

# Chemistry 365

## Biochemistry, Cell & Molecular Biology I

### Fall 2016

#### Instructor:

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#### Course time:

12:30-1:45 p.m., Tues. & Thurs., GMCS-333

#### Office hours:

9:15-11:15 a.m. Thurs., or e-mail to make an appointment.

*Due to our class size and lack of TA, I cannot effectively respond to emails, so make use of office hours. If you are asking a question that is in the syllabus, I will not respond to your email. Please put "CHEM 365 scheduling alternative office hours" in the subject line to ensure I respond in a timely manner if this is the purpose of your email.*

#### Textbooks:

Fundamentals of Biochemistry: Life at the Molecular Level, 4th Edition (2013), D. Voet, J. Voet & C.W. Pratt (John Wiley & Sons, Inc.)

#### Other course materials:

iClickers and red ParScore scantrons (and #2 pencils) for each exam will be required. You will need to purchase a **subscription to Sapling** for this class in order to gain access to required homework.

Information will be posted on Blackboard, so please check this site regularly. Most lectures will be posted here.

#### Course details:

*Prerequisites* - Chemistry 232, and 232L; Biology 203 and 203L

*Course description* - 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 explain the diverse and complex processes required for life and what goes awry in disease. This is a thriving area of research, and so I will supplement the assigned text with examples of the types of cutting-edge research and case studies of diseases related to our topics of study.

#### *Overall learning goals:*

- 1) To understand that life consists of a complex set of chemical processes
- 2) To integrate system-wide the biomolecules that perform and/or are affected by these processes
- 3) To have the tools to evaluate the biological functions at work in health and disease

- 4) To decide that you can help society in evaluating and disseminating accurate scientific information
- 5) To discover that science is an ongoing endeavor; that what we are learning in class is the foundation for laboratory research addressing human disease, environmental issues, technology development, etc.

*Specific learning objectives:*

- 1) To know the biological role of biomolecules, understand their building blocks, and apply their chemical characteristics to explain how they are suited for their role
- 2) To understand the structure/function relationship of biomolecules, and use these features to make connections to other classes of biomolecules
- 3) To apply basic equations to assess energetics, buffering, and enzyme kinetics and inhibition
- 4) To evaluate how class concepts are being used in the lab and in the health fields

*Resources available to students* - The text is the primary resource for this course. Lectures will not fully cover all textbook topics, although a short list of “lecture goals” will be highlighted at the beginning of each lecture to aid students in studying for exams. Most slides used in lectures will be posted in Blackboard, but answers to In Class Problem Sets and iClicker questions will not be posted. You will miss this material if you don’t attend. Make use of office hours to ask questions about material you find confusing before you encounter it on your exam.

*In Class Problem Sets* – There will be three In Class Problem Sets to help students master learning objectives and prepare for exams that will be worked in class for points. It is possible that some exam questions will be taken from the problem sets. In addition, students will benefit from being able to answer the “checkpoint” questions and the problems present at the end of chapters in the Voet, Voet, and Pratt text. The end of chapter problems in particular will help students prepare for exams.

*Participation* – This will come from In-Class Problem Sets (using iClickers) and from answering In-Class iClicker questions. For the iClicker questions, you will be graded on participation, not whether you have answered the questions correctly. 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.

*Homework* – There will be graded homework assigned for each chapter that will be administered via Sapling. Due dates will be given via email or Blackboard.

*Exams and grading* – There will be three 3 exams, including the final which is not cumulative. Each exam is worth 150 points. **You will need to purchase and bring the small red parscore scantrons, #2 pencils, and calculators to each exam.** Exams may be curved using Z scores and standard deviations. If a student scores an A on 2/3 exams, the third exam will be dropped if this procedure benefits the student’s grade.

**Exam 1:** Chapters 1-4 (150 points)

**Exam 2:** Chapters 5-8 (150 points)

**Exam 3:** Chapters 9-12 (150 points)

**Participation:** In Class Problem Set 1, 9/13 (25 points), In Class Problem Set 2, 10/27 (25 points), answering 75% of iClicker questions (25 points), for 75 points total

**Homework:** 50 points total (average of all homework sets, with the lowest dropped)  
Total course points: 575

*Grading scale –*

A =  $\geq 92.5\%$   
A- = 89.5-92.4%  
B+ = 87.5-89.4%  
B = 82.5-87.4%  
B- = 79.5-82.4%  
C+ = 77.5-79.4%  
C = 72.5-77.4%  
C- = 69.5-72.4%  
D+ = 67.5-69.4%  
D = 62.5-67.4%  
D- = 59.5-62.4%  
F < 59.4%

*Expectations - I expect you to:*

- 1) Try to read the assigned material before coming to class. We cannot cover everything in class, so reading the text is vital. Doing so before the class will help you fully engage. If you fail to read the material before class, you must do so before the exam.
- 2) Attend lectures and participate in learning.
- 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 websurfing.
- 4) Seek help during office hours as needed.

*Attendance and absences –* Lectures will provide material beyond the scope of the text including focus on medical relevance and technological tools used in research labs, so attendance is strongly encouraged. To receive full percentage points in participation, you must participate in the In-Class Problem sets and answer 75% of iClicker questions over the course of the semester -- these points are issued as “all or nothing”. Thus skipping class participation (i.e. skipping class) will negatively impact your grade. Having someone answer your iClicker questions is academic misconduct and will be treated as such.

