BIOLOGICAL SCIENCES 435 (ADVANCED BIOCHEMISTRY)
SPRING SEMESTER 2017

Lecture: TTh 9.30-10:50, GFS 207, **Discussion:** T 2:00-3:50, LVL 16
Professors: John Petruska, RRI 119B (213-740-5189, petruska@usc.edu)
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Text: Berg, Tymoczko & Stryer, Biochemistry 7th ed, 2012 (or 8th ed, 2015)
Online resources (syllabus, lecture notes, etc): **Blackboard** http://blackboard.usc.edu

Week	Date	Lecturer	Lecture Topics	Text Chapter
Week 1	**Jan 10**	**JP**	**DNA, RNA Structures and Associated Activities**	**1, 4**
	Jan 12	**JP**	**Protein Structures & Their Interactions with DNA**	**2**
Week 2	**Jan 17**	**JP**	**Structural Features Involved in Sequence-Specific DNA-Protein Interactions**	**28–28.2**
	Jan 19	**JP**	**DNA Sequence Recognition by Restriction/ Modification Enzymes in Prokaryotes**	**5–5.1, 9.3**
Week 3	**Jan 24**	**JP**	**DNA Modification Enzymes in Mutagenesis & Epigenetics**	**6, 7.4, 24.2–3 32–32.1**
	Jan 26	**JP**	**DNA Sequence Recognition by Prokaryotic Transcription Factors**	**29–29.2 31–31.3**
Week 4	**Jan 31**	**JP**	**DNA Sequence Recognition by Eukaryotic Transcription Factors**	**32.1–32.3**
	Feb 2	**JP**	**General and Cell-Specific Transcription Factors in Eukaryotes**	**29.2 32.2 – 32.4**
	Feb 7	**JP**	**MIDTERM 1**	
	Feb 9	**MFG**	**DNA Polymerases**	**28 – 28.2**
Week 6	**Feb 14**	**MFG**	**Biochemistry of Leading & Lagging Strand Replication**	**28.3**
	Feb 16	**MFG**	**Biochemical Basis of Spontaneous Mutation**	**28.4**
Week 7	**Feb 21**	**MFG**	**Mismatch & Base Excision Repair**	**28.4 – 28.5**
	Feb 23	**MFG**	**Enzymatic Targeting of Oxidative DNA Damage**	**28.4 – 28.5**
Week 8	**Feb 28**	**MFG**	**Biological Consequences of DNA Damage; Nucleotide Excision Repair**	**28.4 – 28.5**
	Mar 2	**MFG**	**Specialized, Sloppier Copier DNA polymerases; Polymerase Exchange**	**28.4 – 28.5**

Week 9	**Mar 7**	**MFG**	**SOS Error-prone Repair, Fitness & Evolution**	**6, 34**
	Mar 9	**MFG**	**Generating Immunological Diversity – Good Mutations**	**34**
	Mar 13-17		**SPRING BREAK**	
Week 10	**Mar 21**	**JP**	**Eukaryotic RNA Modifications: Capping, Splicing and PolyA Tail Addition**	**29.3 – 29.4**
	Mar 23	**JP**	**RNA Interference (RNAi) as a Biochemical Process in Specific Gene Silencing**	**4.4, 5.4, 32.4**
Week 11	**Mar 28**	**JP, MFG**	**MIDTERM 2**	
	Mar 30	**XC**	**X-Ray Crystallographic and NMR Solution Analysis**	**3, 6**
Week 12	**Apr 4**	**XC**	**Relating Structure & Function**	**2 + Appendix**
	Apr 6	**XC**	**DNA Replication Fork Motion – Topology and Energetics**	**28.1 – 28.3**
Week 13	**Apr 11**	**XC**	**Structure and Function of Helicases**	**28.2 – 28.4**
	Apr 13	**XC**	**Structure and Function of Kinesins**	**35.1 – 35.3**
Week 14	**Apr 18**	**XC**	**How Does ATP Hydrolysis Produce Movement?**	**35.3 – 35.4**
	Apr 20	**XC**	**Structural Aspects of APOBEC Family of DNA C Deaminases**	**28.4, 29.3**
Week 15	**Apr 25**	**XC**	**Uracil Glycosylase Search and Destroy Mechanism**	**28.4**
	Apr 27	**XC**	**FAPY Glycosylase Search and Destroy Mechanism**	**28.4**
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Discussion Sessions: You will examine current respected research journals* in Biochemistry and Molecular Biology (e.g. in Seaver Library, or online) and select a recently pubished (2012-2017) research article on an interesting, well-described topic for a 15-20 min oral presentation and 5-10 min discussion. Participation (your attendance, alertness, and interest in other presentations indicated by asking questions) will be counted toward your grade, in addition to your oral presentation and discussion performance. More information will be provided by Dr. Petruska at the first class meeting and discussion session.

* Recommended journals whose research articles are refereed before publication:
Journal of Biological Chemistry, Biochemistry, Proceedings of the National Academy of Sciences (USA), Science, Nature, Cell, Journal of Molecular Biology

Grading:

Midterm 1 100 pts
Midterm 2 100 pts
Final 100 pts
Discussion (Including Oral Presentations & Questions) 100 pts
TOTAL = 400 pts

Letter grades are determined by a curve based upon total points.

Other Policies:
1. **Exam dates are firm**. If a student misses an exam due to a true emergency (with an acceptable written excuse; written information concerning a death in the family must be provided), Dr. Petruska MAY schedule a make-up exam, or at his discretion MAY permit use of the average of other exams in determining course grade. **No one will be admitted to an exam after the first student has left the exa**m.

2. **Regrading of exams will be done only by the professor(s) who wrote the question(s) and only within one week of the day the exam is returned to class. No exams written in pencil will be regraded.**

3. No special assignments for extra credit are given.

4. Final exams will be kept in Dr. Petruska's office for the required period.

5. **Academic integrity policies of the university will be strictly followed. Infractions can result in severe penalties.** See SCampus for these policies.

6. **It may be necessary to make some adjustments in the syllabus during semester.**

7. Disability: Students requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP when adequate documentation is filed. Please be sure the letter is delivered to Dr. Petruska as early in the semester as possible. DSP is open Mon-Fri, 8:30-5:00. in Room 120. Grace Ford Salvatori Hall, 2601 Watt Way; phone number (213)740-0776; FAX (213)740-8216; Email
<ability@usc.edu>