answering correctly. These points will be weighted to be worth a maximum total of 20 points (as part of the 510 total possible core points) at the end of the semester. A common misconception is that once a student has accrued 20 points they have gotten the maximum points they can get for iClicker question participation. That would be counterproductive, since the main purpose behind iClickers is class participation. The student(s) with the most iClicker points will get 20 points. Everyone else will get a proportion of the 20 points scaled to what proportion of the highest number of points they earned. For example, if the highest score is 450 points, that student will get 20 points. If someone else gets 430 points they will get $430(20/450) = 19.11$ points. In the grand scheme of a course grade they will be worth 19 points out of the 20 possible iClicker points out of the total 510 points possible in the course.

4. In Class Active Learning Activities – 40 points, 10 points each activity, 4 activities

There will be five in class active learning activities to provide interactive, hands-on and engaging means to better grasp difficult concepts. These activities are designed to integrate core concepts and big ideas. Four of these learning activities (Free Energy, Protein Folding, Transmembrane Transport and Metabolic Regulation) will have pre- and post-activity homework assignments worth 5 points each. See the course schedule for due dates. The learning activities will focus on thermodynamics, protein structure and folding, transmembrane transport and metabolic regulation.

5. Recitations – 15 points extra credit, must attend 75% to get any points

There will be weekly voluntary recitations led by undergraduate Learning Assistants (LAs) offered at a range of days and times. LAs will facilitate group problem solving activities and discussions on course related materials. Student should join LA led groups on the “People” page on Canvas. Attending a recitation is not required. However, students can earn 15 extra credit points by attending 75% (10) of the recitations.

6. Discussion Board Posts (Coffee Shop) and Weekly Questions Surveys

Submission of Discussion Board posts under the pinned Coffee Shop threads and completing the Weekly Questions Surveys are not required. However, each Discussion Board post and survey completion is worth 1 extra credit point. There is also the option to post a video describing the basics of protein structure for extra credit points.

Course Materials

I will provide materials on Canvas to help you grasp my organization of the course content. These materials define what concepts I want you to know and understand. The materials also aid your study outside of class.

1. Textbook pages and supplemental articles to read
2. Module outlines
3. Lecture slides for note taking
4. Module study guides (and answers as pdf and recorded tutorial)
5. Lectures recordings
6. Recitation group activity questions and answers
7. In class learning activity homework assignments

COURSE PRESENTATION AND PROCEDURES

Organization of content: 1 module/week comprised of readings, lectures, recordings, learning activities and graded assignments. | Students should complete all tasks in each module before moving on.

How to Study

Come to the lectures prepared (know something about what I will talk about) having read the textbook pages and articles provided and looked over the lecture outlines and the study guide questions for the lecture. Review lecture notes and the study guide questions and attempt to answer these questions completely. If you do not have a good understanding of the questions and how to answer them ask about them by email or by posting your question on the Canvas Discussion Board (Coffee Shops). Use the quizzes as practice for the exams. Study your notes including key terms and concepts, and then take the quiz the first time without your notes. If you do not do as well as you would like, review your notes again and take the quiz again. Repeat this process until you can answer all the questions correctly. Finally, to study for exams I strongly suggest that you *practice drawing out* the biochemical processes on a white board multiple times rather than just looking over them and that you start this process a few weeks before the exam. You will find the information sticks in your memory much more quickly and you will recognize gaps in your understanding more readily. Using this approach in a study group is even more effective.

GRADING

As a student enrolled in this course, one of your responsibilities is to submit course work by the due dates listed in the Course Schedule. With that said, I take my role as your instructor very seriously, and, in fact, I care about how well you do in this course and that you have a satisfying, rewarding experience.

Each of the 4 exams in BC 351 will be worth 100 points each (400 total). A total of 50 points are possible for quizzes. Each of the 12 quizzes will be worth 5 to 7 points but their value in your final grade will be scaled to 50 points total possible (for example, 60 points/1.2 = 50 points possible). In addition, there will be 20 iClicker points and 40 in-class active learning activity points possible for a total of 510 core assignment points possible. If you achieve the following point totals for BC 351 you will be assured of the minimum letter grade shown:

459-510 ($\geq 90\%$)	A
408-458 (80-90%)	B
357-407 (70-80%)	C
306-356 (60-70%)	D
<306 (<60%)	F

Each exam will not be curved individually, but the final total points required for a course grade might be curved downward depending on the averages and distribution of points. Your grade for BC 351 will be determined based on the total 510 points (combined). Students in BC 351 have averaged around 80% or greater of the total points possible over the past several years. Thus, I have never graded on a curve. Please note that plus/minus grading will be used.

Missed Exams and Re-grading of Exams

There will be no make-up exams offered. Exams or quizzes you have missed without an excuse will be graded as zero. If you have an excused absence (based on written or other verifiable evidence) from

an exam or quiz, your final grade will be based on a percentage of the total possible points for the exams and quizzes you did take. Students can schedule to take an exam early with the instructor if they know they cannot take the exam at the regularly schedule date and time. If you have questions concerning the grading of any of your exams or quizzes, the questions you want re-graded should be circled and the exam or quiz should be turned in to the instructor within one week of the date of its return to the class after grading. You must also provide a written explanation as to why you feel the question should be re-graded. Exams will not be accepted for re-grading after this one-week period, so go over your exam carefully soon after it has been returned to you.