You are required to attend class on exam days and in class problem set days. If you are going to miss an exam and/or an in class problem set 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 have written record of this. You are required to provide a written excuse from the Office of Student Life. **If you miss an exam or Problem Set 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. iClicker points for non-In-Class Problem Sets days cannot be made up.**

*Students with Disabilities -* The University is committed to providing reasonable academic accommodation to students with disabilities. If you require accommodation, contact the Student Disability Services Office (or visit

[http://go.sdsu.edu/student\\_affairs/sds/](http://go.sdsu.edu/student_affairs/sds/)) at (619) 594-6473. The instructor cannot provide any test accommodations without the prior consent of Student Disability Services.

*Religious Observances* - By the end of the second week of classes, students should notify the instructors of any planned absences for religious observances. The student and instructor will work together to reasonably accommodate students who have notified in advance of planned absences for religious observances.

*Statement on Cheating and Plagiarism* – Basically, don't cheat, no exceptions! The University adheres to a strict [policy regarding cheating and plagiarism](http://studentaffairs.sdsu.edu/srr/conduct1.html) (<http://studentaffairs.sdsu.edu/srr/conduct1.html>). If you cheat you will receive an F for the course and you will be referred to the University for disciplinary measures. 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>). If you feel overwhelmed, come to office hours. Appreciate how cheating can ruin your otherwise bright future.

*Syllabus is Subject to Change* - This syllabus and schedule are subject to change. If you are absent from class, it is your responsibility to check on announcements made while you were absent.

*The following schedule provides the topics, required readings, and important dates.*

<b>Date</b>	<b>Topic</b>	<b>Pre-class reading assignment</b>	<b>In class problem sets, Sapling HW</b>
8/30	1: Chemistry of life Case study: What's in a genome?	Chap 1, pg 1-11	HW 1 assigned
9/1	2: Energy in biological systems	Chap 1, pg 11-21, Chap 14, pg 448-56	
9/6	3: Water and non-covalent interactions Tools of the trade: designing therapeutics	Chap 2, pg 22-30	<b>HW 1 due</b> HW 2 assigned
9/8	4: Acids, bases and buffers Case study: can you alter your pH with diet?	Chap 2, pg 30-39	
9/13	5: Group work: in-class problem set 1	Review Chap 1, 2	Problem Set 1
9/15	6: Nucleotides, nucleic acids, genetic info Tools of the trade: HIV antiretrovirals	Chap 3, pg 40-51	<b>HW 2 due</b> HW 3 assigned
9/20	7: Sequencing and genomics Case study: the ethics of genomics	Chap 3, pg 51-62	
9/22	8: Recombinant DNA technology Tools of the trade: CRISPR-Cas9	Chap 3, pg 62-75	
9/27	9: Amino acids	Chap 4, pg 76-92	<b>HW 3 due</b> HW 4 assigned
9/29	10: Protein purification	Chap 5, pg 93-105	HW 5 assigned
10/4	11: Protein sequencing, evolution Tools of the trade: proteomics	Chap 5, pg 106-126	<b>HW 4 due</b>

10/6	<b>Exam 1 (Chap 1-4)</b>		
10/11	12: Proteins: secondary structure	Chap 6, pg 127-141	HW 6 <i>assigned</i>
10/13	13: Proteins: tertiary, quaternary structure; stability and folding, Case study: student interest guided (TBD) Prep for Hands-on Demo	Chap 6, pg 142-175	<b>HW 5 due</b>
10/18	14: Tools of the trade: X-ray crystallography Hands-on Demo (bring your laptops!): targeting kinases in cancer		
10/20	15: Protein function: Mb, Hb	Chap 7, pg 176-196	<b>HW 6 due</b> HW 7 <i>assigned</i>
10/25	16: Protein function: Antibodies, Protein regulation	Chap 7, pg 208-216	
10/27	17: Group work: in-class problem set 2	Review Chaps 5-7	Problem Set 2
11/1	18: Monosaccharides Tools of the trade: PET scans	Chap 8, pg 217-230	<b>HW 7 due</b> HW 8 <i>assigned</i>
11/3	19: Polysaccharides	Chap 8, pg 230-240	
11/8	20: Lipids Tools of the trade: student interest guided (TBD)	Chap 9, pg 241-257	HW 9 <i>assigned</i>
11/10	21: Membranes and membrane proteins	Chap 9, pg 258-272	<b>HW 8 due</b>
11/15	<b>Exam 2 (Chap 5-8)</b>		
11/17	22: Membrane transport Tools of the trade: fluorescence-guided surgery	Chap 10, pg 288-314	<b>HW 9 due</b> HW 10 <i>assigned</i>
11/22	23: Enzymatic catalysis	Chap 11, pg 315-332	HW 11 <i>assigned</i>
11/29	24: Polymerases and proteases Case study: the speed of life without enzymes	Chap 11, pg 332-354	<b>HW 10 due</b>
12/1	25: Enzyme kinetics, Michaelis-Menten equation	Chap 12, pg 355-367	HW 12 <i>assigned</i>
12/6	26: Enzyme kinetics, cont. Demo: reaction rates		<b>HW 11 due</b>
12/8	27: Bisubstrate reactions, inhibition Tools of the trade: pre-steady-state kinetics	Chap 12, pg 368-395	
12/13	Catch up on any missed material, In-class problem set for review (bring calculators) <i>*Note, today's In-class problem set is scored only for regular iClicker credit*</i>	Review Chaps 9-12	<b>HW 12 due</b>
TBD	<b>Final Exam (Chap 9-12)</b>	Time TBD	