

# CHEM 560, General Biochemistry

## Spring, 2023

### COURSE INFORMATION

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**Lectures times:** Tuesday and Thursday, 11:00-12:15 LH 439

**Mode of Delivery:** In person lectures

**Instructor:** Peter van der Geer

**Email:** [pvanderg@sdsu.edu](mailto:pvanderg@sdsu.edu)

During the week, I usually respond to emails within 24 hours.

**Office location:** CSL 322

**Office hours:** Monday, 9:30–11:00; Wednesday, 9:30-11:00

### THIS COURSE IN YOUR DEGREE:

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**Prerequisites:** Chemistry 232, 232L, and credit or concurrent registration in Chemistry 410A, 432, 432L.

This course fulfills a requirement for majors in Chemistry or Biochemistry

### COURSE DESCRIPTION

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The goal of this course is to give an overview of the field of biochemistry and to teach the language of so that students are prepared to take more advanced courses in the subject.

### COURSE MATERIALS

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**Fundamentals of Biochemistry**, life at the molecular level, 5th edition (ISBN 9780470547847), Voet, Voet, and Pratt: Chapters 1-11

### STUDENT LEARNING OUTCOMES

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**Students that have completed this course should be able to:**

- Discuss the origin of life and compare prokaryotes and eukaryotes
- Use thermodynamic equations to describe biochemical reactions
- Discuss the role of water in biochemical systems and calculate the pH of aqueous solutions
- Describe the composition, structure, and function of the molecules of life, including nucleotides, nucleic acids, amino acids, polypeptides, carbohydrates, polysaccharides, and lipids
- Discuss the central dogma of biology
- Detail methods that are used for protein purification, protein sequencing, and the elucidation of the three-dimensional structure of proteins
- Describe the peptide group, protein folding, and protein structure
- Explain how the structure of myoglobin and hemoglobin relates to their function

- Describe the composition and function of biological membranes and explain how type 1 integral membrane proteins are inserted into the membrane.
- Describe different types of membrane transport and thermodynamic equations to describe membrane transport.
- Explain how enzymes catalyze reactions in terms of elementary catalytic mechanisms

## ASSIGNMENTS AND ASSESSMENTS

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**Homework:** Posted on Canvas

**Midterm 1:** Tuesday, February 21: Chapters 1-4. Midterm is composed of 20-30 multiple choice questions and 3-5 short answer questions, calculations, or drawings. Please bring a blue scantron (#20788-PAR).

**Midterm 2:** Tuesday, April 11: Chapters 5-8. Midterm is composed of 20-30 multiple choice questions and 3-5 short answer questions, calculations, or drawings. Please bring a blue scantron (#20788-PAR).

**Final:** Tuesday, May 9, 10:30, Chapters 1-11 (12). The final exam is comprehensive and will cover all 12 chapters. The final exam will be composed of 30-40 multiple-choice questions and 3-5 short answer questions, calculations, or drawings. Please bring a blue scantron (#20788-PAR).

**Calculators:** No programmable or graphing calculators will be used during quizzes or exams.

## COURSE SCHEDULE

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Date	Activity	Reading Assignment
January 19	Introduction	Chapter 1 (pp. 1-5)
January 24	Cells and Bioenergetics	Chapter 1 (pp. 5-22)
January 26	Water	Chapter 2 (pp. 23-31)
January 31	pH Nucleotides and nucleic acids	Chapter 2 (pp. 31-41) Chapter 3 (pp. 42-45)

<b>Date</b>	<b>Activity</b>	<b>Reading Assignment</b>
February 2	DNA, RNA, DNA sequencing	Chapter 3 (pp. 46-58)
February 7	Molecular cloning Amino acids	Chapter 3 (pp. 46-58, 66-69, 71-72) Chapter 4 (pp. 80-86)
February 9	Amino acids Protein purification	Chapter 4 (pp. 86-96) Chapter 5 (pp. 96-100)
February 14	Assays and Chromatography	Chapter 5 (pp. 100-107)
February 16	Protein sequencing	Chapter 5 (pp. 107-116, 119-128)
<b>February 21</b>	<b>Midterm 1</b>	<b>Chapters 1-4</b>
February 23	The peptide bond	Chapter 6 (pp. 131-135)
February 28	Secondary structure, fibrous proteins	Chapter 6 (pp. 135-145)
March 2	Structure determination	Chapter 6 (pp. 145-148)
March 7	Structure visualization	Chapter 6 (pp. 148-155)
March 9	Quaternary structure and folding Myoglobin	Chapter 6 (pp. 158-173) Chapter 7 (pp. 180-184)
March 14	Hemoglobin	Chapter 7 (pp.185-199)
March 16	Carbohydrates	Chapter 8 (pp.221-227)

