

University of San Diego

Chem 331 Biochemistry

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Office Hours:
 Monday 10:10 Tuesday 10:00 & 2:30
 Wednesday 10:10
 Thursday By Arr Friday 1:30

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What is biochemistry?

- Advanced organic chemistry?
- Cell biology?
- Molecular biology?
- The most fun and interesting subject in science (personal bias)?
- The study of life on a molecular level. Or, the formal term of bios = life meaning biochemistry is the science concerned with the chemistry of various molecules that occurs in living cells



Two out of three farmers approve of genetically engineered produce.

- Biochemistry encompasses large areas of cell biology, molecular biology, and molecular genetics
- Biochemistry is essential to all of the life sciences (biomedical and plant sciences) All advanced degrees require that biochemistry is one of the first courses
- This class will be taught not - as an advanced organic but as an encompassing science that should help tie several of your classes together

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Course Description

This course is an introduction to the chemistry of biological molecules and macromolecules.

- We will study the structure and properties of the four major classes of biomacromolecules:
 - nucleic acids, proteins, carbohydrates and lipids, and their functional impact on the cell and on the organism.
- We will study enzyme kinetics and metabolism and how they relate to different cellular pathways, including the production of energy and macromolecules.
- Throughout the semester we will take these broad ideas and study them in the context of human health and disease pathology.

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Biochemistry

Simply put, we will be studying the four macro-biomolecules - proteins, DNA/RNA, lipids and carbohydrates, and when possible, put them into a biomedical context

What are YOUR expectations of this class?
 – Ask yourself why you need this course

What are my expectations of this class?
 – Work hard but have fun with the semester
 – Push you intellectually and make you think about how life works around you - like a mechanic understands an engine, you will understand how a cell/tissue/organ/body works

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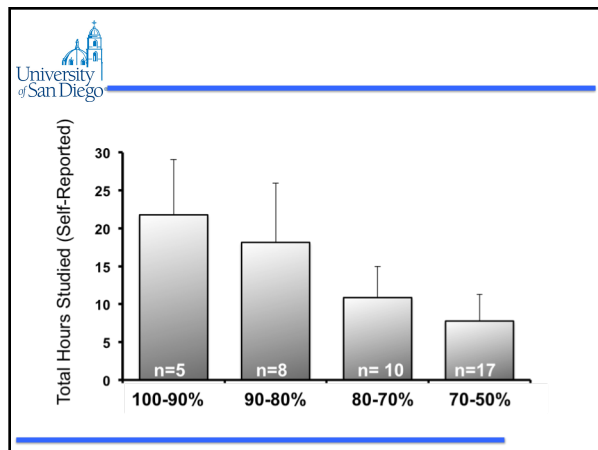
Class Resources

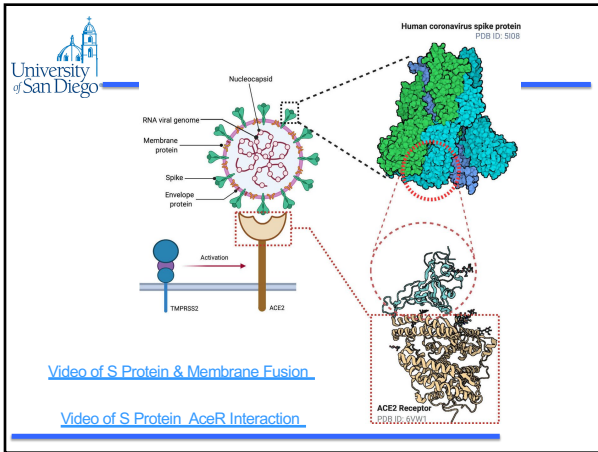
(a) **Lectures:** The most important topics are always identified in class, and are usually discussed in detail. Attending class and accurate note-taking are the only way to learn the material.

(b) **Textbook Required:** *Fundamentals of Biochemistry, Voet, Voet and Pratt*. The material in the book will clarify points, fill in gaps, and extend your knowledge. Portions of selected lectures will come from current literature and handouts. *Reading the book is required, not suggested.*

(c) **Help sessions:** We will have the help sessions as the schedule allows. Please do not hesitate to make an appointment to ask questions. I believe that there is no such thing as a stupid question. Your questions are the best guide I have to your particular needs. If you do not know enough to phrase a question, then meet with me and we can work it out.

(d) **Website:** The website will have ppt handouts, learning objectives/study guides and suggested study questions.





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ELSEVIER

Current Research in Structural Biology
Volume 4, 2022, Pages 41-50

Mutations in human SARS-CoV-2 spike proteins, potential drug binding and epitope sites for COVID-19 therapeutics development

Nearly, 96.5% amino acid residues in the human SARS-CoV-2 spike protein have undergone mutations since outbreak of the COVID-19 pandemic disease.

- 4,729 distinct mutations that were associated with 1,229 mutation sites are catalogued.
- 8.8 trillion possible combinations of DNA mutations
- ~252 additional amino acid substitutions were identified for the 46 Variants classified according to WHO as Variants Being Monitored (VBM) or as Variants of Concern (VOC).

The non-mutated surface exposed residues may represent epitope sites for developing monoclonal antibodies. **(why?)**

Gly502, Tyr449 and Asn487 are least mutated among the residues in human SARS-CoV-2 spike protein RBD known to interact with human ACE-2 receptor and represent potential sites for drug design. **(why?)**

Transcription
Translation

