

- Class Lectures:** TR 9:30 – 10:50 AM (Pepper Canyon Hall 120)
F 10 – 10:50 AM (Cognitive Science Building 004)
- Discussion Sections:** W 9-9:50 AM (Mandeville B104)
W 11-11:50 AM (Mandeville B104)
- Instructor:** Associate Professor Adam J Engler (aengler@ucsd.edu)
Sanford Consortium Building Room 2005 / PFBH 429
- Office Hours:** M 12:00-1:00 PM in PFBH 429
- Teaching Assistants:** Courtney Green (crgreen@ucsd.edu)
Jaclyn Einstein (jeinstei@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 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 the molecular machines and higher-ordered structures that are self-assembled from these molecules; 3) how these molecules are synthesized; 4) how to analyze and catalog them (in particular DNA/RNA and proteins); and 5) how to engineer DNA/RNA, proteins and living system. Rote memorization of facts is not encouraged. 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 and final exam. The 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 (60% total) and a final exam (40%). The quizzes will be given on specified Fridays in the course schedule (see next page). To help you prepare for the quizzes and exam, 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.

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.

Date*	Topic	Book Chpt.
Part 1 - Chemical & Physical Foundations		
3/29	Introduction; Molecular & Cellular Basis of Life	1.1-1.4
3/31	Length, Time, and Energy scales for Life	
4/5	Digital information of our genome	2.1-2.3
4/7	Water, rxns, driving forces, self assembly	
4/8	Quiz 1	
Part 2 - Molecular Design of Living Systems		
4/12	No Class	
4/14	Amino acids & proteins: structures and functions	3.1-3.4; 4.1-4.4
4/19	Enzyme catalysis	6.1-6.3
4/21	Carbohydrates: structures and functions	7.1-7.3
4/26	Lipids, their biology and transport	10.1-10.2; 11.1-11.3
4/28	Nucleic acids, chromosomes and genomes	8.1-8.3; 24.1-24.3
4/29	Quiz 2	
Part 3 - Decoding the Genomes		
5/3	Replication – DNA synthesis	25.1-25.2
5/5	Transcription – RNA synthesis and processing	26.1-26.2
5/10	Translation – Protein synthesis and turnover	27
5/12	Transport – Where to go in the cell?	27
5/13	Quiz 3	
Part 4 – Analytical Technologies (The development of “omics”)		
5/17	Proteomics: From separations to spectrometry	3.3 & Notes
5/19	No Class	
5/24	Protein Engineering	8; 9 & Notes
5/26	Genomics: qPCR to sequencing	Notes
5/27	Quiz 4	
5/31	Genome Editing in cells to tissues to organisms	Notes
6/2	Class Review	
6/7	Final Exam**	

****June 7, 8-11am, Pepper Canyon Hall 120**