

Metabolic Biochemistry (BIBC 102)

Syllabus

Spring 2022

Professor:

Alexandra Jazz Dickinson, PhD
Section of Cell and Developmental Biology
Division of Biological Sciences

Office: Muir Biology Building #3258.

E-mail: adickinson@ucsd.edu (please use the subject line: 'BIBC 102'). Note that emails will be generally answered within 24 hours on week days.

Office hours: Tuesdays 1:15 – 2:45 PM (US Pacific Time), online.

Zoom: <https://ucsd.zoom.us/j/95117564966> (Meeting ID: 951 1756 4966)

Textbook: D. L. Nelson and M. M. Cox, *Lehninger-Principles of Biochemistry* (7th or 8th Edition)

Class website: <https://canvas.ucsd.edu>

Purpose of the course: Metabolic Biochemistry is the study of the chemistry of life. In this class, we will touch on the creation of life, evolution of living organisms, and critical diseases that affect the basic processes that cells depend on to live. We will deeply examine the concepts of energy and metabolism, how they are harnessed, and how they are regulated at the molecular, cellular, and organismal level. We will start by looking in detail at enzymes: how they function and how that function can be interrupted. Then, we will focus on metabolism: the pathways by which molecules are broken down or created to provide energy for the cell, and how these pathways are regulated.

Lectures: In person MWF 2:00 – 2:50 pm in Pepper Canyon Hall (PCYNH) 109

Lectures will be podcast and uploaded to podcast.ucsd.edu.

Exams:

FINAL EXAM (In person), Friday June 10 from 3:00 pm – 5:59 pm (Location TBA)

There is NO midterm exam. However, there will be a fully in-person **Review Session** on Thursday, May 5 from 7:00 pm – 8:20 pm (SOLIS 107). Attendance will be worth **10%** of your final grade.

Discussion Sections:

Section:	A04	A05	A01	A02	A03
Time:	Wed 7:00-7:50 pm	Wed 8:00-8:50 pm	Thurs 2:00-2:50 pm	Thurs 3:00-3:50 pm	Friday 8:00-8:50 am
Location:	MANDE B-104	MANDE B-104	WLH 2115	WLH 2115	CENTR 220
IA:	Anjali Iyengar	Yoya Kim	Casey Cheng	Casey Cheng	Amman Klair

The goal of discussions sections is to prepare you for the quizzes and the final exam. Each discussion section will be interactive and focused on a problem set. All discussion sections are *highly recommended*. Discussion sections will be available on zoom, but will not be recorded.

You may only attend the section in which you are enrolled.

Note that there will be extra credit points for discussion section participation. There will be extra credit points that will be granted based on discussion section participation (5 pts per discussion section up to a maximum of 50 pts). Participation requires visual and auditory communication (you must be seen and heard for the duration of the discussion section).

Assessments:

Quiz 1 (4/11): 50 pts

Quiz 2 (5/2): 100 pts

Quiz 3 (5/23): 100 pts

“Midterm” Review Session Participation (5/5/22): 50 pts

Final Exam (6/10/22): 200 pts

Total Points: 500

Extra Credit: Discussion Section Participation up to 50 pts (5 pts for each discussion)

Notes: Bring calculators to the exams and quizzes!

Also, If you have an illness, injury or personal situation that you believe will prevent you from participating in or performing adequately on any in-person assessment, you must contact the instructor **before** the exam to discuss your options.

485 – 500 pts: A+

450 – 484 pts: A

435 – 449 pts: B+

400 – 434 pts: B

385 – 399 pts: C+

350 – 384 pts: C

300 – 349 pts: D

Below 300 pts: F

If necessary, these cutoffs will be adjusted downward so that at least 50% of students in the class receive a B or above, but they will not be adjusted upward for any reason.

Academic integrity: Students are expected to do their own work, as outlined in the UCSD Policy on Academic Integrity (“Academic integrity” folder in the class website). **Academic misconduct** is broadly defined as any prohibited and dishonest means to receive course credit, a higher grade, or avoid a lower grade. Academic misconduct misrepresents your knowledge and abilities, which undermines the instructor’s ability to determine how well you’re doing in the course. Please do not risk your future by cheating.

Disabilities: Students requesting accommodations and services due to a disability for this course need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), prior to eligibility for requests. Receipt of AFAs in advance is necessary for appropriate planning for the provision of reasonable accommodations. **Please note that instructors are unable to provide accommodations unless they are first authorized by OSD.** For more information, contact the OSD at (858) 534-4382 (voice), osd@ucsd.edu, or visit osd.ucsd.edu.

Responsibilities:

It is my (and the IAs) responsibility to come to class well prepared and to provide students with multiple pathways to learning the topics, including lecture slides, explanations on the board,

assignments, discussion sections, and office hours.

It is your responsibility to put a significant effort into the class, by coming to class in person when you can, taking notes, actively participating in discussions, reading the textbook, working through problem sets, and asking questions when you need it.

Together, I hope we can establish a foundation for you to continue exploring (and maybe someday even revolutionize) the field of metabolic biochemistry!

Course Schedule

Week	Start Date	Concepts	Reading (7 th Edition)	Reading (8 th Edition)
1	Mar 28	Course Introduction: The Chemistry of Life Protein Structure and Enzyme Function Thermodynamics and Enzyme Catalysis	1 (21-29) 3 (75-81; 85-88; 96-97) 13 (491-501) Problem Set 1	1 (19 -27) 3 (70-76; 81; 90-91) 13 (465-472) Problem Set 1
2	Apr 4	Michaelis-Menten Enzyme Kinetics Enzyme Inhibition and Activation	6 (187-213, 225- 231) Problem Set 2	6 (177-200) Problem Set 2
	Apr 11	Quiz 1 – in class (on Problem Sets 1-2)		
3	Apr 11	Metabolism: Coupling of Endergonic and Exergonic RXNs Metabolism: Electron Carrier Cofactors	13 (review 491- 501; read 507- 524) Problem Set 3	13 (review 465- 472; read 479- 494) Problem Set 3
4	Apr 18	Electron Carriers Glycolysis	14 (533-545) Problem Set 4	14 (510-521) Problem Set 4
5	Apr 25	The Pyruvate Dehydrogenase Complex The Citric Acid Cycle	16 (All) Problem Set 5	16 (All) Problem Set 5
	May 2	Quiz 2 – in class (on Problem Sets 3-5)		
6	May 2	The Mitochondrial Electron Transport Chain	19 (711-743) Problem Set 6	19 (659-689) Problem Set 6
	May 5	“Midterm” Review Session – Thursday May 5 7 – 8 pm (Problem Sets 1-6)		
7	May 9	Oxidative Phosphorylation and ATP Synthase The Malate-Aspartate Shuttle	Review 19 (711- 743) Problem Set 7	Review 19 (659-689) Problem Set 7
8	May 16	Gluconeogenesis The Pentose Phosphate Pathway	14 (558-570) Problem Set 8	14 (533-551) Problem Set 8
	May 23	Quiz 3 – in class (on Problem Sets 6-8)		
9	May 23	Glycogen Metabolism Oxidation of Fatty Acids; Ketone Bodies	15 (601-608) 10 (361-367) 17 (649-657; 668- 670) Problem Set 9	15 (556-565) 10 (341-346) 17(601-609; 619-621) Problem Set 9
10	May 30	Synthesis of Fatty Acids	21 (811-819) Problem Set 10	21 (744-752) Problem Set 10
	Jun 10	Final Comprehensive Exam (June 10) 3:00 – 6:00 pm		