Course Documentation Outline

School of Business, Biosciences and Justice Studies

SECTION I

1. Program (s): Biofood, Biotechnology, Chemical and Environmental

2. Course Name: Introduction to Microbiology

3. Course Code: BIOS1001

4. Credit Value: 2 Course Hours: 30

Class	Lab	Field	Other	Total
30	0			30

5. Prerequisites/Corequisites/Equivalent Courses

PR/CO/EQ	Course Code	Title
PR	BIOS1000	Biology

6. **Faculty:** Antonina Vassilieva(Durham) **Date:** January 2010 **Effective Date:** January 15, 2010

7. **Dean/Chair's Approval:** Jim Whiteway **Date:** January 2010

9. **Revision Number:** **Date:** **Effective Date:**

10: **Notes: A passing grade is 60%.**

Section II

11. **Calendar Description:**

This applied biology course provides an introduction to microbiological theory, specifically addressing fundamentals like the functional anatomy of microorganisms, metabolism and growth, and microbial genetics and biotechnology. The interaction between microorganisms and hosts will be examined, as will select topics in environmental and applied microbiology.

12. **Provincial Context:**
This course meets the following Ministry of Education and Training requirements:

a). **Prior Learning Assessment (PLA)**
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 by *

Challenge Exam	Portfolio	Interview	Other	Not Eligible
*	*	*		

PLAR Contact:

13. **Employability Skills emphasized in this course**

	communication - written		communication - visual		communication - oral
*	analytical		creative thinking		decision making
*	interpersonal	*	numeracy	*	organizational
*	problem solving	*	technological		other (specify)

14. **Required Texts, Materials, Resources or Technical Materials Required:**

Microbiology: An Introduction / Gerard J. Tortora, Berdell R.Funke, Christine L.Case. -Benjamin Cummings – 10th ed (2010). 960p.ISBN 10: 0-321-55007-2; ISBN 13:978-0-321-55007-1.

15. **Evaluation Plan**
Students will demonstrate learning in the following ways:

Assignment Description	Evaluation Methodology	Due Date
Assignments	4% per assessment (10 in total)	weekly
Tests	Test 1 – 10% Test 2 – 20% Test 3 – 30%	Week 4 Week 10 Week 15

16. **Other**

Policy for missed tests/work and submission of assignments:
Students are expected to make every reasonable effort not to miss tests and to submit all assigned work on time! Students must advise the instructor **in advance** if they are unable to meet scheduled deadlines, **otherwise late assignments will not be accepted for evaluation and a grade of zero will be assigned**. Every effort will be made to accommodate students unable to meet specified deadlines as a result of extenuating circumstances; however, the instructor reserves the right to refuse late assignments and to refuse to reschedule assessments.

Loyalist College has a Violence Prevention policy:

- All College members have a responsibility to foster a climate of respect and safety, free from violent behaviour and harassment.
- Violence (e.g. physical violence, threatening actions or harassment) is not, in any way, acceptable behaviour.
- Weapons or replicas of weapons are not permitted on Loyalist College property.
- Unacceptable behaviour will result in disciplinary action or appropriate sanctions.
- More information can be found in the “Student Manual and Guide - Rights & Responsibilities”.

Section III

17. **Curriculum Delivery, Learning Plan and Learning Outcomes:**

Course Components/Content	**Related Learning Outcomes**	**Learning Activities/Resources**
1. Introduction to microbiology.	a. Describe and delineate the field of modern microbiology and appreciate the inter-disciplinary nature of the science. b. Explain the difference between eukaryotic and prokaryotic cells. c. Outline the principle types of organisms studied by microbiologists. d. Identify the main bacterial morphologies. e. Describe the primary structures found on the surfaces of bacterial cells. f. Compare the cell wall of gram positive and gram negative bacteria and recognize the importance of gram staining in bacterial identification. g. Describe the structure of cytoplasm, the functions of the nuclear area, ribosomes and inclusions.	Curriculum objectives will be achieved through a combination of the following teaching strategies: 1. Lecture 2. Guest speaker 3. Demonstration 4. Cooperative study 5. Independent study (i.e. required readings and exercises) 6. Field trip(s)

2. Microbial metabolism and growth.	a. Describe metabolic energy pathways including chemotrophic (i.e., respiration and fermentation) and phototrophic systems. b. Explain how proteins, polysaccharides and lipids are anabolized and catabolized and describe their functions in metabolic processes. c. Define catalysis and list major categories of enzymes. d. State the function of co-enzymes and cofactors. e. List the basic nutrients required for bacterial growth. f. Describe external conditions necessary for bacterial growth. g. Describe the phases of a bacterial growth curve. h. Define concepts of microbial control including sterilization, disinfection and antisepsis. i. Explain the identity and source of important hospital-acquired infections. j. Describe pasteurization and explain how it differs from sterilization.	

3. Microbial genetics and biotechnology.	a. Define genetic terminology like chromosome, gene, genetic code, genotype and phenotype. b. Describe the arrangement of DNA in a prokaryotic cell. c. Describe the central dogma of molecular biology. d. Explain the processes of DNA replication, transcription and translation. e. Explain the concept of regulation of gene expression in bacteria. f. Compare and contrast genetic engineering, recombinant DNA and biotechnology. g. Describe the roles of a clone and a vector in genetic engineering. h. Define restriction enzymes and outline how they are used to make recombinant DNA. i. List properties of vectors and describe the use of plasmid and viral vectoring in biotechnology.	
4. Eukaryotic microorganisms.	a. Differentiate algae, protozoa, and fungi based on general characteristics, cellular organization, morphology and physiologic activities. b. State the ecological importance of various products that result from the physiological activities of certain eukaryotes. c. Appreciate the ecological significance of the elaborate life-cycle of parasitic worms. d. Describe a parasitic infection in which humans serve as a definitive host, an intermediate host, and as both. e. Define arthropod vector and state the epidemiological significance of some notable examples.	

5. Principles of disease and microbial pathogenicity.	a. Define pathology, etiology, infection and disease. b. Explain the difference between normal and transient micrbiota. c. Compare the ecological relationships of commensalism, mutualism and parasitism. d. State Koch's postulates. e. Explain patterns of disease and methods of disease transmission. f. State the importance of, and effort to control, nosocomial infection. g. Outline societies' concern with regard to emergent infectious diseases.	
6. Topics in applied and environmental microbiology	a. Describe the functions of microbes in the environment and explain how microbial processes are essential to life on Earth. b. Explain the concept of bioremediation and provide examples of the use of microorganisms to remove environmental pollutants. c. Define the types of microorganisms found in water and the methods used for the enumeration of bacteria in water. d. State methods for testing water potability. e. Explain what is meant by biological oxygen demand. f. Describe some methods of sewage disposal designated to decrease the biological oxygen demand and to eliminate enteric pathogens. g. Describe methods used to harness microbial metabolism for application in food production and in industrial product manufacturing.	