



## Biochemistry | Lecture and Lab

Academic Year: 2021-2022

### Course Information

Course Numbers	Total Credits	Time Requirement
BIO322/BIO322L	4 (3 Lecture + 1 Lab)	75 hrs (Lecture 45hrs + Lab 30hrs)

### Course Details

#### Recommended Prerequisites

General Chemistry I and II and Organic Chemistry I and II.

#### Course Description

Biochemistry examines the structure and function of the following biological macromolecules in the context of cellular integrity, dynamics and metabolism: carbohydrates, lipids, proteins and nucleic acids. The weekend biochemistry topics include enzymology, bioenergetics, catabolism, anabolism, regulation of gene expression, biotechnology, and hormone regulation of mammalian metabolism and the pre-biotic evolution of life on earth. This course is designed to enhance, deepen, and further integrate knowledge of the subject by developing different problem-solving skills and conceptual organization. This course will serve as an extension of organic chemistry, in that a thorough understanding of bio-macromolecules will be achieved. The structure, function, and mechanism of polymerization will be investigated as pertains to proteins, carbohydrates, and nucleic acids. Metabolic processes will be studied, including glycolysis, the citric acid cycle, electron transport and oxidative phosphorylation. A goal will be to comprehend these complex biochemical processes with a rigid mechanistic approach, like that of organic chemistry.

#### Lecture and Laboratory Communication

A website will be set up on Canvas by your instructor.

Log in with your Username and password: <https://scuhs.instructure.com>

#### Faculty Information

Refer to the Canvas course page for this information.

#### Class Meeting Times

Refer to Canvas course page for this information.

### Instructional Materials

#### Required Text(s)

Nelson, David L., and Michael M. Cox. Lehninger Principles of Biochemistry 8th edition, 2021.  
ISBN:9781319230906

Access to the electronic textbook is provided from your Canvas course page.



## Lab

Biochemistry Lab Manual available on Canvas course page.

## Course Purpose

### Student Learning Outcomes

At the conclusion of this course, a successful student should be able to:

1. Students will learn to think critically about biochemistry and understand the basic principle and composition of biomolecules.
2. Students will explain and recognize major concepts and principles in biochemistry and think analytically about biological processes.
3. Students will understand metabolic pathways and bioenergetics including glycolysis and TCA cycle.
4. Student will demonstrate knowledge of simple changes in molecules and pathways can alter biochemical processes and cellular functions.
5. Students will be confident in searching, retrieving, evaluating, and analyzing data or information.

**Course Learning Objectives: Please refer to the appendix for a full list of course objectives.**

## Course Schedule (subject to slight modifications by the instructor)

Week	Lecture	Assessment
1	Module 1: Foundation Biochemistry	Pre-lecture activity
	Module 2: Water, The solvent of life	Adaptive quiz
	Module 3: Amino Acids and the Primary structure of Proteins	Homework
		Participation
2	Module 4: The Three-Dimensional Structure of Proteins	Pre-lecture activity
	Module 5: Protein Function	Adaptive quiz
	Module 6: Enzymes	Homework
		Participation
3	Module 7: Carbohydrates and Glycobiology	Pre-lecture activity
	Module 8: Nucleotides and Nucleic acids	Adaptive quiz
	Module 9: Lipids	Homework
		Participation
		Exam 1 (modules 1-9)
4	Module 10: Biological Membranes and Transport	Pre-lecture activity
	Module 11: Biochemical Signaling	Adaptive quiz
	Module 12: Introduction to Metabolism	Homework
	Module 13: Glycolysis, Gluconeogenesis and PPP	Participation
5	Module 14: The Citric Acid Cycle	Pre-lecture activity
	Module 15: Fatty Acid Catabolism	Adaptive quiz
	Module 16: Amino Acid Oxidation and the Production of Urea	Homework
	Module 17: Oxidative Phosphorylation	Participation
		Exam 2 (modules 10-17)

## Grading Procedures (subject to slight modifications by the instructor)

### Lecture

Assignment	Total assignments	Weight
Pre-lecture activity	15-18	10%
Participation	1-10	10%
Adaptive Modules Quiz	17	25%
Homework	17-30	15%
Exams	2	40%
	Total	100%

