

Course Documentation

School of Biosciences



Program: Biotechnology Technologist, Chemical
Academic Year: 2011-12 Fall [x] Winter [] Spring []
Program Year: 3 **Program Semester:** 5
Course Name: Biochemistry
Course Code: BIOS 3000 **Course Hours:** 70 **Credit Value:** 5
Faculty: Jennifer Campbell

Class	Lab	Field	Other	Total
28	42			70

Prerequisites/Corequisites/Equivalent Courses

PR/CO/EQ	Course Code	Course Name	Conditions
PR	(CHEM 1002 Or CHEM 1002)	Organic Chemistry 2 Organic Chemistry 2	
CO			
EQ			

This Course is A Prerequisite For:

Course Code	Course Name
CHEM 3000	Food Chemistry

Dean/Chair Approval:

Date: 9/2/2011

1. Calendar Description

This course provides a one-semester investigation of biochemistry, designed to introduce students to the complex structure of cellular components, the function of biomolecules, and the dynamics of metabolic pathways. Based on theoretical and lab-based study, students will examine major groups of biomolecules (carbohydrates, amino acids, proteins, lipids, nucleic acids), enzyme function, metabolism and inborn errors of metabolism

2. Course Learning Outcomes: Upon successful completion of the course, the student will be

1. Describe the molecular structure for each major class of biomolecules, and provide specific examples of their role(s) in living organisms
2. Elucidate the underlying structural and biochemical mechanisms that determine the function(s) of each class of biomolecule.
3. Contrast alternative models of enzyme catalysis, explain the basic principles of enzyme kinetics, and predict products of select enzymatic reactions
4. Differentiate between active and passive cell membrane transport, and explain the principles underlying each mode of transport.
5. Perform qualitative and quantitative analyses of the products of biochemical reactions, based on proper experimental design and employing biochemical assay methods used in quality control and research
6. Employ correct practices that contribute to safe lab operation
7. Report results of biochemical analyses in a timely manner, and interpret them within a broader biochemistry context
8. Compile and appraise resources pertaining to a specific topic in Biochemistry, and integrate them for presentation to a learned audience

3. Essential Employability Skills Outcomes: This course will contribute to the achievement of the following essential employability skills

- 1. communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
- 2. respond to written, spoken, or visual messages in a manner that ensures effective communication.
- 3. execute mathematical operations accurately.
- 4. apply a systematic approach to solve problems.
- 5. use a variety of thinking skills to anticipate and solve problems.
- 6. locate, select, organize, and document information using appropriate technology and information systems.
- 7. analyze, evaluate, and apply relevant information from a variety of sources.
- 8. show respect for the diverse opinions, values, belief systems, and contribution of others.
- 9. interact with others in groups or team in ways that contribute to effective working relationships and the achievement of goals.
- 10. manage the use of time and other resources to complete projects.
- 11. take responsibility for one's own actions, decisions, and consequences.

4. General Education:

Indicate if this course is identified as a General Education course in the program of study.

Yes

No

If yes, indicate which General Education theme this course addresses.

1. Arts in Society

2. Civic Life

3. Social and Cultural Understanding

4. Personal Understanding

5. Science and Technology

5. Prior Learning Assessment and Recognition:

Students may apply to receive credit by demonstrating achievement of the course learning outcomes through previous life and work experiences.

This course is eligible for challenge through the following method(s) indicated

Challenge Exam

Portfolio

Interview

Dual Credit

Other

Not Eligible

PLAR

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Email: kholder@loyalistc.on.ca

6. Required Texts, Materials, Resources or Technical Materials Required

Any college-level biochemistry text. E.g. Campbell and Farrell, Biochemistry (any edition). A variety of biochemistry texts in the Loyalist Library will be available for short-term loan.

The following resources will also be used:

Class notes and handouts (provided via Learning Management System)

Lab protocols

7. Evaluation: Students will demonstrate learning in the following ways

Assessment Description	Course Learning Outcome(s)	Assignment Weighting
Assignments	CLO 1, 2, 3, 4	20%
Tests	CLO 1, 2, 3, 4	15%
Lab book	CLO 5	10%
Lab competency	CLO 6	5%
Formal lab reports	CLO 5, 7	35%
Independent research, oral presentation and class handout	CLO 8	10%
Peer teaching exercise	CLO 1, 2, 8	5%

8. Other:**Loyalist College has a Violence Prevention policy:**

All College members have a responsibility to foster a climate of respect and safety, free from violent behavior and harassment.

