

**Colorado State University Department of Biochemistry
BC 403 Comprehensive Biochemistry II – Metabolism
Spring 2022**

Instructor: Aaron Sholders
Office: AZ E206D
Phone: 491-7916
Email: aaron.sholders@colostate.edu
Office hours: Monday 3:00 – 4:00PM

LA's: Scott Burlingham (scott.burlingham@colostate.edu)
Sam Snyder (samuel.snyder@rams.colostate.edu)
Brooke Harris (brooke.harris@colostate.edu)
Cole Shepherd (cole.shepherd@colostate.edu)

Q&A Sessions: Scott Burlingham – TBA
Sam Snyder – TBA
Brooke Harris – TBA
Cole Shepherd – TBA

Schedule: 2:00 - 2:50 P.M. MWF in Stadium 1205.

Prerequisites: CHEM 245 or CHEM 341 or CHEM 345

Textbook: The **suggested text** is:
1. Lehninger's Principles of Biochemistry, Nelson, Cox, 7th Edition, WH Freeman
Other texts that would work:
1. Lehninger's Principles of Biochemistry, Nelson, Cox, 6th Edition, WH Freeman
2. Textbook of Biochemistry with Clinical Correlations 6th Edition, Wiley-Liss
3. Voet and Voet Biochemistry 4th Edition, Wiley
4. Berg, Tymoczko, Gatto, Stryer Biochemistry 8th edition, Freeman-MacMillan

Prerequisites: CHEM 245 or CHEM 341 or CHEM 345

Objectives: BC403 is designed to provide an understanding of the molecular and cellular features that constitute and regulate the central pathways in metabolism. We will focus on metabolism of carbohydrates, lipids, and amino acids, from absorption to tissue specific utilization and production. A complete list of Learning objectives will be placed on Canvas. Students will be strongly encouraged throughout the semester to read and understand these objectives.

Course Design: In a course covering a subject, which is the core of biochemistry, a balance has to be struck between covering a variety of topics and, at the same time, going into

sufficient depth to make for rewarding study. BC403 has been designed with this constraint in mind. The course can be divided into 5 units:

- Unit 1 – Laying the Foundations (**Lecture 1**)
- Unit 2 – Carbohydrate Metabolism (**Lectures 2 – 6**)
- Unit 3 – Cellular Respiration (**Lectures 7 – 9**)
- Unit 4 – Lipid Metabolism (**Lectures 10 – 11**)
- Unit 5 – Amino Acid Metabolism (**Lecture 12**)

Canvas: All course material will be presented via Canvas:

1. In Canvas you will find the following:
 - a. Course home page:
 - i. When you login to this course this will be the default page.
 - b. Announcement:
 - i. I will make weekly “announcements” regarding what is due for that particular week.
 - ii. I will also use this page to update you on the “happenings” in the course.
 - c. Modules:
 - i. There are a number of modules in this class. The 1st module is the syllabus module that contains the “Start here” page. If you haven’t already, please go to this page and work your way through the first steps for this class
 - ii. Thirteen Lecture Modules that contain:
 1. A powerpoint file for that modules set of lectures.
 2. Links to discussion forums, quizzes, and other assignments for that particular module.
 - iii. Four exam study materials modules that contain:
 1. Study guides, practice exams, and learning objectives. They are found immediately following the last chapter for that particular exam.
 - d. Quizzes:
 - i. There will be 12 total quizzes in this class that will all be found on Canvas (in the lecture modules).
 - e. Grades:
 - i. I will report the grades on all your assignments in this tool as well as your final grade.
 - f. Echo360:
 - i. This page will take you to recordings of each day’s lecture and also be a place in which students can join the livestream of the class.

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, extreme illnesses, or University excused absences will be accepted and dealt with appropriately on a case-by-case basis.

