

Chemistry 747 Special Topics in Biochemistry

Nucleic Acid Biochemistry

Fall 2006

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Course meeting time:	Wed. and Fri., 3:30-5:00 PM
Course location:	Beury 120
Textbooks:	No required textbook, but selected texts will be on two hour reserve at the Science & Engineering library.
Prerequisites:	A course in biochemistry and in organic chemistry.

DESCRIPTION & COURSE OBJECTIVES

This course will examine the structures and functions of the primary nucleic acids: RNA and DNA; the interactions of RNA and DNA with proteins and other ligands; and how nucleic acids function in gene expression and regulation. In addition, molecular biological and biotechnological techniques involving nucleic acid processing and modifying enzymes will be discussed. The course primarily will be based on the recent literature, and will include lectures given by the instructor, with presentations by students later in the semester.

Grading: There will be a midterm exam (30% of grade; format & date to be announced); a final exam (30%; format to be announced). In addition, there will be a term paper (30%; format to be announced), and an oral presentation (10% of grade) on the features and use of a biochemistry/molecular biology website.

Any student who has a need for accommodation based on the impact of a disability should contact me privately, and as soon as possible, to discuss your specific situation.

Please refer to Policy 03.70.02 (Temple Policies and Procedures website), regarding Student and Faculty Academic Rights and Responsibilities.

Chemistry 747 (continued)**LECTURE SCHEDULE & TOPICS (*subject to modification*)**

Lecture	Topic
1.	Introduction: Central dogma of molecular biology and its ramifications.
2	Review of water structure & dynamics; Hydrogen bonding.
3	Nucleobase / nucleoside / nucleotides: structures & properties.
4	Standard base-pairing & the chemical basis of heredity; nonstandard base-pairing; base modifications & functional roles.
5	Polynucleotide chains (DNA and RNA): structures & properties.
6	RNA: review of structural and functional types. Survey of RNA processing & decay.
7	RNA folding – 2° and 3° structural motifs, dynamics. Mfold.
8	Ribozymes – discovery; basic types & functions.
9	RNA-protein interactions: Protein motifs and functional roles.
10	RNA interference (RNAi): enzymes & pathways.
11	RNAi (continued)
12	Biotechnological applications of RNAi and antisense nucleic acids.
13	Polymerases: functional classes and roles; Nucleic acid sequencing techniques.
14	Nucleic acid sequencing techniques (continued); PCR.
15	Restriction enzymes and nucleases – structures and mechanisms.
16	Nucleic acid modifying enzymes – ligases, kinases, etc.
17	Putting it all together – recombinant DNA technology & molecular cloning.
18	SELEX technologies; aptamer production and use.
19	Nucleic acid detection – hybridization technologies.
20	Emerging areas: nucleic acid based nanotechnologies: riboswitches, DNA wires, etc.
21	Emerging areas (continued).
22	Student presentation
23	Student presentation
24	Student presentation
25	Student presentation
26	Student presentation