Douglas College

EFFECTIVE: MAY 2007
CURRICULUM GUIDELINES

A. Division: **Education** Effective Date: **May 2007**

B. Department / Program Area: **Science and Technology**
Biology

Revision [ ] New Course [X]

If Revision, Section(s) Revised:
Date of Previous Revision:
Date of Current Revision:

C: BIOL 1310 **D: Introduction to Biology** **E: 5**

Subject & Course No. | Descriptive Title | Semester Credits

F: Calendar Description:

This course is an introduction to the biosphere, the diversity of life, biochemistry, cell biology and ecological interactions. Mechanisms of genetic inheritance and evolution are also studied.

G: Allocation of Contact Hours to Type of Instruction / Learning Settings

Primary Methods of Instructional Delivery and/or Learning Settings:

Lecture / Tutorial / Laboratory

Number of Contact Hours: (per week / semester for each descriptor)

Lecture/Tutorial **4 hours/week**
Laboratory **3 hours/week**

Number of Weeks per Semester:

15 weeks

H: Course Prerequisites:

BIOL 1109 and BIOL 1209 or permission of the instructor

I: Course Corequisites:

none

J: Course for which this Course is a Prerequisite:

BIOL 2321and BIOL 3205 and BIOL 3305 and BIOL 3500 and BIOL 3600 and BIOL 3700

K: Maximum Class Size:

35

L: PLEASE INDICATE:

[ ] Non-Credit
[ ] College Credit Non-Transfer
[X] College Credit Transfer:

SEE BC TRANSFER GUIDE FOR TRANSFER DETAILS (www.bctransferguide.ca)

M: Course Objectives / Learning Outcomes

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

1. Understand and explain an understanding of the relationship between the biotic and abiotic components of the biosphere, their interactions and relationship to evolution.
2. Use and demonstrate techniques for identifying plants and animals, including use of microscopes and dichotomous keys.
3. Understand and explain the evolutionary relationships among major taxa.
4. Understand and explain the relationship between genetics and evolution.
5. Appreciate the scientific process, including the use of testable hypotheses.
6. Explain cell division in plants and animals, and describe the significance of mitosis and meiosis to growth, development and reproduction.
7. Solve monohybrid and dihybrid problems, and problems involving multiple alleles and sex-linked genes.
8. Explain the molecular basis and significance of proteins, nucleic acids, lipids and carbohydrates, and their relationships to cellular respiration, photosynthesis and general metabolism.
9. Explain how DNA and RNA replicate and code for proteins, and analyse problems using the genetic code.
10. Understand and explain how genes interact with the environment, and the role of mutations, meiosis and fertilization in changing the genetic composition of populations over time.
11. Discuss the mechanisms of evolution, and apply evolutionary concepts to the analysis of current environmental problems.
12. Demonstrate the use of common laboratory equipment.
13. Conduct simple directed experiments and explain the procedures and results.
14. Understand and use biological principles in the discussion of current topics in Biology.

N: Course Content:

1. Introduction to Evolution and Taxonomy
   - 1.1. process and mechanisms of evolution
   - 1.2. sources of heritable variation within a species
   - 1.3. meaning and role of fitness in evolution
   - 1.4. types of natural selection
   - 1.5. levels of organization in the biosphere
   - 1.6. principles of taxonomy
   - 1.7. survey of major taxa, from viruses to animals
2. Origins and Evolution of Life
   - 2.1. theories regarding the origins of life
   - 2.2. origin of prokaryotic and eukaryotic cells
   - 2.3. macroevolution, speciation and reproductive isolating mechanisms
3. Introduction to Genetics
   - 3.1 mitosis and meiosis
   - 3.2 Mendelian Inheritance: theory and problems
   - 3.3 Non-Mendelian Inheritance: multiple alleles, sex linkage and multigenic inheritance.

