

CHEMISTRY 350 – MOLECULAR PRINCIPLES OF BIOCHEMISTRY

FALL 2017

COURSE OVERVIEW	This course is designed to help students master the fundamental knowledge they need in order to understand the key molecular processes in biology. Instead of learning a large number of facts and observations, students are challenged to develop a deeper insight into the primary molecular principles operating behind biochemistry. The course will train students to use these concepts to understand how cells leverage fundamental chemical forces to perform important biological functions, emphasizing the interpretation of facts and the synthesis of knowledge by deduction, over memorizing details and specifics. Main topics include: biomolecular structures, protein and nucleic acid chemistry and functions, carbohydrates, lipid membranes, enzyme catalysis and kinetics, and biochemical signaling. In addition, a concise overview of molecular biology will be given, highlighting the key molecular processes central to metabolism and to gene expression and replication.
FACULTY	Professor Chi H. Mak Office: SSC 704 (213) 740-4101 cmak@usc.edu
OFFICE HOURS	T 12-1 W 5-6 (Other times by appointment)
LECTURE	TTh 9:30-11 MHP 101
DISCUSSION	T 11-12 WPH 103 W 12-1 GFS 222 W 1-2 GFS 222 W 2-3 SGM 226
TA	TBA
PREREQUISITE	Pre-requisite: CHEM-105b or CHEM-0115b Co-requisite: CHEM-322a or CHEM-325a Recommended preparation: BISC-220 or BISC-221
TEXTBOOKS	Required: 1. <i>Fundamentals of Biochemistry: Life At The Molecular Level</i> , 5 th Edition, by Voet, Voet and Pratt, 2016, Wiley. Recommended: 1. WileyPLUS (comes with textbook if purchased at USC bookstore)
WEBSITE	http://chemmac1.usc.edu/350 The Web will be used extensively in this course for instructions, homework, discussions and for distribution of information. Make sure you have access to the web.

LECTURES Chapters 1 through 19 will be covered in detail this semester. Overview of the topics in rest of the book (Chapters 20 through 28) will be given towards the end of the course to highlight other metabolic pathways, gene expression and regulation mechanisms, as well as DNA replication.

Reading and problem assignments are assigned every lecture.

Full attendance at all lectures is expected. You are responsible for any announcements made in lecture and all material presented whether or not it is in the textbook. Your responses to PRS questions (see Participation below) will be used to measure your attendance.

DISCUSSION A weekly discussion section will be used to go over the homework and lecture materials.

HOMEWORK Homework consists of weekly problem sets. Homework is assigned after every lecture. Weekly homework is collected during lecture every Thursday.

READING ASSIGNMENT The lectures will not necessarily revisit every section in the textbook, especially the basic ones. It is therefore critical that you do the reading assignments thoroughly. Reading assignment for each lecture is posted on the web. You should complete the reading assignment before you come to class.

GRADING

One-Hour Exams	3 @100 points	300
Problem Sets	12 @20 points	240
Final Exam	1 @200 points	200
Participation	25 points	25
Total:		<u>765</u>

EXAMS **There will be three 1-hour exams given during the semester.** The materials covered on each exam will be announced in lecture prior to the exam. **The exams will be given during the lecture time.** The one-hour time period will be strictly enforced. No one will be allowed to enter the exam late or leave early. Bring your student I.D. to all exams.

PARTICIPATION **In-class discussions will be used to encourage students to actively engage in the learning process.** Discussion will be conducted in small groups and/or through a web-based peer response system (PRS) which you can assess on any web-enabled device such as a cell phone or a tablet. Students are encouraged to actively participation in all in-class discussions.

FINAL EXAM **A comprehensive two-hour final exam will be given on December 7th, 2017 at 11:00 am to 1:00 pm.** This is the only time the final exam may be taken. No early or makeup final will be given.

ABSENCES **All unexcused absences from an exam will result in a zero.** Individuals with excused absences will be given special consideration at the end of the semester. Absences will be excused on the basis of official university policy. To secure an excused absence, bring verification to Prof. Mak prior to the absence, or in case of illness, immediately upon your return. All excuses will be verified.

TEACHING ASSISTANTS You are strongly encouraged to see any of the TAs during their office hours for questions or assistance on homework or the lecture materials.

COPYRIGHTED MATERIALS All course materials, including notes, slides, exams, exam keys, PRS questions, homework, homework solutions, discussion questions and case studies are considered copyrighted materials. Any student who transmits any of these materials to unauthorized users who are not registered in the course is in violation of USC student conduct code and will be reported to SJACS.

Statement for Students with Disabilities:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP:

http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html, (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

Statement on Academic Integrity:

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, (www.usc.edu/scampus or <http://scampus.usc.edu>) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

Emergency Preparedness/Course Continuity in a Crisis:

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.

LECTURE AND EXAM SCHEDULE

Week	Topic	Reading	Problem Set Due	Exams & Special Dates
1	Essential Chemistry Background Water	Ch. 1 Ch. 2		
2	Nucleotides, Nucleic Acids and Genetic Information	Ch. 3	#1	
3	Amino Acids Protein Primary Structures	Ch. 4 Ch. 5	#2	
4	Protein Tertiary Structures	Ch. 6	#3	
5	Protein Functions Carbohydrates (I)	Ch. 7 Ch. 8	#4	Exam 1 Thursday, Sept 21st
6	Carbohydrates (II) Lipids and Biological Membranes (I)	Ch.8 Ch. 9	#5	
7	Lipids and Biological Membranes (II) Membrane Transport	Ch. 9 Ch. 10	#6	
8	Enzyme Kinetics, Inhibition and Control Enzyme Mechanisms (I)	Ch. 12 Ch. 11	#7	
9	Enzyme Mechanisms (II) Biochemical Signaling	Ch. 11 Ch. 13	#8	Exam 2 Thursday, Oct 19th
10	Introduction to Metabolism Glycolysis	Ch. 14 Ch. 15	#9	
11	Glycogen Metabolism & Gluconeogenesis The Citric Acid Cycle	Ch. 16 Ch. 17	#10	
12	Electron Transport and Oxidative Phosphorylation Lipid Metabolism	Ch. 18 Ch. 20	#11	
13	Amino Acid and Nucleotide Metabolism DNA Replication, Repair and Recombination	Ch. 21,24 Ch. 25	#12	Exam 3 Thursday, Nov 16th Thanksgiving
14	Transcription and RNA Processing	Ch. 26		
15	Protein Synthesis Regulation of Gene Expression	Ch. 27 Ch. 28		
Final				Final Exam Thursday, Dec 7th