ASSIGNMENT DETAILS

Quizzes will consist of 10 to 12 multiple choice questions taken on Canvas. Exams will consist of matching questions (2 five part questions worth 10 points each), multiple choice questions (10 questions worth 4 points each) and two free response questions (2 five part questions worth 20 points each). See example for exam 1 posted on Canvas (note: no key or additional exam examples will be posted).

GRADE DESCRIPTION

97.5-100 % = A+	90-97.4 % = A	88.8-89.9 % = A-
87.5-88.7 % = B+	80-87.4 % = B	78.8-80 % = B-
77.5-78.7 % = C+	70-77.4 % = C	
	60-69.9 % = D	
	0-59.9 % = F	

MAKE UP POLICY

There will be no make-up exams offered. Exams or quizzes you have missed without an excuse will be graded as zero. If you have an excused absence (based on written or other verifiable evidence) from an exam or quiz, your final grade will be based on a percentage of the total possible points for the exams and quizzes you did take. Students can schedule to take an exam early with the instructor if they know they cannot take the exam at the regularly scheduled date and time.

ACADEMIC INTEGRITY POLICY

This course will adhere to the CSU Academic Integrity [Policies and Guiding Principles](#) as found in the General Catalog and the [Student Conduct Code](#).

Academic integrity is conceptualized as doing and taking credit for one's own work. Violations of the university's academic integrity standards include, but are not limited to:

- Cheating—includes using unauthorized sources of information and providing or receiving unauthorized assistance on any form of academic work or engaging in any behavior specifically prohibited by the faculty member.
- Plagiarism—includes the copying of language, structure, ideas, or thoughts of another, and representing them as one's own without proper acknowledgment.

- Unauthorized Possession or Disposition of Academic Materials—includes the unauthorized selling or purchasing of examinations or other academic work; stealing another student’s work; unauthorized entry to or use of material in a computer file; and using information from or possessing exams that an instructor did not authorize for release to students.
- Falsification—includes any untruth, either verbal or written, in one’s academic work.
- Facilitation—includes knowingly assisting another to commit an act of academic misconduct.

At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.

CSU HONOR PLEDGE

Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, I will ask that you affirm the CSU Honor Pledge as part of completing your work in this course. *While you will not be required to affirm the honor pledge, you will be asked to affirm the following statement at the start of your exams:*

"I have not given, received, or used any unauthorized assistance."

Further information about Academic Integrity is available at CSU’s [Practicing Academic Integrity](#).

UNIVERSAL DESIGN FOR LEARNING

I am committed to the principle of universal learning. This means that our classroom, our virtual spaces, our practices, and our interactions be as inclusive as possible. Mutual respect, civility, and the ability to listen to others carefully are crucial to universal learning.

If you are a student who will need accommodations in this class, please contact me to discuss your individual needs. Any accommodation must be discussed in a timely manner prior to implementation. A verifying memo from [Resources for Disabled Students](#) may be required before any accommodation is provided.

SYSTEM, MULTIMEDIA, AND SOFTWARE REQUIREMENTS

Having trouble with the multimedia in this course? See the solutions below. Also, it is highly recommended that you access your course via a **high-speed Internet connection**.

- Problems with opening PDFs?
 - Download [Adobe Reader](#).
- Canvas acting funny?
 - Review Canvas guide for [Supported Browsers](#).
- YouTube videos not playing?
 - Download [Flash Player](#).
- Videos not opening or playing on your Mac?

- Download [Windows Media Components for QuickTime](#).
- Still having issues:
 - Call the **CSU Help Desk at 970-491-7276** or [Email Help Desk Support](#)

You must have speakers installed and working properly on your computer before beginning the course.

You may need access to Microsoft Word, PowerPoint, and/or Excel to complete assignments. If you do not have access to the Microsoft Office applications, you may use one of the following free resources that allow you to save your files with Microsoft Office file extensions (.doc, .docs, .ppt, .xls.):

- [Google Apps for CSU](#)—a free, outsourced communications suite endorsed by The University Technology Fee Advisory Board (UTFAB)
- [Office 365](#)—the full version of Microsoft Office free of charge for CSU students.

SUGGESTED STUDY METHODS

College education requires skills and habits that may be less essential in traditional courses. To be successful in this course you will need:

- Space—Establish a comfortable and well-organized physical study space.
- Time management skills—Set personal, group study times as well as classroom times
- Organization skills—Print out all class material (modules, PowerPoints, assignments, additional resources, and any work you generate) and keep everything in a single location. Maintain electronic backups of all class materials.
- Communication skills—Demonstrate a willingness to interact with your instructor and classmates through email, phone calls, discussion boards, and active participation in all in-class activities.
- Initiative—Seek help from your instructor and classmates, ask questions as they arise.
- Discipline—Pace yourself, complete all activities and assignments before the due date, follow through on all class requirements to completion. Start studying a few weeks before each exam.

The more closely you adhere to the recommendations above the greater your chances of having a successful semester and a rewarding BC 351 experience.