

A. Division: Academic Date: September 5, 1984

 B. Department: Science and Mathematics New Course:

 Revision of Course Information Form:

 Dated: September 5, 1984

 C. BIOLOGY 421 D. Cell Biochemistry E. 3
 Subject & Course No. Descriptive Title Semester Credits

 F. Calendar Description:
This course is an introduction to the biochemistry of a cell, including the structural and functional aspects of the micro and macro molecules. Protein structure, enzyme action, and energy pathways will be considered. Some metabolic sequences in the cell will be examined in relation to control mechanisms.

 Summary of Revisions:
 (Enter date and Section Revised)
 e.g. 1982-08-25
 Section C,E,F, and R.

G. Type of Instruction:		Hours Per Week / Per Semester		H. Course Prerequisites:	
Lecture	<u>4</u>	Hrs.	Biology 321 & Chemistry 320		
Laboratory	_____	Hrs.	I. Course Corequisites:		
Seminar	_____	Hrs.	Chemistry 420		
Clinical Experience	_____	Hrs.	J. Courses for which this Course is a Pre-requisite:		
Field Experience	_____	Hrs.	None		
Practicum	_____	Hrs.	K. Maximum Class Size:		
Shop	_____	Hrs.	35		
Studio	_____	Hrs.			
Student Directed Learning	_____	Hrs.			
Other (Specify)	_____	Hrs.			
Total	<u>4</u>	Hrs.			

L. College Credit Transfer	<input checked="" type="checkbox"/>	M. Transfer Credit: Requested	<input type="checkbox"/>
College Credit Non-Transfer	<input type="checkbox"/>	Granted	<input checked="" type="checkbox"/>
Non-Credit	<input type="checkbox"/>	(Specify Course Equivalents or Unassigned Credit as Appropriate)	
		U.B.C. Biology 201	
		S.F.U. Biology 301	
		U. Vic. Biology 200 (with Douglas Biology 321)	
		Other	

Valentin Schaefer
 Course Designer(s)

A. Brown
 Director / Chairperson

S. M. Wilson
 Divisional Dean

Andrew Wilson
 Registrar
 Oct 26, 1984

N. Textbooks and Materials to be Purchased by Students (Use Bibliographic Form):

Biochemistry, 2nd Ed. Armstrong, F.B. Oxford University Press, New York 1983
(\$35.00 - 1984)

Douglas College, Biology 421 Study Guide (in preparation)

Complete Form with Entries Under the Following Headings: O. Course Objectives; P. Course Content;
Q. Method of Instruction; R. Course Evaluation

O. COURSE OBJECTIVES

The student will be able to:

1. describe the chemistry of water, acid-base properties, and buffers
2. describe the chemistry of amino acids
3. explain how protein sequence is studied, and describe the structure of peptides
4. describe the structure of proteins, especially in terms of how this structure relates to function
5. describe what allosteric proteins are, and their importance
6. describe enzyme kinetics and enzyme mechanisms
7. explain basic bioenergetic principles as they relate to catabolism in the cell - free energy, coupled reactions, nucleotides
8. describe the chemistry of carbohydrates - structure and function
9. explain in detail the process of cellular respiration - glycolysis, krebs cycle, electron transport, and ATP synthesis
10. give examples of alternative oxidative pathways - phosphogluconate path, lipids and fatty acid oxidation, amino acid oxidation, and glyoxylate cycle
11. describe the light reaction of photosynthesis - photosystems I and II
12. describe anabolism in the cell in terms of gluconeogenesis
13. describe the Calvin cycle and the Hatch-Slack pathway
14. describe the biosynthesis of macromolecules - polysaccharides
15. describe metabolic control in the cell and energy charge
16. describe regulation in the cell - hormone action
17. describe the chemistry of nucleic acids - structure and function

P. COURSE CONTENT

1. The course deals with the chemical basis of life. The chemical nature of the cell will be described. The importance of water in life processes will be discussed reviewing the molecular, intermolecular and thermal properties of water. The dipole moment, acid base properties, and buffers will be reviewed.
2. The structure and function of proteins will be discussed. Amino acid structure, identification, and density will be examined.
3. The conformation of proteins (allosteric), and the factors that stabilize conformation will be discussed.
4. The nomenclature, structure and mechanisms of action (inhibition, regulation) will be described. Simple enzyme kinetics will be explained.
5. The topic of bioenergetics will be introduced covering thermodynamics, the free energy concept, coupled reactions, and energy carriers. The structure and function of ATP will be described.
6. Carbohydrate chemistry and the role of carbohydrates as an energy source will be reviewed. The structure and nomenclature of carbohydrates will be examined, as well as the processes of fermentation and glycolysis. Oxidative metabolism, the Krebs cycle, electron transport, and ATP generation will be discussed.
7. Other oxidative pathways will be considered, including the phosphoglucomate path, lipid and fatty acid oxidation, amino acid oxidation, and the glyoxylate cycle.
8. The process of photosynthesis will be examined. Photosystems I and II will be described, and the relationship between the two examined.
9. The synthesis of organic molecules in a cell will be discussed. Gluconeogenesis and the Calvin cycle will be explained.
10. Metabolic control in the cell will be discussed in terms of how the metabolism of proteins, lipids, and carbohydrates are integrated. The action of hormones will be reviewed.
11. Nucleic acid chemistry and the role of nucleic acids in cellular reproduction and protein synthesis will be considered.

Q. METHOD OF INSTRUCTION

Lectures, demonstrations and discussions.

R. COURSE EVALUATION

Midterm	30%
Final Exam	30%
Project	10%
Weekly Evaluations	30%
TOTAL	100%