SDC arrangements: If you are a student who will need accommodations in this class due to a disability or chronic health condition, please request that the SDC send me an accommodation letter. If you do not already have these accommodation letters, please contact the SDC as soon as possible to initiate the process of setting up accommodations. The SDC is located in room 121 of the TILT building. You can reach them by phone at 970-491-6385 or visit www.disabilitycenter.colostate.edu

Assignments: The assignments in this class consist of the following:

1. Quizzes – 60 points
 - a. There will be 12 quizzes each worth five points. Quizzes will be presented on Canvas and will be open for a 1-week period of time. Once you begin the quiz you will have 25 minutes to complete it. Due dates for quizzes will be announced. You will have two opportunities to take each quiz.
2. Problem sets – 65 points
 - a. Five problem sets will be posted on Canvas during the course of the semester. Written answers to the questions will be due on the specified dates (announced and stated on the assignment) and will be graded for accuracy and completeness and checked for plagiarism.
 - b. Instructions on how to complete these will be given in class.
3. Exams - 360 points
 - a. Four exams are scheduled. The exams are not cumulative, i.e. they will cover only material presented in the lectures following the previous exam. All of the exams will include both objective and short answer essay questions. The format for the exams will be described in class.
4. Metabolic map puzzle – 50 points
 - a. This semester we will have five metabolic map assignments. Each student will be given eight “sections” of a partially completed metabolic map. As we work our way through each pathway, students will be asked to fill in details on the map and put together the “puzzle”. Detailed instructions for each portion of the puzzle will be given the day we work on the puzzle. There will be a total of five portions of the puzzle each worth 10 points.

Grades: Final grades for the course will be assigned as follows:

<u>Grade</u>	<u>Final Average</u>
A+	97-100%
A	90 - 96%
B+	87 - 89%
B	80 - 86%
C+	77 - 79%
C	70 - 76%
D	60 - 69%
F	<60%

If appropriate, the final averages required for a specific grade will be reduced to compensate for a low final class average or A- and B- grades may be used to better discriminate breaks in the grade distribution.

Grade Breakdown:	<u>Assignment</u>	<u>Points Counted</u>
	4 Exams (90 points each)	360
	5 Problem sets (13 points each)	65
	Metabolic Map Puzzle	50
	<u>12 quizzes (5 points each)</u>	<u>60</u>
	Total	535

Extra Credit: I will use “iClicker Reef” this semester. The program costs you nothing but you will need to make a user account if you haven’t already done so.

Here is a link to the [student iClicker information](#) page where you can learn how to make a student account and also how to prepare your device to answer questions in the classroom. Questions can be responded to from any mobile device (smart phone, ipads or other tablets) or laptop. For mobile devices you will want to download the [mobile app](#). For laptops you will be able to log into the [iClicker Reef website](#). I do NOT recommend using the iClicker remote as not all questions I will ask can be responded to from this device.

I am going to give only **extra credit points** for the use of iClickers. If you participate in **80%** of the polls I will give you **10 points of extra credit**. The iClickers will be used essentially every day in class, and you are responsible for bringing a device that allows you to respond each day.

Finally, your LA’s will be holding weekly Q&A sessions. The timing of these will be posted on Canvas and begin the 2nd week of class. There will be a total of 14 weeks of Q&A sessions. If you participate in 12 of the 14 weeks (you only need to attend one Q&A session to be marked as attending) I will give you **5 points extra credit**.

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

COVID19: **Important information for students:**

Masks are required inside university buildings. You must also meet university vaccine or exemption requirements.

All students are expected and required to report to the COVID Reporter (<https://covid.colostate.edu/reporter/>) when:

- You suspect you have symptoms of COVID, regardless of whether or not you are vaccinated and even if your symptoms are mild
- You have tested positive for COVID through a non-CSU testing site, such as home test or test at a pharmacy
- You believe you may have been exposed to COVID go to the COVID Reporter and follow the guidance under “I believe I have been in close contact with someone who has COVID-19.” This guidance will depend upon your individual circumstances

You will not be penalized in any way for reporting symptoms or concerns.

Do not ask me as your instructor to report for you. It is your responsibility to report through the COVID Reporter promptly.

