Department of Science
Grande Prairie Regional College

Biochemistry 3300

Nucleic Acid Chemistry & Molecular Biology

Course Outline
2006-2007

Instructor
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Course Description: This course is intended to provide students with a comprehensive introduction to the biochemistry of nucleic acids. It covers the structure and properties of nucleotides and nucleic acids; DNA-based information technologies; genes and chromosome structure; molecular mechanisms in DNA replication, repair and recombination; RNA metabolism; protein synthesis and targeting; the regulation of gene expression.

Pre-requisites: BC 2000, CH 1020 and CH 2630

Notes:
1. Students with grades of less than B- in pre-requisite courses require consent of the department.
2. This course may not be taken for credit if credit has already been obtained in BC 2030 or BC 2050.

Transferability: Biochemistry 330 – University of Alberta

Text-book: Lehninger Principles of Biochemistry (4^{th} edition)
David Nelson & Michael Cox
W.H. Freeman and Co. (2005)

Requirements: Since participation in lectures and completion of assignments are essential to achieving success in this course, regular attendance at classes is highly recommended. Those who chose not to attend must assume whatever risks are involved. In this regard, your attention is directed to the Academic Guidelines of Grande Prairie Regional College.

Evaluation:

Mid-term Exam I	30%
Mid-term Exam II	30%
Final Exam	40%

Mid-term Exam I will test knowledge of material covered in the first third of the course.
Mid-term Exam II will test knowledge of material covered since the first mid-term exam.
The Final Exam will be cumulative and test knowledge of the entire course.

BC 3300 – Topic Outline & Required Readings

Hours	Topic	Readings
2	Nucleotides and Nucleic Acids	
	Basics	
	Bases	274
	Ribo- and deoxyribonucleosides and nucleotides	274-276
	Phosphodiester bonds	276
	5' and 3' ends	277
	hydrolysis of nucleic acids	277
	sequence conventions	278
	functional groups on bases; hydrogen bonds	279
	storage of genetic material	280-281
	Nucleic Acid Structure	
	Distinctive base composition (Chargoff's Rules)	281
	Antiparallel nature and complementary strands	282-283
	3-D forms of DNA (B, A and Z forms)	283-285
	unusual structures in DNA	285-287
	Structure of RNA	287-290
	Nucleic Acid Chemistry	
	Denaturation of double-helices	291-293
	Induced & spontaneous alterations of chemical structure	293-295
	methylation	296
1	Biosynthesis and Degradation of Nucleotides	
	Purine Nucleotides	
	De novo synthesis (PRPP)	864-866
	regulation	866-867
	Pyrimidine Nucleotides	
	De novo synthesis (PRPP)	867-868
	regulation	868
	General	
	Conversion of NMP to NTP	868-869
	Deoxynucleotides from ribonucleotides	869
	Ribonucleotide reductase	869-872
	Production of thymidylate	872-873
	Catabolism	
	Global overview (uric acid vs. ammonia	873-875
	Salvage pathways for recycling bases	875
	Lesch-Nyhan Syndrome	875
	Gout	875-876
	Chemotherapy	876-878