

Grande Prairie Regional College  
Dept. of Science

BI 1070  
CELLULAR BIOLOGY

COURSE OUTLINE  
FALL 2006

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” (7<sup>th</sup> edition, 2005), Campbell, Reese and Mitchell  
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.

**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 on September 7<sup>th</sup>, 2006. 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 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.

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.

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

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 =	A	64-66 =	C
80-84 =	A-	60-63 =	C-
76-79 =	B+	55-59 =	D+
73-75 =	B	50-54 =	D
70-72 =	B-	0-49 =	F

**Lectures:** Time: Tuesday, Thursday, 8:30 to 9:50

**Labs:** Time: Tuesday, Wednesday, Thursday, 2:30 to 5:20

# BI 1070 - Topic Outline

## **Macromolecules and inorganic constituents: Chp 5**

## **Membrane structure and function: Chp 7**

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

## **Prokaryotes: Chps 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 6**

- 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 8**

- 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 prokaryotes 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***