

Chemistry 142C/242C
Chemical Aspects of Biological Systems
Spring 2008

Meeting Time: T,R; 12:30-1:45 PM, Phelps Hall 3515

Instructor: Prof. Luc Jaeger (jaeger@chem.ucsb.edu)
Office: PSBN 4649A
Office Hrs: R, 2:00-3:00 PM or by appointment

TA: Erin Calkins (ecalkins@chem.ucsb.edu)
PSBN 4638, Phone: 5302
Office Hrs: T and R, 11-12 AM or by appointment

Text: *Mandatory:* Nelson DL & Cox MM. "Lehninger Principles of Biochemistry", 5th edition, Worth Publishers (2008)

Exams and Grading: There will be two closed-book mid-term exams worth 100 each and a final closed-book exam worth 200 points. 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: The best approach *by far* is to read the relevant textbook material BEFORE the lecture is given. **Read the chapters before class, come to class and take notes, rewrite your notes VERY SOON after class, and make sure that you don't let anything go by that you have not understood. Please, ASK QUESTIONS!!!**

Required background: 142C builds on the information base presented in 142A and 142B. It is expected that you already know the structures of the amino acids, the common protein secondary structure motifs, the structure of nucleic acids, the structures of the building blocks of complex carbohydrates and lipids, the basics of enzyme catalysis, and much of intermediary metabolism. General knowledge of these subjects, and especially of the central pathways of carbohydrate metabolism, all levels of protein structure, and the underlying basis for rate acceleration by enzymes, will be assumed on the exams.

Assignment for graduate students and honor students:

Students will have to write a small review paper (10 pages) related to the course (need to be discussed ahead of time). The paper should be based on 15-20 references. You need to submit your topic before the end of the 2nd week to me (and Erin Calkins).

Syllabus

Part 1: Information pathways and DNA (chapters 24 and 25)

Lecture 1 (March 31) Information transfer, genes, chromosomes and DNA super-coiling. *Reading p. 947-962 (15 pages)*

Lecture 2 (April 2) Chromosome structure. *Reading p. 962-971. DNA replication. Polymerase mechanism. Reading p. 975-984. (18 pages)*

Lecture 3 (April 7) DNA replication stages and DNA repair. *Reading p. 984-1003. (9 pages)*

Lecture 4 (April 9) DNA recombination. *Reading p. 1003-1016. (12 pages)*

Part 2: Information pathways and RNA (Chapter 26)

Lecture 5 (April 14) DNA-dependent synthesis of RNA. *Reading p. 1021-1033 (12 pages).*

Lecture 6 (April 16) RNA processing. *p. 1033-1049 (16 pages)*

First midterm (April 21) First mid term: Chap. 24-25 and parts of 26.

Lecture 7 (April 23) RNA-dependent synthesis of RNA and DNA; ribozymes and RNA world. *Reading p. 1049-1061 (12 pages).*

Part 3: Information pathways and proteins (Chapter 27)

Lecture 8 (April 28) Genetic code and protein synthesis. *Reading p. 1065-1081 (16 pages)*

Lecture 9 (April 30) Protein synthesis (stages 1 to 4). *Reading p. 1081-1096 (15 pages)*

Lecture 10 (May 5) Protein targeting and degradation. *Reading p. 1096-1109 (15 pages)*

Part 4: Information pathways and gene regulation (Chapter 28)

Lecture 11 (May 7) Gene regulation, protein-DNA interactions. *Reading p 1115-1125 (10 pages)*

Second midterm exam (May 12) on chapters 26-27 only!

Lecture 12 (May 14) Prokaryotic gene regulation. *Reading p. 1126-1136 (10 pages).*

Lecture 13 (May 19) Eukaryotic gene regulation. *Reading p. 1036-1154 (18 pages).*

Part 5: Metabolism of the building blocks of informational molecules: examples of integration of informational and metabolic pathways (Chapters 22 and 18).

Lecture 14 (May 21) Linking aa s catabolism and synthesis. *Reading p. 673-702 (29 pages)*

Lecture 15 (May 26) aas synthesis. *Reading p. 851-881 (30 pages)*

Lecture 16 (May 28) Nucleotide synthesis. *Reading p. 882-896 (13 pages)*

Part 6: informational pathways and cellular bio-signaling (examples from Chap.12)

Lecture 17 (June 2). *Reading p. 419-449 (30 pages)*

Lecture 18 (June 4) *Reading p. 449-479 (30 pages)*

Final Exam on all Chapters-- Monday June 8th, 12 noon- 3 PM

For Honor students: the paper should be given before June 13.