

# Biochemistry, Cell and Molecular Biology I

## CHEM365

**NE 60, 3 units, Tuesday and Thursday: 12:30 – 1:45 pm**

<b><u>Instructor:</u></b>	Professor John J. Love Department of Chemistry & Biochemistry Office: CSL 339A (located inside Laboratory 339) e-mail: <a href="mailto:jlove@mail.sdsu.edu">jlove@mail.sdsu.edu</a>
<b><u>Course time:</u></b>	12:30-1:45 p.m., Tuesday and Thursday, NE 60
<b><u>Professor Love's Office hours:</u></b>	2:00 -3:00 p.m. on Tues. & 4:00-5:00 pm on Wed. in CSL 508 (if Dr. Love is not in CSL 508 then go to his lab/office in CSL 339). If necessary, send e-mail to Dr. Love to make an appointment for an alternative time (see next page for possible alternative times).
<b><u>Required Textbook:</u></b>	<b>Fundamentals of Biochemistry</b> Life at the Molecular Level by D. Voet, J.G. Voet and C.W. Pratt, <b>4<sup>th</sup> Edition</b> , Wiley & Sons, Inc.
<b><u>Clicker (NOT required):</u></b>	Clickers will not be used or required during this semester.
<b><u>Course attendance Policy:</u></b>	Students are expected to attend all lectures.

**Syllabus is Subject to Change:** *This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent.*

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**Course Overview and Description:** Basic concepts of modern integrated biochemistry, cell and molecular biology. The structure, function, metabolism, and thermodynamic relationships of chemical entities in living systems will be fully described. The thermodynamic properties of biological macromolecules will initially be reviewed along with a review of the important role water plays in all living systems. Students will learn the different levels of macromolecular structure and the important interplay between structure and function. The macromolecules that will be explicitly described include DNA, RNA, proteins, carbohydrates, lipids as well as some of their derivatives. The lipids that make up the all important cell membrane will be described and analyzed along with all the embedded biological macromolecules that enable the membrane to properly function. Finally, the catalytic mechanisms and kinetic properties of a number of important biological enzymes will be explicitly described and analyzed.

**Professor Love's Office hours:** 2:00 -3:00 p.m. on Tues. & 4:00-5:00 pm on Wed. in CSL 508 (if Dr. Love is not in CSL 508 then go to his lab/office in CSL 339). If necessary, send e-mail to Dr. Love to make an appointment for an alternative time.

#### **Professor Love's Alternate Hours**

Below is a list of weekdays and times that students can come by Professor Love's laboratory/office to ask questions. These time slots are supplementary and in addition to his normal office hours so there is no guarantee that he will be there during these hours. You must schedule alternative times in advance.

Monday	Tuesday	Wednesday	Thursday	Friday
12 noon until 4 pm	<b>2-3 pm</b> 3:30-5 pm	12 noon - 4pm <b>4-5pm</b>	4-5 pm	12 noon - 1:30 pm

**REMEMBER:** These are hours that are in **addition** to Professor Love's normal office hours and therefore there is **NO** guarantee that he will be in his office/laboratory during the additional office hour times.

#### **From the SDSU General Catalog**

##### **CHEM 365. Biochemistry, Cell and Molecular Biology I (3)**

Prerequisites: Biology 203, 203L and Chemistry 232, 232L.

Basic concepts of modern integrated biochemistry, cell and molecular biology.

Not open to students with credit in Chemistry 361A or 560.

Applicable to chemistry major or minor **only** with approval from department.

#### **Student Learning Outcomes:**

1. Students will be able to fully describe and analyze the thermodynamic properties of biological macromolecules and the means by which these molecules function in living systems.
2. Students will be able to fully describe the role that water plays in all biochemical processes.
3. Students will be able to fully describe the structures and associated functions of biological macromolecules such as DNA, carbohydrates, lipids and proteins.
4. Students will be able to fully describe the methods used to purify biological macromolecules and explicitly analyze polyacrylamide gel electrophoresis results as well as column chromatography.
5. Students will be able to fully describe the catalytic mechanisms of a number of important biological enzymes.
6. Students will be able to understand, and potentially use, many of the fundamental tools used extensively in the field of molecular biology.

**Required Textbook: Fundamentals of Biochemistry** Life at the Molecular Level by D. Voet, J.G. Voet and C.W. Pratt, **4<sup>th</sup> Edition**, Wiley & Sons, Inc.

