

Syllabus: CHEM 519 Spring 2017

Biochemistry and Molecular Biology: An Introduction for Chemists (4 units)

This class introduces the framework of modern biochemistry and molecular biology using examples centering on gene recognition and manipulation, including those involving the recently discovered CRISPR-Cas9 systems. Students are expected to learn fundamental concepts underlying biochemistry and molecular biology, to gain exposures to tools commonly used in biochemical research, to develop an ability to critically evaluate literature, and to build up scientific presentation skills.

Lecturer: Professor Peter Z. Qin

Office: LJS – 251; Phone: (213) 821-2461; Email: pzq@usc.edu

Time & Location: MWF 10 – 10:50 a.m. GFS 201

Note: January 27 is the last day to drop this course without a mark of W. April 7 is the last day to drop this course with a grade of W.

Office Hours: W 11 – 12 or by appointment

Class Web Page: http://pzqin.usc.edu/Chem_519/

You are responsible for regularly visiting the web page for new information on the course.

Notes & References: Course Reader (post lecture notes, papers, syllabus, *etc...*)

Various on-line resources and programs (protein databank, jmol, *etc..*)

Grading:	Problem sets:	100
	Midterm:	150
	Term paper:	150 (presentation 75; paper 75)
	Final:	150
	Total	550

Note: No makeup exams will be given

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, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:

<http://www.usc.edu/scampus/>. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>.

Lecture Schedule: (Dec 23, 2016; subject to change)

	Date	Topic
Week 1	Jan. 9	Class Introduction
	Jan. 11	Review of Basic Chemical & Physical Concepts
	Jan. 13	Amino Acids & peptides
Week 2	Jan. 16	<i>University Holiday</i>
	Jan. 18	Protein Structure
	Jan. 20	Protein Folding
Week 3	Jan. 23	Protein mis-folding
	Jan. 25	Nucleotide
	Jan. 27	DNA duplex structure
Week 4	Jan. 30	DNA melting & stability
	Feb. 1	RNA; RNA structure
	Feb. 3	Enzymatic synthesis: transcription, translation; DNA replication
Week 5	Feb. 6	<i>No Class</i>
	Feb. 8	Chemical Synthesis of Peptides
	Feb. 10	Chemical Synthesis of DNA/RNA
Week 6	Feb. 13	PCR; DNA sequencing
	Feb. 15	Molecular Biology Techniques

	Feb. 17	Basic Enzymology
Week 7	Feb. 20	[<i>University Holiday</i>]
	Feb. 22	Basic Enzymology: M-M mechanism
	Feb. 24	Basic Enzymology: inhibition
Week 8	Feb. 27	Enzyme regulation: Cooperativity
	Mar. 1	Midterm (closed book exam)
	Mar. 3	Enzyme; general catalytic strategy
Week 9	Mar. 6	Protein-based nucleases; catalytic strategy
	Mar. 8	protein-DNA recognition; prokaryotic transcription regulation
	Mar. 10	protein-DNA recognition; TALEN & gene editing
<i>March 12 – 19 Spring Break</i>		
Week 10	Mar. 20	Ribozymes; small ribozyme
	Mar. 23	Ribozyme; large ribozyme
	Mar. 24	Ribozyme & gene editing
Week 11	Mar. 27	Riboswitch (I)
	Mar. 29	Riboswitch (II)
	Mar. 31	In vitro selection (I)
Week 12	Apr. 3	In vitro selection (II)
	Apr. 5	RNA interference (I)

	Apr. 7	RNA interference (II)
Week 13	Apr. 10	CRISPR-Cas
	Apr. 12	CRISPR-Cas
	Apr. 14	CRISPR-Cas
Week 14	Apr. 17	CRISPR-Cas
	Apr. 19	CRISPR-Cas
	Apr. 21	CRISPR-Cas
Week 15	Apr. 24	Oral presentations
	Apr. 26	Oral presentations
	Apr. 28	Oral presentations
Final	May 8	Final Exam; Closed Book