Chemistry 492/592
Biochemistry
Spring 2012

Meeting Time: MWF, 11:30 AM -12:35 PM, SRTC 101

Instructor: Dr John Perona; perona@pdx.edu
Office: SRTC 414
Office Hrs: W 9:45-11:15 AM


Exams and Grading: There will be 2 closed-book midterm exams worth 25% each and a closed-book, comprehensive final exam worth 50% of the grade. No calculators will be needed. Exam questions will focus primarily but not exclusively on material covered in the lectures. There will be no make-up exams given for the midterms. Missing a midterm exam with giving of appropriate notice (physician’s note or serious close family emergency) will result in proportionately greater weight placed on the final examination.

Studying: Most students find this to be a challenging course, and the material forms a critical part of your professional education in Biochemistry. Keeping up with the reading is essential. Additional suggested strategies: (i) read the relevant textbook material BEFORE the lecture is given; (ii) print out the annotated transparencies available on-line at d2l.pdx.edu, and use them in note-taking during class; (iii) make use of professor office hours; (iv) synthesize your own ongoing outline of the material based on your personal class notes, all material presented in class, and the textbook – and use this outline to study from; (v) practice writing structures and pathways until they are routine; (vi) spend some time thinking about the suggested study problems.


Required background: C- or better in 490/491 is required. 492/592 builds on the information base presented in the first two terms of the series. It is expected that you already know the structures of all the amino acids, the common protein secondary and tertiary structure motifs, and the fundamentals of enzymology and biothermodynamics. Basic knowledge of chemical kinetics and thermodynamics (freshman chemistry level), and some aspects of organic reaction mechanisms, will also be presumed.

Chem 592 students – A total of three 3-page written research perspectives, each based on a research article from the literature, will be required. One paper is due at or before each midterm and the third is due on the final day of class. See the Writing Assignments CH592 file posted on d2l.

Final Exam: Thursday June 14 from 12:30 – 2:20 PM in SRTC 101. Comprehensive, with about 50% of the material tested from Part III.
Syllabus

Part I. Nucleic acid structure and experimental approaches
April 2 Basics of nucleic acid structure and chemistry. Reading: pp 271-277; review 1.1, 1.4
April 4 DNA and RNA duplex structures. Reading: pp 277-287
April 6 RNA tertiary structure; nucleic acid chemistry Reading: pp 284-296
April 9 Chromosomes and introduction to supercoiling. Reading: pp 947-958
April 11 DNA supercoiling. Reading: pp 954-962
April 13 Chromatin structure. Reading: pp 962-971
April 16 Basics of DNA cloning. Reading: pp 303-316
April 18 PCR, forensics, and genomics. Reading: pp 316-324
April 20 Review
April 23 Midterm I: Chapters 8, 9, 24

Suggested problems: Chapter 8: 2,7,12,13,16 Chapter 9: 1,2,3,4,11 Chapter 24: 3,5,8,9,11

Part II. DNA and RNA metabolism.
April 25 DNA replication. Reading: pp 975-984
April 27 DNA replication. Reading: pp 984-993
April 30 DNA repair. Reading: pp 993-1002
May 2 DNA recombination. Reading: pp 1003-1014
May 4 RNA polymerases and transcription. Reading: pp 1021-1033
May 7 RNA processing. Reading: pp 1033-1045
May 9 Ribozymes and reverse transcriptases Reading: pp. 1045-1056
May 11 RNA replicases, TUF RNAs, and microarrays. Reading: pp. 1056-1061, pp 324-330
May 14 Review
May 16 Midterm II: Chapters 25 and 26

Suggested problems: Chapter 25: 1,2,5,6,9,14 Chapter 26: 1,2,4,12

Part III. Protein synthesis and gene regulation.
May 18 Introduction to translation. Ribosomes. Reading: pp 1075-1081
May 21 Genetic code. Reading: pp. 1065-1074
May 23 Aminoacylation and genetic code expansion. Reading: pp. 1082-1087
May 25 Initiation and elongation of protein chains on the ribosome. Reading: pp 1088-1096
May 28 Memorial Day Holiday
May 30 Protein modification, targeting and degradation. Reading: pp 1096-1109
June 1 Principles of gene regulation. Reading: pp 1116-1125
June 4 Gene regulation in bacteria. Reading: pp 1126-1136
June 6 Gene regulation in eukaryotes. Reading: pp 1136-1146
June 8 Review

Suggested problems: Chapter 27: 1,2,5,7,8,11 Chapter 28: 2,4,5,6,9

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