**Course Requirements:**

- **Course attendance Policy:** Students are absolutely required to attend all lectures.
- **Grades:** Grades are based on the following: 1) three midterm exams, and 2) approximately 12 on-line Blackboard homework quizzes (one per chapter). Exams and quizzes that students fail to take will be assigned a grade of **zero**. The date of each exam is given below in this course schedule. The first two exams are given during class periods and the last exam is given during the final exam time slot. The due-date schedule for the on-line Blackboard homework quizzes are also listed below in the class schedule.
- **Homework:** Your online homework assignments **MUST** be completed through your SDSU Blackboard account. The on-line Blackboard homework quizzes will all be somewhat similar to the problems you are assigned from the textbook. They will be similar but not exactly the same. It is suggested that you first work on and complete the homework assignments at the end of each chapter. You will **NOT** hand these in. You must complete the on-line Blackboard homework quizzes by the assigned dates as they will not be available after the assigned due-date.

**Statement on Cheating and Plagiarism:** *Academic honesty, simply put - Don't cheat! If you cheat you will receive an F for the course and possibly be expelled from SDSU. Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term 'cheating' not be limited to examination situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work. The penalty for cheating and plagiarism is an F for the course and possible expulsion from the University. For more information on the University's policy regarding cheating and plagiarism, refer to the Schedule of Courses ('Legal Notices on Cheating and Plagiarism') or the University Catalog ('Policies and Regulations'). You will need to learn the material in this course and, more importantly, develop the problem solving skills required of this course to be prepared for upper division coursework and eventually a career.*

**Exams and grading:** There will be 2 mid-term exams given in class and one final exam. The final is not comprehensive and will be given on Thursday December 11<sup>th</sup>, 2014 from 10:30-12:30 p.m. in NE 60. Any absence from an exam, which is not excused **before** the exam will result in an automatic **zero** for that exam. If an online Blackboard homework quiz is not completed by the assigned due-date that quiz will receive a zero (**NO** exceptions).

Exam 1	300 pts.	Chapter 1, 2, 3, 4
Exam 2	300 pts.	Chapter 5, 6, 7, 8
Exam 3 (final exam)	300 pts.	Chapter 9, 10, 11, 12
Online Blackboard Homework Quizzes	<u>100 pts.</u>	~12 quizzes
	1000 pts. total	

The following grades are guaranteed for the percentages shown. It is possible that the percentages may be lowered, but they will not be raised for a given letter grade.

A	90%	D	60%
B	80%	F	below 60%
C	70%		

**Online Blackboard Homework Quizzes:** Throughout the semester there will be approximately 12 online Blackboard (BB) homework quizzes (one for each chapter). Each BB homework quiz may contain between 5 to 25 questions and each question will be worth one point. At the end of the semester the quiz scores will be totaled and scaled to 100 points. For example, if there are a total of 150 BB homework quiz questions (worth one point each) throughout the semester and a student answered 120 questions correctly then they would receive 80 out of a possible 100 points for correct quiz answers (*i.e.*,  $120/150 = 80\%$ .  $80\%$  of 100 possible points = 80 points).

**Students with Disabilities: "Americans with Disabilities Act (DA) Accommodation:** *The University is committed to providing reasonable academic accommodation to students with disabilities. The Student Disability Services Office provides university academic support services and specialized assistance to students with disabilities. Individuals with physical, perceptual, or learning disabilities as addressed by the Americans with Disabilities Act should contact Student Disability Services for information regarding accommodations. Please notify your instructor so that reasonable efforts can be made to accommodate you. If you expect accommodation through the Act, contact the Student Disability Services Office ([http://go.sdsu.edu/student\\_affairs/sds/](http://go.sdsu.edu/student_affairs/sds/)) at (619) 594-6473."*

**Religious Observances:** "University Policy on Absence for Religious Observances includes the following statements: "By the end of the **second** week of classes, students should notify the instructors of affected courses of planned absences for religious observances. Instructors shall **reasonably** accommodate students **who notify them in advance** of planned absences for religious observances." Please notify the instructor in a timely manner and a reasonable accommodation will be reached.

