UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE: 1994
COURSE REVISED IMPLEMENTATION DATE: September 2006
COURSE TO BE REVIEWED: September 2010
(Four years after implementation date) (MONTH YEAR format)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Biology**

BIO 201		**4**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS

Cell Biology I
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course provides an introduction to the biochemistry, structure, and function of cellular components. The course opens with an exploration of biological macromolecules, enzymes, and energetics as the basis for interpretation of structure and function of cellular membranes and organelles. Students examine major pathways of chemotrophic and phototrophic metabolism in cells, mitochondria and chloroplasts, focusing on energy flow in the cell and its control. Lectures and integrated laboratory exercises emphasize the importance of experimental evidence underlying current understanding of cell structure and function.

PREREQUISITES: **BIO 112 and CHEM 114. CHEM 213 strongly recommended.**
COREQUISITES:

SYNONYMOUS COURSE(S)
(a) Replaces: _____ *(Course #)*
(b) Cannot take: _____ *(Course #)* for further credit.

SERVICE COURSE TO:
_____ *(Department/Program)*
_____ *(Department/Program)*

TOTAL HOURS PER TERM: 90
STRUCTURE OF HOUR

Lectures:	**45**	Hrs
Seminar:		Hrs
Laboratory:	**45**	Hrs
Field Experience:		Hrs
Student Directed Learning		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE: _____
HOURS PER DAY: _____

MAXIMUM ENROLLMENT: **24**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **annual**

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☒ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☐ Yes	☐ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☒ Yes	☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Ernest Kroeker, Edith Camm
Chairperson: Gillian Mimmack *(Curriculum Committee)*

Department Head: Barbara Moon
Dean: J. Snodgrass

PAC Approval in Principle Date:
PAC Final Approval Date: November 26, 2004

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

Successful students will:
1) Understand the structure and function of the four main classes of biological macromolecules.
2) Understand the basic metabolism of eukaryotic cells including central metabolic pathways involved with cellular respiration and photosynthesis.
3) Understand the energetics of cellular reactions and be able to calculate free energy changes for important biological reactions.
4) Know the basic structure and function of cellular membranes.
5) Understand the transport processes which occur in cells and how cellular homeostasis is maintained.
6) Gain valuable experience in a biology laboratory setting by working in small groups gathering real experimental data.
7) Learn the proper way to analyze and interpret scientific experimental data and be able to make proper summary graphs and tables.
8) Learn laboratory skills such as proper pipetting procedures, use of spectrophotometers, protein gel electrophoresis, use of gas chromatograph, etc.

METHODS: Lectures, laboratory exercises and reports, problem sets.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check :) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Methods may include interview, special assignments, and/or exams.

This course may be challenged. The student must challenge both lecture and lab components of the course by writing an examination for each. The student will be provided with a copy of the syllabus and information how to obtain a copy of the current text and lab manual. The student will also be given information about exam style and expected standards.

The student can sit the examination for the lecture portion of the course at a time convenient to both student and instructor. However, since it is not reasonable to expect a lab instructor to set up a lab exam for one student, our practice has been to permit the student to write the exam for the laboratory portion of the course at the same time is written by a regular class.

Students enrolled in Biology 201 for a second time are not obliged to take the laboratory part of the course if their previous lab mark was >70%.

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]
A typical textbook is *Becker, W.M., L. J. Kleinsmith, and J. Hardin. The World of the Cell. 5th ed. San Francisco: Benjamin Cummings, 2003.*

SUPPLIES / MATERIALS:

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Laboratory reports and lab exam:	30%
Midterm:	25%
Final examination:	45%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

Biological molecules
- mino acids, properties of R groups
- protein structure
-sugars; polysaccharides
-storage lipids, and introduction to membrane lipids
- nucleotides (roles in ATP and co-factors)
- introduction to nucleic acids

Bioenergetics and enzymes
-free energy changes in chemical reactions
-enzyme structure and function, including regulation
-introduction to enzyme kinetics

Movement of molecules from cell to cell and within the cell
-membrane lipids and their role in membrane structure
-transport of molecules across membranes
-energetics of membrane transport
-implications of membrane transport in nerve function
-extracellular structures and their role in cell-cell communication
-the endomembrane system and its role in sorting proteins

Energy flow in cells
-glycolysis and fermentation
-regulation of glycolysis and fermentation
-aerobic respiration in mitochondria: the TCA cycle and electron transport
- proton gradient and ATP formation
- chloroplasts and energy harvesting
- photosynthetic carbon fixation; photorespiration, CAM and C4 photosynthesis.

Lab exercises include
- Photometric assays
- Isolation of protein fractions from porcine serum
- Electrophoresis of protein fractions from porcine serum
- Enzyme kinetics of acid phosphatase
- Gas chromatography to separate fatty acids from naturally-occurring lecithin (2 weeks)
- Cell fractionation
- Respiration in yeast cells
- Use of inhibitors to probe mitochondrial electron transport (oxygen electrode)
- Chloroplast isolation and measurement of electron flow through PSII.