

Colorado State University Department of Biochemistry
BC 403 Comprehensive Biochemistry II – Metabolism
Spring 2023

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

LA's: Margaret Walker (margaret.walker2@colostate.edu)
Drop-in hours: Tuesday 2:30-3:30
Office: MRB 336

Schedule: 4:00 – 5:15 P.M. TR in Stadium 1205.

Prerequisites: **BC351 or BC401**; 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

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. Twelve Lecture Modules that contain:
 1. A powerpoint file for that modules set of lectures.
 - d. Assignments:
 - i. Quizzes, problem sets, metabolic diagrams, and group exams will all be turned in on Canvas.
 - 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 – 45 points
 - a. There will be 9 quizzes each worth five points. Quizzes will be presented on Canvas and will be open for a 1-week period

of time. Due dates for quizzes are on the schedule below but are subject to change. You will have two opportunities to take each quiz.

2. Problem sets – 50 points
 - a. Five problem sets will be posted on Canvas during the course of the semester. Written answers to the questions will have to be uploaded on specified dates (see schedule below, again subject to change) and will be graded for accuracy, completeness, and checked for plagiarism.
3. Metabolic Diagrams – 50 points
 - a. This semester we will have five metabolic diagram assignments. Hand-written diagrams will have to be uploaded on specified dates (see schedule below, again subject to change) and will be graded for accuracy, completeness, and checked for plagiarism.
4. Group Exams - 225 points
 - a. Three group exams will be given consisting entirely of written response answers. Group exams will need to be accomplished in groups no bigger than 5 people and no smaller than 2 people. You may select your own group. Instructions for communicating members of your group to the instructor will be given in class. The exams will be on Canvas. They will be open for a one-week period. The 1st one will be worth 75 points, the 2nd one worth 100 points, and the last one worth 50 points. Instructions for completing the exams will be given as the time approaches.
5. In Class Exams - 225 points
 - a. Three in-class exams are scheduled (see schedule below). All of the exams will include only matching, multiple choice, and T/F questions. In class exams will be taken individually and students will be allowed a single 8.5 x 11 handwritten sheet of notes to use during the exam.

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>
	3 Group Exams (Avg 75 points each)	225
	3 In class exams (Avg 75 points each)	225
	5 Problem sets (10 points each)	50
	5 Metabolic Diagrams (10 points each)	50
	<u>9 quizzes (5 points each)</u>	<u>45</u>
	Total	595

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.

Academic Integrity: 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 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
1/17	T	Laying the Foundation – Lecture 1	225-230; 491-524; 575-588		
1/19	R	Laying the Foundation – Lecture 1			
1/24	T	Laying the Foundation – Lecture 1 (35 minutes) Glucose Absorption – Lecture 2 (40 minutes)	408-410; 421		Problem set #1 (Laying Foundations)
1/26	R	Glucose Absorption – Lecture 2 (40 minutes) Glycolysis – Lecture 3 (35 minutes)	533-558	Quiz 1 (Laying Foundations and Glucose Absorption)	
1/31	T	Glycolysis – Lecture 3			
2/2	R	Gluconeogenesis (GNG) – Lecture 4	558-564		Metabolism Diagram #1 (Glycolysis)
2/7	T	Glycogen metabolism – Lecture 5 Regulation of glucose metabolism – Lecture 6 (25 min)	601-614		Problem set #2 (GNG)
2/9	R	Regulation of glucose metabolism – Lecture 6	440-465, 589-599, 932-935	Quiz 2 (Glycolysis, GNG, Glycogen Metabolism)	
2/14	T	Regulation of glucose metabolism – Lecture 6			Metabolism Diagram #2 (Glycogen Metabolism)
2/16	R	Regulation of glucose metabolism – Lecture 6		Quiz 3 (Regulation of Glucose Metabolism)	
2/21	T	Pyruvate dehydrogenase complex – Lecture 7	619-624		

		Citric acid cycle – Lecture 8 (15 min)			
2/23	R	In-class exam #1	Lectures 1-6		Group Exam #1 (Lectures 1-6) – Due at 4PM.
2/28	T	Citric acid cycle – Lecture 8	624-642		
3/2	R	Oxidative phosphorylation – Lecture 9	565-570; 711-739; 742-743	Quiz 4 (PDC/CAC)	
3/7	T	Oxidative phosphorylation – Lecture 9			Problem Set #3 (CAC)
3/9	R	Oxidative phosphorylation– Lecture 9		Quiz 5 (Oxidative Phosphorylation)	
3/14		Spring break			
3/21	T	Oxidative phosphorylation – Lecture 9			
3/23	R	Oxidative phosphorylation – Lecture 9			Problem set #4 (Oxidative Phosphorylation)
3/28	T	Oxidative phosphorylation – Lecture 9		Quiz 6 (Oxidative Phosphorylation)	
3/30	R	Lipid absorption and transport – Lecture 10	649-652; 826-830; 842-854		Metabolism Diagram #3 (Cellular Respiration of Glc)
4/4	T	In-class exam #2	Lectures 7-9		Group Exam #2 (Lectures 7-9)
4/6	R	Lipid absorption and transport – Lecture 10			
4/11	T	Lipid metabolism – Lecture 11	653-670; 811-826	Quiz 7 (Lipid Absorption)	
4/13	R	Lipid metabolism – Lecture 11			Metabolism Diagram #4 (Beta- Oxidation)
4/18	T	Lipid metabolism – Lecture 11			
4/20	R	Lipid metabolism – Lecture 11		Quiz 8 (Lipid Metabolism)	Problem Set #5 (Beta-Oxidation and ATP Generation)
4/25	T	Amino acid absorption/metabolism – Lecture 12			

4/27	R	Amino acid absorption/metabolism – Lecture 12			
5/2	T	Catch-up			
5/4	R	Catch-up		Quiz 9 (Amino Acid Metabolism)	Metabolism Diagram #5 (CAC/MAS/Urea Cycle)
5/11	R	In-class exam #3 9:40AM – 11:40AM STDM 1205	Lectures 10-12		Group Exam #3 (Lectures 10-12)