## Grande Prairie Regional College Dept. of Science

# BI 1070 CELLULAR BIOLOGY

### COURSE OUTLINE WINTER 2004

Instructor:

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### **BIOLOGY 1070 – CELLULAR BIOLOGY**

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 development of prokaryotic and eukaryotic cell lineages, energy conversions, the compartmentation of biochemical functions within a cell, the genetic code and its replication, transcription and translation, and communication from cell to cell. The genetic control of cellular activities is examined through methods in molecular genetic analysis and their application in genetic engineering and biotechnology. Throughout this course, we will examine how cellular biology provides support for the theory of evolution.
Textbooks:	"Biology" (6 <sup>th</sup> edition, 2002), Campbell, Reese and Mitchell Benjamin Cummings Pub.
	Student Study Guide for "Biology" (optional, but useful) (6 <sup>th</sup> ed. 2002), Martha R. Taylor, Benjamin Cummings Pub.
	Biology 1070 Lab Manual (required) - available in book store.
WWW Resources:	Biology 107 web-site at University of Alberta http://www.biology.ualberta.ca/courses.hp/bio107.hp/bio107.html
Requirements:	This course is a 3-credit course that includes 3 hours of lecture and 3 hours of lab each week, beginning with the week of September 7 <sup>th</sup> , 2004. It is transferable to the University of Alberta as Biology 107, with a grade of C- or above. 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
	Students must attend the laboratory session and complete the exercise in order to receive credit for the lab reports.
	Plagiarism will not be tolerated. Any student who plagiarizes will be given a zero on the assignment in question. A second case of plagiarism will result in expulsion from the course. The instructor reserves the right to use electronic plagiarism detection services.

Evaluation:	Lab. Assignments and Quizzes	15 %
	Final Lab Exam	20 %
	Midterm Exams (2)	25 %
	Final Exam	40 %
	TOTAL	100 %

Examinations will include both multiple choice and short answer questions.

At the end of this course you will be assigned a letter grade. These letter grades correspond to percentages in the following way:

90-100 =	A+	67-69 =	C+
85-89 =	А	64-66 =	С
80-84 =	A-	60-63 =	C-
76-79 =	B+	55-59 =	D+
73-75 =	В	50-54 =	D
70-72 =	B-	0-49 =	F

Lectures: Time: Monday & Wednesday, a0:00 to 11:20

#### **BI 1070 - TOPIC OUTLINE**

#### Macromolecules and inorganic constituents: Chp 5

#### Membrane structure and function: Chp 8

Fluid mosaic model Permeability & transport Differences in prokaryotic/eukaryotic cell structure

#### Prokaryotes: Chps 12, 18, 27

Ecological importance Classification Morphology – cell walls, cell surface, internal structures, motility Genome & genetic exchange, growth and binary fission Endospores

#### Viruses: Chp 18

Structure & replication Viral infection - Lytic/lysogenic life cycles Animal viruses, viral disease, viruses & cancer Viroids & prions

#### Eukaryotic cell structure: Chp 7

Nucleus and ribosomes Endoplasmic reticulum and Golgi apparatus Lysosomes and vacuoles Cell wall synthesis Cytoskeleton and contractility Extracellular matrix Peroxisomes Mitochondria and chloroplasts Endosymbiotic origin of cells

#### Introduction to metabolism: Chp 6

Metabolic maps Enzymes and metabolism Control of metabolism

#### Cellular respiration: Chp 9

ATP/ Redox reactions Respiration: aerobic metabolism Glycolysis/ CAC Electron Transport Chain and Oxidative Phosphorylation Connection to other metabolic pathways

#### Eukaryotic anaerobic respiration: Chp 9

Energy utilization Carbohydrate metabolism

#### Prokaryotic anaerobic metabolism: Chp 9

Fermentation Anaerobic respiration Facultative anaerobes

#### Photosynthesis: Chp 10

Photophosphorylation (light dependent reactions) Calvin Cycle (light independent reactions C3/C4/CAM plants

#### Mitosis and the Cell Cycle: Chp 12

Meiosis and sexual life cycles: Chp 13

Nucleic acids: Chp 16 Composition and function Complementary base pairing

#### Eukaryotic chromosome organization: Chp 19

DNA replication: Chp 16

#### Genes, proteins and the genetic code: Chp 17

#### Transcription: Chp 17

RNA-polymerase Types of RNA Processing of pre-mRNA

#### Translation: Chp 17

tRNA and codon recognition Translation at the ribosomal level Post-translational modifications

#### Protein trafficking and targeting: Chp 17

Peptide signal sequences Protein sorting Protein secretion

#### Mutations: Chp 17

#### Control of gene expression in procaryotes and eukaryotes: Chp 18,19

Negative control by repression Negative control by induction Positive control

#### DNA technology: Chp 20

Cloning: Restriction endonucleases Vectors Genomic and cDNA libraries PCR Cloning and transgenic organisms Application of genetic engineering

#### FINAL EXAMINATION