### Lab Schedule

Topic	Assessment
Check-in: Check in/safety/glassware	Lab notebook
Experiment 1: Amino Acids paper Chromatography	Lab notebook
Experiment 2: Acids, Bases, pH and Buffers	Lab notebook
Experiment 3: Analysis of Lipids	Lab notebook
Experiment 4: Enzymes	Lab notebook
	Quiz 1

Experiment 5: Test for Carbohydrates	Lab notebook
Experiment 6: Analysis of Urine	Lab notebook
Experiment 7: Spectroscopic Analysis of Beta –Carotene	Lab notebook
Experiment 8: Saponification	Lab notebook
Worksheet/review	Quiz 2

## Tentative Grading Procedures

### Lab

Assessment	Weight (%)
Lab Quizzes	40
Lab Notebook	10
Prelabs	15
Post labs	25
Participation (discussions, worksheets etc)	10
Total	100



## Grading scale:

Please note letter grades will be assigned only at the end of the trimester.

**A** = 90% to 100%

**B** = 80% - less than 90%

**C** = 70% - less than 80%

**D** = 60% - less than 70%

**F** = less than 60%

**W** = Withdrawal

## Academic Integrity

Visit SCU's [Academic Integrity](#) page to review policies for professionalism and academic integrity. Course-specific academic integrity policies and consequences can be found in your Canvas course page.

## Teaching Methods and Activities

In classes with scheduled class time, lecture will be delivered in real time/live by the instructor. You must adhere to the attendance policy set out by the instructor for the class. In asynchronous classes, students will review lecture content in their own time. Due to the individualized nature of the learning, students should expect to spend as much time as needed based on individual attainment of prerequisite knowledge. Check your Canvas course page and student schedule to confirm the modality of the course that you are registered in.

**Pre-lecture activity:** Before each lecture, students complete very short 5-7 question quizzes to orient them to the lecture content and to give them an idea of the prerequisite knowledge they might need to full grasp each lecture's content. Pre-lecture activities are graded based on completion.

**Participation:** Students earn points by completing learning activities. Attendance is not the same thing as participation. Students are expected to be involved and engaged in all classroom activities (which may include activities graded on quality of participation).

**Adaptive Module Quiz (may be called LearningCurve ©):** In each Adaptive Module Quiz, your instructor has established a certain score you need to reach to demonstrate comprehension of the concept. That score is called a target score. Once you reach the target score, you will receive full credit for completing the Adaptive Quiz. You must reach the target score to receive credit for the Adaptive Quiz. Questions get harder as you progress through the Adaptive Quiz, and you get more points for answering harder questions. You may be directed back to review portions of the electronic textbook if you miss a question.

**Homework:** Students reinforce concepts learned in class by completing the homework assignments. Homework assignments are open-book formative assessments where students can have unlimited attempts to practice problems. The highest score achieved is recorded in the gradebook. Homework must be completed by the due date – late submissions incur a 2% grade reduction for every day submitted late.

**Exams:** There are two exams in each class, a mid-term and a final exam. You will get two attempts at each exam.



## Laboratory

### Attire for lab

Close-toed shoes, professional attire and lab coats are mandatory during all lab hours. No shorts, heels, or flip-flops will be allowed in the laboratory; hair longer than shoulder-length must be pulled back and held with a clip or hair tie. Gloves, goggles and additional safety equipment will be required per experiment.

**Evaluation of Experimental Technique:** You will be assessed on your general performance and regards for the rules of the laboratory and safety procedures.

**Attendance for lab:** Punctual attendance at each of your regularly scheduled laboratory and period is required. Additionally, you are required to stay until you and/or your group have completed the experiment. Check out with your lab instructor before leaving the laboratory after completing the experiment. You are expected to attend every one of your scheduled lab meeting times. However, if you find yourself in a situation where you are unable to attend lab, please email your instructor right away.

**Lab Notebook:** Students will be required to keep a laboratory notebook, and the instructor will grade notebook entries. The notebook allows you to accurately record experiment procedures and data, so you should write it so that someone else could repeat your experiments and get the same results. Among other things, this includes recording all spectroscopic and analytical data that you obtain from the experiment procedure. Further information about the lab notebook will be provided in class.

