

# Chemistry 365

## Biochemistry, Cell and Molecular Biology I

Fall 2017  
Schedule Number 20819

### COURSE INFORMATION

Class Days: Tuesdays & Thursdays  
Class Times: 12:30 – 1:45 pm  
Class Location: PG-153

Office Hours: Tuesdays & Thursdays 2-3 pm  
(except 9/5, 9/7, 10/5, 10/24, 10/26, 11/2,  
12/7/2017), Fridays 11 am- 1pm, or email  
me to make an appointment,  
[mswairjo@mail.sdsu.edu](mailto:mswairjo@mail.sdsu.edu).

Office Hour Location: My office CSL-340

### INSTRUCTOR INFORMATION

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Office location: Chemical Sciences Laboratory (CSL), room 340 (SDSU map coordinates K3).

### Course Overview

**Course Description:** Biochemistry is an experimental science that brings together biology and chemistry. In one facet of the field, Biochemistry explores the natural chemical processes within living organisms. In another facet, it is the science of using chemical knowledge and techniques to understand and solve biological problems. This is the first in a series of integrated courses (Chem 365, Biol 366, Biol 366L, Biol 567, and Biol 567L). Biochemistry and molecular biology allow us to understand the molecular make up of life, and uncover what goes awry in disease at the molecular level. Biochemistry and molecular biology are enormous fields of science and are still rapidly growing. Therefore, while this course offers the basic concepts in biochemistry and molecular and cell biology, it will emphasize learning of core facts and provide learning skills and resources for continued study. The course is geared toward students with interests in biotechnology, life sciences, pharmacology, and molecular medicine, and will offer an applied treatment of topics in the form of case studies.

- **Course structure:** This one semester course will be delivered over 16 weeks; 13.5 weeks of instruction, 1.5 weeks of assessment, half a week of review, and half a week of break. The course is structured in three learning modules, separated by 2 assessments and followed by a final exam (**see course schedule below**). Class meets twice a week for 1 hour and 15 minutes. The course includes 11 homework assignments due on set dates (see course schedule below). The assessments (exams) consist of problems probing critical thinking, depth of knowledge, and application skills. The homework assignments are in themselves learning opportunities designed for a variety of learning styles and will include conceptual problem solving activities, building illustrative models, experimental design, interpretation of experimental data, fact finding, and memory drills.
  
- **Student Learning Outcomes:**  
 Upon completing this course, students should be able to
  - 1) compare the structures of a prokaryotic and a eukaryotic cell.
  - 2) match the molecules that act as basic building blocks of life with their functions. These include nucleotides and nucleic acids; amino acids and proteins, carbohydrates and polysaccharides, and lipids and membranes.
  - 3) dissect the processes of DNA replication, DNA transcription and protein translation.
  - 4) match the molecules of gene expression with their biochemical functions.
  - 5) classify protein structural hierarchy and illustrate how it relates to protein function.
  - 6) Draw a schematic of the structure of a biological membrane.
  - 7) describe the principles that govern membrane structure and function.
  - 8) describe the biochemical/molecular basis of at least 5 human diseases.
  - 9) describe the biochemical/molecular biological principles behind at least 5 biotechnologies.
  
- **Real Life Relevance:**  
 This course is designed to introduce students of biology to basic biochemical knowledge needed for the study of biology and medicine. It gives a broad view of the biochemical and molecular underpinnings of Biology, placed in the context of evolution, human health and disease, and ecology. Students see how it is that understanding nature and advancing medicine is impossible without in-depth biochemical/molecular knowledge. Therefore, a major outcome of the course is the promotion of interest in the molecular basis of disease (a topic later offered in depth in an advanced chemistry course at SDSU) and a curiosity toward modern research approaches in molecular medicine and biotechnology.

## Enrollment Information

### Prerequisites:

Organic chemistry (e.g. CHEM 232), principles of cell biology (Biol 203), and general physics.

### Dropping class:

You can drop the class within the first 10 days of the semester (university policy).