As your instructor I may not ask you about vaccination status or if you have COVID but you may freely volunteer to send me information from a public health official - if you have been asked to isolate or quarantine.

When you complete the COVID Reporter, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600.

For the latest information about the University’s COVID resources and information, including FAQs about the spring semester, please visit the **CSU COVID-19 site** <https://covid.colostate.edu/>.

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 assignment 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 through hard work and diligent effort.

Lecture Schedule
SUBJECT TO CHANGE

DATE	DAY	TOPIC	TEXT READING	QUIZZES	ASSIGNMENTS
1/19	W	Laying the Foundation – Lecture 1	225-230; 491-524; 575-588		
1/21	F	Laying the Foundation – Lecture 1			
1/24	M	Laying the Foundation – Lecture 1			
1/26	W	Glucose Absorption – Lecture 2	408-410; 421	Quiz 1,2,3	
1/28	F	Glucose Absorption – Lecture 2			
1/31	M	Glycolysis – Lecture 3	533-558		Problem Set #1
2/2	W	Glycolysis – Lecture 3		Quiz 4	
2/4	F	Gluconeogenesis (GNG) – Lecture 4	558-564		
2/7	M	Glycogen metabolism – Lecture 5	601-614		
2/9	W	Glycogen metabolism – Lecture 5		Quiz 5	Problem Set #2
2/11	F	Regulation of glucose metabolism – Lecture 6	440-465, 589-599, 932-935		Metabolic Puzzle #1
2/14	M	Regulation of glucose metabolism – Lecture 6			
2/16	W	Catch-up			
2/18	F	Exam 1	<u>Lecture 1-5</u>		
2/21	M	Regulation of glucose metabolism – Lecture 6			
2/23	W	Regulation of glucose metabolism – Lecture 6			
2/25	F	Regulation of glucose metabolism – Lecture 6		Quiz 6	
2/28	M	Pyruvate dehydrogenase complex – Lecture 7	619-624		
3/2	W	Citric acid cycle – Lecture 8	624-642		Problem set #3

3/4	F	Citric acid cycle – Lecture 8			Metabolic Puzzle #2
3/7	M	Catch-up		Quiz 7	
3/9	W	Exam 2	<u><i>Lectures 6-8</i></u>		
3/11	F	Oxidative phosphorylation – Lecture 9	565-570;711-739; 742-743		
3/14-3/18	Spring Break				
3/21	M	Oxidative phosphorylation – Lecture 9			
3/23	W	Oxidative phosphorylation – Lecture 9			
3/25	F	Oxidative phosphorylation – Lecture 9		Quiz 8	
3/28	M	Oxidative phosphorylation – Lecture 9			
3/30	W	Oxidative phosphorylation – Lecture 9			
4/1	F	Oxidative phosphorylation – Lecture 9			
4/4	M	Oxidative phosphorylation – Lecture 9		Quiz 9	Metabolic Puzzle #3
4/6	W	Lipid absorption and transport – Lecture 10	649-652; 826-830; 842-854		
4/8	F	Catch-up			
4/11	M	Exam 3	<u><i>Lecture 9</i></u>		
4/13	W	Lipid absorption and transport – Lecture 10			
4/15	F	Lipid absorption and transport – Lecture 10			
4/18	M	Lipid absorption and transport – Lecture 10			
4/20	W	Lipid metabolism – Lecture 11	653-670; 811-826	Quiz 10	
4/22	F	Lipid metabolism – Lecture 11			
4/25	M	Lipid metabolism – Lecture 11			Metabolic Puzzle #4
4/27	W	Lipid metabolism – Lecture 11		Quiz 11	Problem Set #4

4/29	F	Amino acid absorption/metabolism – Lecture 12			
5/2	M	Amino acid absorption/metabolism – Lecture 12			
5/4	W	Amino acid absorption/metabolism – Lecture 12			Problem Set #5
5/6	F	Catch-up		Quiz 12	Metabolic Puzzle #5
5/10	T	Exam 4 4:10 – 6:10PM (STDM 1205)	<u><i>Lecture 10-12</i></u>		