**(Class Schedule is on the following page)**

**Course Schedule:**

<b>Date</b>	<b>Topic</b>	<b>Required Reading</b>	<b>Textbook Assignments</b>	<b>Blackboard homework quiz deadline</b>
08/26/14	Introduction and Overview (Origins of Life)	Chap. 1, pages 1 - 11	<b>1:</b> 1 - 13	09/05/14
08/28	Thermodynamics: 1st & 2nd Laws	Chap. 1, pages 11 - 21		
09/02	Gibbs Free Energy and $\Delta G$ in coupled reactions	Chap. 14.2, pages 446 - 456	<b>14:</b> 13 - 15, 17, 18	09/12/14
09/04	Properties of water; acids and bases	Chap. 2, pages 22 - 30	<b>2:</b> 1- 10, 12 - 21	09/19/14
09/09	Acids and bases (continued), buffers	Chap. 2, pages 30 - 39		
09/11	Acids and bases (continued), buffers			
09/16	Nucleotide and Nucleic Acid Structure	Chap. 3, pages 40 - 48	<b>3:</b> 1, 2, 7-10, 13-15, 17-20, 22, 25-27, 29	09/26/14
09/18	Genetic Information and Sequencing	Chap. 3, pages 48 - 58		
09/23	Manipulating DNA	Chap. 3, pages 62 - 75		
09/25	Amino Acids: acid-base properties; peptide bonds	Chap. 4, pages 76 - 92	<b>4:</b> 5-12,14, 16, 17, 24	10/01/14
09/30	Amino Acids (con't.)			
10/02	<b>First Examination</b>	<b>(Chapters 1-4, 14.2)</b>		
10/07	Peptides and proteins; protein isolation, purification by chromatographic methods	Chap. 5, pages 93 to the bottom of 105. You are not responsible for section 5.3 except for numbers 1, 2 and 3 on page 106. You are also responsible for section 5.3D and 5.3E on pages 113-116. You are not responsible for section 5.4	<b>5:</b> 1, 3-7, 9-14, 19, 20, 23-27 (come to office hours if you need help with any of these problems)	10/17/14

10/09	Protein Purification (cont.): electrophoresis, ultracentrifugation			
10/14	Protein secondary structure: $\alpha$ -helix, $\beta$ -sheet, structural proteins: collagen, keratin, silk fibroin; tertiary structure	Chap. 6, pages 127 – 155. You are <b>NOT</b> responsible for section 6.3 (Quaternary Structure and Symmetry). You are responsible for pages 156 – up to the top of page 166	<b>6:</b> 1, 2, 4-16, 19-21, 23, 24	10/24/14
10/16	Myoglobin and hemoglobin, Bohr effect, sickle cell and other abnormal hemoglobins.	Chap. 7, pages 176 – 192, but <b>NOT</b> the section on The Symmetry Model of Allostereism (191-193). You are responsible for pages 193(E) – 196, but <b>NOT</b> section 7.2 (Muscle Contraction), you are responsible for section 7.3 on pages 208-216	<b>7:</b> 5-8, 11-16, 23-29	10/31/14
10/21	Hemoglobin (continued), Antibody structure			
10/23	Carbohydrates: monosaccharides, reducing sugars (redox reactions), hemiacetal and acetal bonds, bonding, disaccharides and polysaccharides	Chap. 8, pages 217 - 240	<b>8:</b> 3, 4, 6, 11, 12, 14, 18, 19	11/07/14
10/28	carbohydrates (con't.)			
10/30	carbohydrates (con't.)			
11/04	<b>Second Examination</b>	<b>(Chapters 5, 6, 7, 8)</b>		
11/06	Lipids, triacylglycerol, steroid hormones, etc.	Chap. 9, pages 241 – 251 (but not the section titled: Vitamin D Regulates $\text{Ca}^{2+}$ Metabolism)	<b>9:</b> 1-3, 6, 7, 11-15, 17, 18	11/14/14
11/11	<b>SDSU closed - No Class</b> Veteran's Day			

11/13	Membranes	Chap. 9, pages 252 – 287		
11/18	Membrane Transport	Chap. 10, pages 288 – 295, 299-314	<b>10:</b> 5-11, 17, 22	11/28/14
11/20	Enzymatic Catalysis	Chap. 11, pages 315-354	<b>11:</b> 1-4, 6-8, 11-16, 19-21, 27-31	12/05/14
11/25	Enzymatic Catalysis (con't.)			
11/27	<b>Thanksgiving</b> – no class, have a happy and healthy holiday			
12/02	Enzymatic Catalysis (con't.)			
12/04	Enzyme Kinetics	Chap. 12, pages 355 - 376	<b>12:</b> 1-4, 9-11, 15-17, 25	12/10/14
12/09	Enzyme Kinetics (con't.)			
Final Exam Thur. 12/11/14 10:30 – 12:30 pm	<b>Final Exam is NOT cumulative and covers Chapters 9 through 12.</b>	The final exam will be held on Thursday December 11 <sup>th</sup> , 2014 from 10:30 – 12:30 pm location: NE 60		