## Course Materials

### Required Materials:

- **Fundamentals of Biochemistry, Fourth or Fifth Edition**  
**D. Voet, J. Voet & C.W. Pratt (John Wiley & Sons, Inc.).**
- Laptop with internet connection.
- **SDSU Blackboard account.**
- Access to **Sapling online homework** and study module. See "Assignment instructions" below.
- Three SCANTRONS F-289-PAR-L (red long type) and #2 pencils will be required for each exam. They can be purchased from the SDSU bookstore.
- iClickers will be required for each in-class quiz.

### HOW TO ACCESS THE eBook:

Immediate access to the required textbook (Voet: Fundamentals of Biochemistry 5th, ISBN 9781118918401) & Sapling (Sapling Learning Single Course Access, 9781319080518) are provided in a 180-day subscription digital format by the first day of classes and are free through Sept 11<sup>th</sup> at 11:59PM. After Sept 11<sup>th</sup>, your SDSU student account will be charged a special reduced price of \$92.00 for access to the content in Blackboard for the remainder of the Fall semester unless you opt-out of the content by 11:59 PM on Sept 11<sup>th</sup>.

To access your eBook, click the RedShelf link in Blackboard, then the green View Course Materials button and Start Reading. Note: avoid FireFox and Safari web browsers. Google Chrome and Internet Explorer work.

To opt out visit: [www.shopaztecs.com/optout](http://www.shopaztecs.com/optout) .

For more information visit: [www.shopaztecs.com/immediateaccess](http://www.shopaztecs.com/immediateaccess) .

Additionally, after the opt-out period ends and if you remain in the program, a reduced price print add-on will be available for \$49.99 if you prefer print. For those opting out, you will need to procure digital and/or print materials at regular pricing through the bookstore or elsewhere.

If you have problems/questions or if you have accidentally opted out, email [optout@aztecmail.com](mailto:optout@aztecmail.com)

**ADDITIONAL RESOURCES:** I will be posting all lecture PowerPoints on Blackboard. Check there weekly. The lectures will introduce additional online resources for certain topics.

**HOW TO STUDY:** Your textbook and lecture PowerPoints are the two major resources for this course. Use the lecture PowerPoints as your study guide, by following the specific learning objectives listed at the beginning of each lecture. Guided by this list, read the pertinent sections in the book chapter for that lecture.

### Course Structure and Mode of Delivery

- **Course structure:** This one semester course will be delivered over 16 weeks; 13.5 weeks of instruction, 1.5 weeks of assessment, half a week of review, and half a week break. The course is structured in three learning modules, separated by 2 assessments and followed by a final exam (**see course schedule below**). Class meets twice a week for 1 hour and 15 minutes. The mode of delivery includes lecture, in-class problem-based assignments, guided online applications, videos.
- **Technology Utilized in the Course:** Blackboard with eBook link RedShelf, PowerPoint, Sapling homework student website, videos.

## Course Assessment and Grading

### Scoring:

10 Homework assignments: 5 points each, total 50 points =25% of final grade.

20 in-class quizzes: 2.5 points each, 50 points total =25% of final grade. **Note: 24 quizzes will be offered, but you are required to take 20 quizzes. If you take less than 18 quizzes, you lose all quiz credit. If you take more than 20 quizzes, you get the extra credit.**

First midterm exam: 25 points = 12.5% of final grade.

Second midterm exam: 25 points = 12.5% of final grade.

Final exam: 50 points = 25% of final grade.

**TOTAL POINTS: 200**

### Grading scale:

Percent Score	Grade
≥ 93.33	A
90 to < 93.33	A-
86.66 to < 90	B+
83.33 to < 86.66	B
80 to < 83.33	B-
76.66 to < 80	C+
73.33 to < 76.66	C
70 to < 73.33	C-
66.66 to < 70	D+
60 to < 66.66	D
< 60	F

Grade Point Conversion Chart		
A = 4.0	C + = 2.3	D - = 0.7
A - = 3.7	C = 2.0	F = 0
B + = 3.3	C - = 1.7	WU = 0
B = 3.0	D + = 1.3	I = 0
B - = 2.7	D = 1.0	IC = 0

## Assignments instructions

### **SAPLING HOMEWORK:**

We will be making use of an online homework/study module prepared specifically for this course by Sapling Learning. All students are required to purchase access to the online homework server.