**Pre-labs:** Prelabs contain content questions that are intended to help you prepare for lab procedures. Pre-labs can be found in the lab manual and must be completed before each lab class.

**Post-labs:** Post-labs, or lab reports will consist of the report sheet(s), answers to post-lab questions and sometimes Excel plots of data analysis when appropriate. While the lab activity may be group-based, you must complete lab reports on your own (lab reports are not group assignments).

**Laboratory Quizzes:** Quizzes will be given the week after your experiment and its modality will be indicated by the Professor. These quizzes will be closely based on the pre-labs and lab reports.

### Classroom Expectations

Please be professional, prompt, prepared, and polite at all times.

The professor will adhere to all policies as found in the Student Handbook. Cellular phones must be kept on silent during class and lab times. Students may not use a phone as a calculator. As a safety precaution, no food or drinks are allowed inside the lab, but there will be a designated break for eating and drinking outside of the lab.

## Best Practices for Studying Biochemistry

- Because of the demands of the course, successful chemistry students don't wait until exam time to begin studying. Instead, you should plan to follow the chemistry rule that every hour spent in class requires two to three hours of effort outside of class to succeed in this course. As an example, let's say you've just been assigned reading on Lewis structures. Don't let a day go by without learning how to write and interpret Lewis structures.



Future work will most likely use these bonding diagrams, and they are likely to reappear in lectures, quizzes and exams. Procrastination doesn't simply mean that you won't understand Lewis structures—you'll also be lost for every subsequent reading and lecture that employs these diagrams. Procrastination in a chemistry course can quickly prove disastrous failure to learn foundational principles can make all future material seem nearly incomprehensible.

- Read before and read after each class. Skim the chapter before it is covered in lecture to become comfortable with some of the terms associated with each topic. Review each chapter after it is covered in class to enhance your understanding of what was covered in class.
- Participate during class by taking notes during class and looking over them afterwards. Don't skip class, arrive late, or leave early. Ask questions for clarification when you don't understand the material.
- Stay on top of the homework and assignments. Do the assigned problems as close to the time as when the topic is covered in the class to increase the depth of your understanding of specific concepts and will help you learn the material more efficiently and effectively.
- Do not wait until the night before the homework is due to start the assignment. You will get more out of it if you take the time to really learn the concepts and review the material without being rushed.
- Find a group of students to study with. Seek out students dedicated to doing well in the course. This makes studying more fun and helps you learn the material better by teaching what you know and learning from your peers what you don't know. Explaining these concepts to others will help you learn the material even better.
- Stay focused by finding an environment where you can study with few distractions.

## University Policies

### Accommodations

As a learning-centered community, Southern California University of Health Sciences recognizes that all students should be afforded the opportunity to achieve their academic and individual potential. The University recognizes and supports the standards set forth in Section 504 of the Rehabilitation Act and

the American with Disabilities Act (ADA). In accordance with its mission and federal and applicable state laws, the University is committed to making reasonable accommodations for qualified applicants for admission and enrolled students with disabilities. A student who needs accommodation(s) due to a disability should contact the Academic Support Office located in the Learning Resource Center.

### Faculty and Dr./Patient Relationships

SCU faculty are highly skilled. However, per University Policy, health care is offered to students through the University Health System only. Neither preclinical nor clinical faculty can provide advice, assessment, treatment, or other elements that would be considered part of a Doctor-Patient relationship outside of a clinical setting established for that purpose.

### Learning Activities





Students are expected to spend at least two hours for each lecture hour of course time per week in activities and assessments outside the classroom. Examples of activities include, but are not limited to: writing papers; reading articles or text; small group work; presentations; completing assignments; preparation for assessments; online activities and other activities that do not include direct instructor interaction and involvement.

All university policies apply to this course and all others. For full policy information please consult the university SCU Policy Manual. For a quick reference guide to the following policies: make-up examination, F-challenge examination, grade posting, results of failing grades, student support information, syllabus amendments, special needs, student conduct, and attendance, please consult the academic policies document housed on the [Online Student Services](#) .