

Class Lectures: TR 11:00 AM – 12:20 PM (<https://ucsd.zoom.us/j/131153683>)

Discussion Sections: W 9-9:50 AM (<https://ucsd.zoom.us/j/546714451>)
W 11-11:50 AM (<https://ucsd.zoom.us/j/384098088>)

Instructor: Professor Adam J Engler (aengler@ucsd.edu)

Office Hours: M 11:00 AM -12:00 PM (<https://ucsd.zoom.us/j/560653585>)

Teaching Assistants: Anvita Komarla (aekomarl@eng.ucsd.edu)
Cam Lamoureux (clamoure@eng.ucsd.edu)

Recommended Text: Lehninger Principles of Biochemistry, 6th Ed.,
by D.L. Nelson and M.M. Cox, 2013. ISBN-10: 1429234148.

Course Objectives: The primary aim of the course is to provide a comprehensive overview of the molecular components and machinery in living systems. The course will provide an introduction to molecular structures, macromolecules and assemblies-proteins, nucleic acids, and metabolites. The course will also cover the principles of design of simple and complex components of organelles, cells, and tissues. Students will gain a solid understanding of: 1) chemical and physical nature of life/living systems; 2) the structures and functions of four major classes of biomolecules (nucleic acids, proteins, lipids and carbohydrates) and their higher-ordered structures; 3) how these molecules are synthesized; 4) how to analyze, catalog, and engineer them (in particular DNA/RNA and proteins). Rote memorization of facts is not required. Instead students are encouraged to gain a fundamental qualitative or quantitative understanding of the structures, machinery, mechanisms and processes from chemistry, physics and engineering principles and perspective.

Homework: Homework will be assigned every week, but not graded. The assignments will help you understand the materials/topics covered in the lectures and prepare you for the quizzes. Students are encouraged to solve the problems by themselves first before checking the solutions that will be posted.

Course Evaluation: There will be four quizzes (25% total). The quizzes will be given on specified Fridays in the course schedule (see next page). To help you prepare for the quizzes, some similar problems/questions will be given in ahead. You will do well if you come to the lectures, do the homework/practice problems, and read the recommended sections in the textbook or supplementary reading materials posted on the course website.

Quizzes: All quizzes will be available on CANVAS for a period of 24 hours from 1pm Thursdays through 1pm Fridays. There will not be a cumulative final exam.

Grading: For this Spring 2020 quarter, the Department of Bioengineering will allow you to take classes required for your major with a P/NP grade. To pass this course, you must achieve a score of 70% or higher. Grading will be as follows:

A+	A	A-	B+	B	B-	C+	C	C-	D
97	93	90	87	83	80	77	73	70	60

Re-grading Policy: All regrade requests must be in writing, explaining the issue in grading, and must be turned in to Dr. Engler or the TAs within 1 week of the assignment's return to the class after grading. Aside from re-grades for clerical errors (i.e. error in adding up total points), the entire exam or homework will be re-graded.

Taking a class online: UCSD's Dept of Psychology has a great video to plan for your quarter online. Be sure to watch it before classes start: <https://www.youtube.com/watch?v=IIIUVU-d1DM&feature=youtu.be>

Date*	Topic	Book Chpt.
Part 1 - Chemical & Physical Foundations		
3/31	Introduction; Molecular & Cellular Basis of Life	1.1-1.4
4/2	Physical Basis of Life	
4/7	Aqueous Systems, Ionization	2.1-2.3
4/9	Buffers	
Part 2 - Molecular Design of Living Systems		
4/14	Amino acids & proteins: structures and functions	3.1-3.4; 4.1-4.4
4/16	Enzyme catalysis	6.1-6.3
4/17	Part 1 Quiz Due	
4/21	Carbohydrates: structures and functions	7.1-7.3
4/23	Nucleic acids and their higher organization	8.1-8.3; 24.1-24.3
4/28	Lipid biology	10.1-10.2
4/30	Lipid membranes: organization and composition	11.1-11.3
Part 3 - Decoding the Genomes		
5/5	Replication – DNA synthesis	25.1-25.2
5/7	Transcription – RNA synthesis and processing	26.1-26.2
5/8	Part 2 Quiz Due	
5/12	Translation – Protein synthesis and turnover	27
5/14	Transport – Where to go in the cell?	27
Part 4 - Analytical Technologies		
5/19	Early Methods: Southern, Northern, Western	3.3 & Notes
5/21	Advanced Methods: separations to spectrometry	Notes
5/22	Part 3 Quiz Due	
5/26	Protein Engineering	9 & Notes
5/28	Genomics: qPCR to sequencing	Notes
6/2	Genome Editing in cells to tissues to organisms	Notes
6/4	Class Review	
6/5	Quiz 4 Due	