Go to your Blackboard account. Under "Assignments" you will find a single-sign-on link to Sapling. For instructions on how to enroll in Sapling using this link, go here

<https://community.macmillan.com/docs/DOC-6225-sapling-learning-student-single-sign-on>.

If you have any issues using Sapling throughout the course, send an email explaining the issue to [support@saplinglearning.com](mailto:support@saplinglearning.com) to get help.

There will be 10 homework assignments, each pertaining to content covered in the two classes of a given week. All homework assignments are given on a Tuesday and are due by 11 am on the following Tuesday.

## Estimated time commitment

### Modules and Estimated Hours

Module	Estimated hours
How is energy conserved and used by the cell? How is genetic information stored, transmitted, expressed, and experimentally gathered?	14
The structures and functions of proteins.	10.5
Membrane structure and function. Enzymes.	13.5

## Guidelines for student participation

1) **Participation** – This will come from frequent in-class quizzes (using iClickers) which will start on the third week of class. You **must** register your iClicker remote for this class in blackboard to receive credit. Students will not receive any points for days they forget their iClicker or if their iClicker malfunctions. **To receive quiz credit, you must have >75% attendance over the semester, i.e. take no less than 18 out of the 24 quizzes offered. If you take fewer than 18 quizzes, you lose all credit coming from quizzes (25% of final grade). It is all or none. If you take more than 20 quizzes, you get the extra credit.**

2) **Missing exams:** You are required to attend class on exam days. If you are going to miss an exam and have a valid excuse, I need to know at least 1 week in advance (with the exception of documented medical or other emergencies to be assessed at my discretion). Come and see me AND email me so I keep written record. You are required to provide a written excuse from the Office of Student Life. **If you miss an exam and 1) do not have a valid excuse and documentation and/or 2) did not communicate this absence to me in advance both in person and via email, you will not be able to make up points.**

3) Help provide a positive and safe space for learning. This includes showing respect to your peers and I, and not using cell phones or disrupting others by web surfing.

4) Seek help during office hours as needed.

5) Be ready to **read** 10-30 pages a week. Reading the text is vital. Doing so before the class will help you fully engage.

- 6) Do your work weekly on time. This is not a course for cramming at the last minute.
- 7) All homework assignments are given on a Tuesday and are due by 11 am on the following Tuesday, except for the first homework (Homework 1) which is due in 2 weeks to give you more time to learn to use Sapling. See course schedule below.

**Course Schedule** (note: the chapter pages indicated are from the 5<sup>th</sup> edition of the text, eBook version. If using the 4<sup>th</sup> edition, the pages are near these numbers.)

Date	Activity (lectures are numbered)	Reading chapter (pages)	Assignment given out that day
Tues, Aug 29	1) <i>Understanding the course syllabus and homework system.</i> Lecture: Introduction to the Chemistry of Life.	Syllabus & Ch. 1 (pp. 1-10)	Homework 1, due 9/12 at 11 am
Thurs, Aug 31	2) Lecture: Energy in biological systems.	Ch. 1 (11-21)	
Tues, Sept 5	No class		
Thurs, Sept 7	No class		
Tues, Sept 12	3) Water, acids, bases and buffers.	Ch. 2 (24-38)	Homework 2, due 9/19 at 11 am
Thurs, Sept 14	4) Lecture: nucleotides and nucleic acids.	Ch. 3 (42-45)	
Tues, Sept 19	5) Lecture: Genetic information and the Central Dogma.	Ch. 3 (46-53)	Homework 3, due 9/26 at 11 am
Thurs, Sept 21	6) Lecture: Sequencing and genomics.	Ch. 3 (54-66)	
Tues, Sept 26	7) Lecture: Recombinant DNA technology.	Ch. 3 (66-77)	
Thurs, Sept 28	<b>Exam 1</b> (in material covered in Lectures 1-7).		
Tues, Oct 3	8) Lecture: Amino Acids and proteins.	Ch. 4 (80-95)	Homework 4, due 10/10 at 11 am
Thurs, Oct 5	9) Lecture: Protein purification and analysis.	Ch. 5 (97-109)	
Tues, Oct 10	10) Lecture: Protein sequencing.	Ch. 6 (110-135)	Homework 5, due 10/17 at 11 am

