Colorado State University Department of Biochemistry
BC 403-001/230 Comprehensive Biochemistry II - Metabolism
Spring Semester 2020

Instructor: Aaron Sholders
Office: AZ E206D
Phone: 491-7916
Email: aaron.sholders@colostate.edu
Office hours: Monday 3:00 – 4:00PM; Tuesday 1:00 – 2:00PM or by appointment.

TA: Sarah Alfieri
                Tom Cast
                Zach Elder

Email: salfieri@rams.colostate.edu (Sarah)
                T.Cast@colostate.edu (Tom)
                Zach.Elder@rams.colostate.edu (Zach)

Study Sessions: TBD
Location: TBD

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

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 goals.

Course Design: In a lecture 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: I will be using Canvas this semester in order to make available to you lecture notes, exam study materials, quizzes 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. Announcement:
        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 1st module is the syllabus module that contains:
            1. Syllabus and Course schedule
            2. Student Guide to Polleverywhere
            3. Course objectives
        ii. There is one "problem set" module that will contain all your problem sets in it. This module is directly below the syllabus module.
        iii. There are 13 modules that correspond directly to a lecture within the course schedule. In each of these modules you will find:
            1. A powerpoint file for that modules set of lectures.
            2. Quizzes
        iv. There are 4 exam study materials modules:
            1. These modules are found immediately following the last chapter for that particular exam.
    d. Quizzes:
        i. There will be 13 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.

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 absolutely 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 provide me the SDC 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: This class consists of 13 quizzes (65 points) 5 problem sets (65 points), 4 exams (360 points), and five in class group assignments (50 points) as detailed below:

1. Quizzes – 65 points
   a. There will be 13 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 **usually** land on a Wednesday and will be announced in class. You will have two opportunities to take each quiz.
2. Problem sets – 65 points
   a. Five sets of questions 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. In addition to completing a problem set you will also be responsible for "evaluating" one of your group members assignment. Evaluations are worth three points each. 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 class periods (sometimes full days sometimes half a day) that are devoted to completing a "metabolic puzzle" within small groups. Each student will be given eight "sections" of a partially completed metabolic map. As we work our way through each pathway, students will be given time in class 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. You must be present the day we work on the puzzle in class to receive full credit. In class announcements will be made regarding the timing of each day.

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

Grade	Final Average
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:

Assignment	**Points Counted**
4 Exams (90 points each)	360
5 Problem sets (13 points each)	65
Metabolic Map Puzzle	50
13 quizzes (5 points each)	65
Total	540

Extra Credit:

I will 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:

https://PollEv.com/thegeek/register?group_key=EubjOCsIARWY4sA8Rq70VGSaH

Here is a link to a "Student Guide to Polleverywhere" (which I also posted 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 **extra credit** for the use of Poll Everywhere. If you participate in **80%** of the polls I will give you *10 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.

I am also going to give an additional 5 points of extra credit to any student that attends **eight** of the **eleven** TA's recitation sessions. Three recitation sessions will be given a week by the TA's. You are welcome to attend all of

them if you like but you cannot receive double credit. Tracking attendance to these sessions will be discussed in individual TA recitations.

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.

Lecture Schedule
SUBJECT TO CHANGE

DATE	DAY	TOPIC	TEXT READING
1/22	W	Laying the Foundation – **Lecture 1**	225-230; 491-524; 575-588
1/24	F	Laying the Foundation – **Lecture 1**	
1/27	M	Laying the Foundation – **Lecture 1**	
1/29	W	Glucose Absorption – **Lecture 2**	408-410; 421
1/31	F	Glucose Absorption – **Lecture 2**	
2/3	M	Glycolysis – **Lecture 3**	533-558
2/5	W	Glycolysis – **Lecture 3**	
2/7	F	Gluconeogenesis (GNG) – **Lecture 4**	558-564
2/10	M	Gluconeogenesis (GNG) – **Lecture 4**	
2/12	W	Glycogen metabolism – **Lecture 5**	601-614
2/14	F	Glycogen metabolism – **Lecture 5**	
2/17	M	Regulation of glucose metabolism – **Lecture 6**	440-465, 589-599, 932-935
2/19	W	**Exam 1**	***Lecture 1-5***
2/21	F	Regulation of glucose metabolism – **Lecture 6**	
2/24	M	Regulation of glucose metabolism – **Lecture 6**	
2/26	W	Regulation of glucose metabolism – **Lecture 6**	
2/28	F	Regulation of glucose metabolism – **Lecture 6**	
3/2	M	Regulation of glucose metabolism – **Lecture 6**	
3/4	W	Regulation of glucose metabolism – **Lecture 6**	

3/6	F	Pyruvate dehydrogenase complex – **Lecture 7**	619-624
3/9	M	**Exam 2**	*Lecture 6*
3/11	W	Pyruvate dehydrogenase complex – **Lecture 7**	
3/13	F	Citric acid cycle – **Lecture 8**	624-642
3/14-3/22		**SPRING BREAK**	
3/23	M	Citric acid cycle – **Lecture 8**	
3/25	W	Oxidative phosphorylation – **Lecture 9**	565-570;711-739; 742-743
3/27	F	Oxidative phosphorylation – **Lecture 9**	
3/30	M	Oxidative phosphorylation – **Lecture 9**	
4/1	W	Oxidative phosphorylation – **Lecture 9**	
4/3	F	Oxidative phosphorylation – **Lecture 9**	
4/6	M	Oxidative phosphorylation – **Lecture 9**	
4/8	W	Oxidative phosphorylation – **Lecture 9**	
4/10	F	Oxidative phosphorylation – **Lecture 9**	
4/13	M	Lipid absorption and transport – **Lecture 10**	649-652; 826-830; 842-854
4/15	W	**Exam 3**	*Lecture 7-9*
4/17	F	Lipid absorption and transport – **Lecture 10**	
4/20	M	Lipid absorption and transport – **Lecture 10**	
4/22	W	Lipid absorption and transport – **Lecture 10**	
4/24	F	Lipid absorption and transport – **Lecture 10**	
4/27	M	Lipid metabolism – **Lecture 11**	653-670; 811-826
4/29	W	Lipid metabolism – **Lecture 11**	
5/1	F	Lipid metabolism – **Lecture 11**	
5/4	M	Amino acid absorption/metabolism – **Lecture 12**	
5/6	W	Amino acid absorption/metabolism – **Lecture 12**	
5/8	F	Amino acid absorption/metabolism – **Lecture 12**	
5/12	T	**Exam 4 (11:50-1:50PM)**	*Lecture 10-12*