



Grande Prairie Regional College

Dept. of Science

BI 1070

CELLULAR BIOLOGY

COURSE OUTLINE

2006-2007

Instructor

Philip Johnson B.Sc., M.Sc., Ph.D., M.S.P.H.

Office: J224

phone: 539 2863

e-mail: [johnson@gprc.ab.ca](mailto:johnson@gprc.ab.ca)

Course description: All life functions are based on cells, and this course will provide an introduction to cell structure and function. Major topics will include the origin of life, the development of procaryotic and eucaryotic cell lineages, energy conversions, the compartmentation of biochemical functions within a cell, and communication from cell to cell. The genetic control of cell activities is examined through methods in molecular genetic analysis and their application in genetic engineering and biotechnology.

Text-books: “Biology” (7<sup>th</sup> edition, 2005) - (5<sup>th</sup> or 6<sup>th</sup> editions are also suitable)  
Campbell & Reese  
Benjamin Cummings Pub.

Student Study Guide for “Biology” (optional, but useful) (7<sup>th</sup> ed. 2005)  
Martha R. Taylor  
Benjamin Cummings Pub.

Biology 1070 Lab Manual (required) - available in book store.

Transferability:	Athabasca University	BIOL 2xx
	Augustana University College	BIO 130
	Concordia University College	BIO 1xx
	King’s University College	BIOL 210
	University of Alberta	BIOL 107
	University of Lethbridge	BIOL 1010
	University of Calgary	Jr. BIOL (BI 1070/1080 accepted in lieu of BIOL 231/223)

Requirements: Since participation in lectures/laboratories and completion of assignments are important components of this course, students will serve their best interests by regular attendance at both class and laboratory sessions. 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. All assignments must be completed and handed to the Instructor by the date specified. Late assignments will not be marked. Students must attend the laboratory session and complete the exercise in order to receive credit for the lab reports.

Evaluation:	Lab. Assignments and Quizzes.....	15%
	Class Quizzes.....	5%
	Mid-term Exam.....	20%
	Final Lab. Exam.....	20%
	Final Exam.....	40%
	TOTAL.....	100%

Alpha scale grades will be assigned only after completion of the course.

## **BI 1070 - Topic Outline**

<b>TOPIC</b>	<b>Chapter</b>
Macromolecules and inorganic constituents	4, 5
Membrane structure and function: <ul style="list-style-type: none"><li>- fluid mosaic model</li><li>- permeability and transport</li><li>- procaryotic/eucaryotic differences</li></ul>	7
Procaryotes: <ul style="list-style-type: none"><li>- morphology</li><li>- cell walls (Gram positive &amp; Gram negative)</li><li>- Archaeobacteria &amp; Eubacteria</li><li>- cell surface structures</li><li>- motility</li><li>- internal structures</li><li>- genome and genetic exchange</li><li>- growth and binary fission</li><li>- growth curves</li><li>- endospores</li></ul>	27
Viruses: <ul style="list-style-type: none"><li>- structure and replication</li><li>- viral infection</li><li>- bacteriophage (lytic/lysogenic cycles)</li><li>- animal viruses - reproductive cycles<ul style="list-style-type: none"><li>- viral diseases</li><li>- viruses and oncogenes</li></ul></li><li>- viroids and prions</li></ul>	18
Eucaryotic cell structure: <ul style="list-style-type: none"><li>- nucleus, ribosomes, endoplasmic reticulum</li><li>- lysosomes and vacuoles</li><li>- cell wall synthesis</li><li>- cytoskeleton and contractility</li><li>- mitochondria and chloroplasts</li><li>- extracellular matrix</li></ul>	6
Introduction to metabolism: <ul style="list-style-type: none"><li>- metabolic maps</li><li>- enzymes and metabolism</li><li>- control of metabolism</li></ul>	8

<b>TOPIC</b>	<b>Chapter</b>
Cellular respiration: - ATP, Redox reactions, respiration	9
Procaryotic anaerobic metabolism: - fermentation - anaerobic respiration - facultative anaerobes	9
Aerobic respiration: - Glycolysis - Kreb's Cycle - Electron Transport Chain - Oxidative phosphorylation	9
Eucaryotic anaerobic respiration: - energy utilization - anaerobiasis - carbohydrate metabolism	9
Photosynthesis: - Photophosphorylation - Calvin Cycle	10
<b><i>MID-TERM EXAM</i></b>	
Mitosis and the Cell Cycle	12
Meiosis and sexual life cycles	13
Nucleic acids: - composition - complementary base pairing	16
Eucaryotic chromosome organization	19
DNA replication	16
Genes, proteins and the genetic code	17
Transcription: - RNA-polymerase - processing of mRNA	17
Transcriptional control: - negative control by repression - negative control by induction - positive control	19

	<b>TOPIC</b>	<b>Chapter</b>
Translation:	<ul style="list-style-type: none"><li>- tRNA and codon recognition</li><li>- translation at the ribosomal level</li><li>- post-translational modifications</li></ul>	17
Mutations		17
Protein trafficking and targeting:	<ul style="list-style-type: none"><li>- peptide signal sequences</li><li>- protein sorting</li><li>- protein secretion</li></ul>	17
Recombinant DNA:	<ul style="list-style-type: none"><li>- restriction endonucleases</li><li>- chromosome mapping</li><li>- splicing genes into vectors</li><li>- expression of cloned genes (cDNA)</li><li>- PCR, RFLP's</li><li>- uses of genetic engineering</li></ul>	20