UNIVERSITY OF THE FRASER VALLEY

ORIGINAL COURSE IMPLEMENTATION DATE: June 1994
REVISED COURSE IMPLEMENTATION DATE: January 2018
COURSE TO BE REVIEWED: (six years after UEC approval) December 2020
Course outline form version: 09/15/14

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: BIO 201	**Number of Credits:** 4 Course credit policy (105)
Course Full Title: Cell Biochemistry/Metabolism **Course Short Title (if title exceeds 30 characters):**	
Faculty: Faculty of Science	**Department (or program if no department):** Biology

Calendar Description:

The biochemistry, structure, and function of cellular components are studied. Students examine pathways of chemotrophic and phototrophic metabolism in cells, focusing on cellular energy flow and control. Laboratory exercises emphasize the experimental evidence underlying current understanding of cell biochemistry and metabolism.

Prerequisites (or NONE):	One of the following: (BIO 112 and CHEM 114, both with a C+ or better) or (BIO 111, [CHEM 110 or CHEM 113], and [two of the following: AGRI 123, AGRI 124, AGRI 129, AGRI 163, AGRI 203, AGRI 204, or AGRI 220], all with a C+ or better).
Corequisites (if applicable, or NONE):	
Pre/corequisites (if applicable, or NONE):	

Equivalent Courses (cannot be taken for additional credit)

Former course code/number:

Cross-listed with:

Equivalent course(s):

Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit

Transfer credit already exists: ☒ Yes ☐ No

Transfer credit requested (OReg to submit to BCCAT):
☐ Yes ☒ No (if yes, fill in transfer credit form)

Resubmit revised outline for articulation: ☐ Yes ☒ No

To find out how this course transfers, see **bctransferguide.ca**.

Total Hours: 90

Typical structure of instructional hours:

Lecture hours	45
Seminars/tutorials/workshops	
Laboratory hours	45
Field experience hours	
Experiential (practicum, internship, etc.)	
Online learning activities	
Other contact hours:	
Total	**90**

Special Topics

Will the course be offered with different topics?
☐ Yes ☒ No

If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☐ Yes, no limit

Note: The specific topic will be recorded when offered.

Maximum enrolment (for information only): 24

Expected frequency of course offerings (every semester, annually, every other year, etc.): annually

Department / Program Head or Director: Allan Arndt	**Date approved:**	July 27, 2016
Faculty Council approval	**Date approved:**	October 2016
Campus-Wide Consultation (CWC)	**Date of posting:**	November 18, 2016
Dean/Associate VP: Lucy Lee	**Date approved:**	October 2016
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	January 27, 2017

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Identify the structure and function of the four main classes of biological macromolecules.
2. Describe and quantify the basic central eukaryotic metabolic pathways involved with cellular respiration and photosynthesis.
3. Calculate free energy changes for important biological reactions.
4. Explain the basic structure and function of cellular membranes.
5. Describe the transport processes which occur in cells and how cellular homeostasis is maintained.
6. Work in small groups in a biology laboratory setting gathering real, experimental data.
7. Analyze and interpret scientific experimental data and be able to make proper summary graphs and tables.
8. Perform laboratory skills such as proper pipetting procedures, use of spectrophotometers, protein gel electrophoresis, use of gas chromatograph, etc.

Prior Learning Assessment and Recognition (PLAR)

☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion)

Lectures, laboratory exercises and reports, problem sets.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☒ No ☐

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

	Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1.	Hardin	Becker's World of the Cell	☒	Pearson	2015

Typical Evaluation Methods and Weighting

Final exam:	35%	Assignments:	%	Midterm exam:	25%	Practicum:	%
Quizzes/tests:	10%	Lab work:	30%	Field experience:	%	Total:	100%

Typical Course Content and Topics

Biological molecules
- Amino 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
- Photometric assays
- Isolation of protein fractions from porcine serum
- Electrophoresis of protein fractions from porcine serum
- Enzyme kinetics of acid phosphatase
- Thin Layer chromatography to separate fats from naturally-occurring lecithin
- Cell respiration in yeast cells
- Use of inhibitors to probe mitochondrial electron transport
- Chloroplast isolation and measurement of electron flow through PSII