<b>Date</b>	<b>Activity</b>	<b>Reading Assignment</b>
March 21	Polysaccharides	Chapter 8 (pp.228-240)
March 23	Lipids	Chapter 9 (pp.245-249)
April 4	More lipids	Chapter 9 (pp.249-258)
April 6	Lipid bilayers	Chapter 9 (pp.259-262)
<b>April 11</b>	<b>Midterm 2</b>	<b>Chapters 5-8</b>
April 13	Membrane proteins	Chapter 9 (pp.262-268)
April 18	Membrane structure	Chapter 9 (pp.269-280)
April 20	Membrane transport	Chapter 10 (pp. 293-300; 305-312; 315-321)
April 25	Enzymes	Chapter 11 (pp. 322- 330)
April 27	Catalytic mechanisms	Chapter 11 (pp. 330- 339)
May 2	Lysozyme	Chapter 11 (pp. 339- 344)
May 4	Serine proteases	Chapter 11 (345-360)

## **GRADING POLICY**

- Homework            100 points (20%)
- Midterm 1            100 points (20%)
- Midterm 2            100 points (20%)

- Final 200 points (40%)
- Total 500 points (100%)

## CHANGES TO THE SYLLABUS

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Consistent with University policy, I retain the right to adjust course design, including assignments, assessments and deadlines. Major departures from the syllabus shall be made only for compelling reasons. "Any major changes to the course syllabus will be announced in class, communicated to all students electronically, and incorporated into an updated and posted version of the syllabus."

## LETTER GRADES

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Percentage score	Points	Letter grade
85% and above	425 and above	A
80-84%	400-424	A <sup>-</sup>
75-79%	375-399	B <sup>+</sup>
70-74%	350-374	B
65-69%	325-349	B <sup>-</sup>
60-64%	300-324	C <sup>+</sup>
55-59%	275-299	C
50-54%	250-274	C <sup>-</sup>
45-49%	225-249	D <sup>+</sup>
40-44%	200-224	D
35-39%	175-199	D <sup>-</sup>
below 35%	below 175	F

## UNIVERSITY POLICIES

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**Accommodations:** If you are a student with a disability and are in need of accommodations for this class, please contact Student Ability Success Center at (619)

594-6473 as soon as possible. Please know accommodations are not retroactive, and I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Ability Success Center.

**Student Privacy and Intellectual Property:** The [Family Educational Rights and Privacy Act](#) (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. I will use [Canvas / Blackboard] to communicate with you, and I will not post grades or leave graded assignments in public places. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

**Religious observances:** According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

**Resources for students:** A complete list of all academic support services--including the [Writing Center](#) and [Math Learning Center](#)--is available on the Student Affairs' [Academic Success](#) website. [Counseling and Psychological Services](#) (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at [http://go.sdsu.edu/student\\_affairs/cps/therapist-consultation.aspx](http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx) between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

**SDSU Economic Crisis Response Team:** If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit [sdsu.edu/ecrt](http://sdsu.edu/ecrt), email [ecrt@sdsu.edu](mailto:ecrt@sdsu.edu), or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

**Academic Honesty:** The University adheres to a strict policy prohibiting cheating and plagiarism. Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;

- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner.

**Classroom Conduct Standards:** SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Violation of these standards will result in referral to appropriate campus authorities. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
  1. physical abuse, threats, intimidation, or harassment.
  2. sexual misconduct.

**Medical-related absences:** Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. [Student Health Services](#) (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the [Student Ability Success Center](#).

**Sexual violence / Title IX mandated reporting:** As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I am a mandated reporter in my role as an SDSU employee. It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep the information you share private to the greatest extent possible. However, I am required to share information regarding sexual violence on SDSU's campus with the Title IX coordinator,

Jessica Rentto 619-594-6017. She (or her designee) will contact you to let you know about accommodations and support services at SDSU and possibilities for holding accountable the person who harmed you. Know that you will not be forced to share information you do not wish to disclose and your level of involvement will be your choice. If you do not want the Title IX Officer notified, instead of disclosing this information to your instructor, you can speak confidentially with the following people on campus and in the community. They can connect you with support services and discuss options for pursuing a University or criminal investigation. Sexual Violence Victim Advocate 619-594-0210 or Counseling and Psychological Services 619-594-5220, [psycserv@sdsu.edu](mailto:psycserv@sdsu.edu). For more information regarding your university rights and options as a survivor of sexual misconduct or sexual violence, please visit [titleix.sdsu.edu](http://titleix.sdsu.edu) or [sdsutalks.sdsu.edu](http://sdsutalks.sdsu.edu).