- Violence (e.g. physical violence, threatening actions or harassment) is not, in any way, acceptable behavior.
- Weapons or replicas of weapons are not permitted on Loyalist College property.
- Unacceptable behavior will result in disciplinary action or appropriate sanctions.
- More information can be found in the "Student Manual"

Please consult the Biosciences Handbook for Students (2011-2012) for information and policies on Course Outlines, Assessment, Evaluation and Grading, Supplemental Exams and Plagiarism and Academic Dishonesty. Briefly:

- You must always submit your own work for evaluation. The minimum penalty for plagiarism is a mark of 0% on the assignment, report, test, etc.
- Lab reports are due at the beginning of the lab period one week following completion of the lab, unless otherwise stated. Reports received late will receive a penalty of 1 mark/day for up to 5 days. Reports received more than one week late will receive a mark of zero.
- I reserve the right to refuse to reschedule assessments or accept late assignments; no assignment will be accepted after it has been returned or made available to the class.
- Missed tests or quizzes cannot be made up, and will receive a mark of zero, unless arrangements are made prior to the test day. In the event that a test or quiz is rescheduled, the student may be asked to write in the Academic Centre for Testing.
- A supplemental exam is available if you meet the criteria as outlined in the Biosciences Handbook for Students

9. Curriculum, Delivery, Learning Plan and Learning Outcomes:

Course Components/Course Learning Outcomes	Related Elements of Performance	Learning Activities/Assessment/Resources
Structure and function of carbohydrates	Students will be able to: Describe the structure and explain the function(s) of simple and complex carbohydrates, and relate to the 'carbohydrate economy'; predict and explain outcomes of oxidation/reduction reactions of carbohydrates; perform redox reactions in lab; analyze and report results of biochemical analyses.	Lecture notes and ancillary materials Lab protocols Class/peer group discussions Group activity Evaluation is based on assignments, qualitative analyses of carbohydrates, lab experiments and reports (Lab #2, #5, #6).
Structure and function of amino acids and proteins	Students will be able to: Classify amino acids by property, explain the relationship between the peptide bond and the structure of proteins, relate protein structure to function, and explain the function of selected peptides and proteins, including haemoglobin and myoglobin; perform lab experiments involving protein structure and function; analyze and report results of biochemical analyses; apply protein assay methods used in quality control, research or manufacturing.	Lecture notes and ancillary materials Individual and group work with molecular models Lab protocols Evaluation is based on manipulation of molecular models to create polypeptides; assignments, lab experiments and reports (Lab #1, #7, #8).
Structure and function of lipids	Students will be able to: Classify lipids based on structure; explain the relationships among classes	Lecture notes and ancillary materials Published literature Cooperative study and peer-teaching

	of lipids and cell membrane properties; differentiate among lipid functions in the cell; relate lipid function to biochemical aspects of lipid structure; perform qualitative and quantitative analyses of lipids in lab and report results.	exercise Lab protocols Evaluation is based on peer-teaching exercise, assignments, test, lab experiments and reports (Lab ##2, #3, #5).
Cell membrane structure and function	Students will be able to: Describe and discuss membrane structure and membrane receptors; explain principles of active and passive transport and differentiate between them; provide specific examples of active and passive transport and relate them to principles of cellular function; perform lab experiment to assess membrane permeability; analyze and report results.	Lecture notes and ancillary materials Published literature Cooperative study and peer-teaching exercise Evaluation is based on assignments, test, lab experiments and reports (Lab #2, #7).
Enzyme kinetics	Students will be able to: Contrast alternative models of enzyme catalysis, and explain the basic principles of enzyme kinetics using the Michaelis-Menton model; predict the outcome of competitive and non-competitive enzyme interactions on biochemical reactions; perform qualitative and quantitative analyses of the products of enzyme-catalyzed reactions; apply assay methods used in quality control and research; analyze and report results of biochemical analyses.	Lecture notes and ancillary materials Published literature Group discussion and class activities Evaluation is based on assignments, test, lab experiments and reports (Lab #1, #4, #10).
Metabolism	Students will be able to: Compare and contrast anabolism and catabolism; interpret complex metabolic networks; explain select metabolic processes including carbohydrate metabolism, photosynthesis and respiration; predict products of select enzymatic reactions; perform lab experiments to demonstrate principles of catabolism; analyze and report results of biochemical analyses.	Lecture notes and ancillary materials Published literature Case studies and problem sets Evaluation is based on assignments, test, lab experiments and reports (Lab #1, #4, #7).