<b>Date</b>	<b>Activity (lectures are numbered)</b>	<b>Reading chapter (pages)</b>	<b>Assignment given out that day</b>
Thurs, Oct 12	11) Lecture: Protein structure: primary, secondary, tertiary, quaternary.	Ch. 6 (146-159)	
Tues, Oct 17	12) Protein stability and folding. Chaperones.	Ch. 6 (159-169)	Homework 6, due 10/24 at 11 am
Thurs, Oct 19	13) Lecture: Protein function: hemoglobin and disease.	Ch. 7 (170-177) Ch. 7 (180-201)	
Tues, Oct 24 (Dr. Luthra)	14) Lecture: Protein function, Antibodies.	Ch. 7 (212-216)	
Thurs, Oct 26 (Dr. Luthra)	<b>Exam 2</b> (in material covered in Lectures 8-14).		
Tues, Oct 31	15) Lecture: Monosaccharides.	Ch. 8 (217-228)	Homework 7, due 11/7 at 11 am
Thurs, Nov 2	16) Polysaccharides and glycoproteins.	Ch.8 (229-243)	
Tues, Nov 7	17) Lecture: lipids and lipid bilayers	Ch. 9 (244-259)	Homework 8, due 11/16 at 11 am
Thurs, Nov 9	18) Lecture: membrane proteins.	Ch. 9 (255-269)	
Tues, Nov 14	19) Lecture: Biological membranes 1.	Ch. 9 (270-277)	Homework 9, due 11/21 at 11 am
Thurs, Nov 16	20) Lecture: Biological membranes 2.	Ch. 9 (277-290)	
Tues, Nov 21	21) Lecture: Facilitated transport across membranes.	Ch. 10 (291-310)	
Thurs, Nov 23	<b>Thanksgiving holiday. No class</b>		
Tues, Nov 28	22) Lecture: Active transport across membranes.	Ch. 10 (310-319)	Homework 10, due 12/5 at 11 am
Thurs, Nov 30	23) Lecture: Enzyme catalysis.	Ch. 11 (322-329)	
Tues, Dec 5	24) Lecture: Enzyme catalytic mechanisms: Serine proteases.	Ch. 11 (330-339) (339-355)	
Thurs, Dec 7	25) Lecture: Enzyme kinetics.	Ch. 12 (361-373)	



Date	Activity (lectures are numbered)	Reading chapter (pages)	Assignment given out that day
Tues, Dec 12	26) Lecture: Enzyme inhibition and structure based design.	Ch. 12 (373-383)	
Thurs, Dec 14 LAST CLASS	27) Catch up review.		
Week of Dec 18-22. Exact date and time TBD.	<b>Final exam</b> (in material covered in Lectures 15-26).		

### Students with Disabilities

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

### Academic Honesty

The University adheres to a strict [policy regarding cheating and plagiarism](http://www.sa.sdsu.edu/srr/conduct1.html). These activities will not be tolerated in this class. Become familiar with the policy (<http://www.sa.sdsu.edu/srr/conduct1.html>). Any cheating or plagiarism will result in failing this class and a disciplinary review by Student Affairs.

Examples of Plagiarism include but are not limited to:

- 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
- Submitting a piece of work you did for one class to another class.

If you have questions on what is plagiarism, please consult the [policy](http://www.sa.sdsu.edu/srr/conduct1.html) (<http://www.sa.sdsu.edu/srr/conduct1.html>) and this [helpful guide from the Library](http://infodome.sdsu.edu/infolit/exploratorium/Standard_5/plagiarism.pdf):([http://infodome.sdsu.edu/infolit/exploratorium/Standard\\_5/plagiarism.pdf](http://infodome.sdsu.edu/infolit/exploratorium/Standard_5/plagiarism.pdf))

## Turnitin

Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. You may submit your papers in such a way that no identifying information about you is included. Another option is that you may request, in writing, that your papers not be submitted to Turnitin.com. However, if you choose this option you will be required to provide documentation to substantiate that the papers are your original work and do not include any plagiarized material.