4. Molecular and Cellular Basis of Life
   4.1. chemistry of amino acids
   4.2. formation of primary, secondary, tertiary and quaternary structure of proteins.
   4.3. functions and mechanisms of action of enzymes
   4.4. functions and structures of DNA and RNA
   4.5. replication of DNA
   4.6. protein synthesis
   4.7. molecular and chromosomal basis of mutations
   4.8. structure and function of cellular organelles
   4.9. structure and function of biologically-important lipids & carbohydrates
   4.10. models of membrane structure and membrane transport

5. Conversion and Use of Energy by Cells
   5.1. location and process of cellular respiration
   5.2. catabolic pathways and interrelationships for carbohydrates, fats and proteins
   5.3. significance of ATP
   5.4. location and process of photosynthesis
   5.5. light dependent reactions & light independent reaction

6. Plant and Animal Growth and Development
   6.1. mechanisms by which seed plants reproduce
   6.2. process of double fertilization
   6.3. results of fertilization and growth of seeds
   6.4. role of soil in plant growth and development, including impact of acid rain
   6.5. role of plant hormones and the photoreceptor phytochrome on plant growth and development
   6.6. process of animal fertilization
   6.7. embryological development following fertilization
   6.8. significance of primary germ layers

7. Introduction to Ecological Systems
   7.1. organization of biomes
   7.2. succession in terrestrial and aquatic habitats
   7.3. population dynamics and community interactions
   7.4. energy flow and nutrient cycling

8. Laboratory Techniques
   8.1. techniques required for the use of common laboratory equipment
   8.2. use of compound and stereomicroscopes
   8.3. preparation of various wet mounts for microscope work
   8.4. introduction to experimental methods
   8.5. development of dichotomous keys
   8.6. preparation of plant tissue for microscopic chromosome analysis.
   8.7. lab analysis of enzyme action and optimum pH
   8.8. technique of paper chromatography for separation of leaf pigments.
   8.9. measurement of fermentation rate in yeast

DOUGLAS COLLEGE SIGNATURE ELEMENTS:

Core Competencies:

a. Oral, written and interpersonal communication:
   Students will write essays on examinations and in class, and will learn interpersonal communication through group work.

b. Computational and Information Technology
   Students will perform basic computational exercises in class and on exams. They will use myDouglas for communication outside the classroom.

c. Critical and Creative Thinking
Students will learn critical and creative thinking through the course content and instructional methodology, which will involve team work and use of the scientific method.

d. Teamwork
Team work will be encouraged and required during laboratory work and class discussions.

Academic Signature:

a. Applied Skills (field, laboratory practicum)
Students will apply the theory they learn in class to laboratory exercises and projects.

b. Ethical behaviour and social responsibility
Ethical behaviour and social responsibility will be practiced and discussed with respect to many aspects of the course.

c. Intercultural, International and Global Perspective
The global and intercultural implications of the knowledge that students will be learning will be discussed and considered during the course.

O: Methods of Instruction

Lecture
Discussion groups and problem solving
Practical application in the laboratory
Field observation and/or video observation
Reading assignments and discussion groups via MyDouglas
Instructor tutoring

P: Textbooks and Materials to be Purchased by Students

Will be decided by course instructors. Potential resources include:

Campbell, N. A., et al. (2005). Biology, 7th Edition. Benjamin Cummings, Pearson Education, Newmarket, Ontario, Canada

Douglas College produced manual**:** Biology 1310: Introduction to Biology.

Q: Means of Assessment

TYPE OF EVALUATION		POINTS
Class Tests and Assignments		20
Laboratory Reviews (see note 1 below)		(up to -20)
Laboratory Examination	- final	15
Comprehensive Examinations	- midterm	30
	- final	35
	TOTAL	100

GRADES: **A+ 95 – 100** **A 90 – 94** **A- 85 - 89** **B+ 80 – 84** **B 75 – 79**

B- 70 – 74 **C+ 65 – 69** **C 60 – 64** **C- 55 – 59** **P 50 – 54**

F 0 - 49

Notes:

1. Laboratory Reviews:
Required laboratory reviews will be assigned in most weeks, and these reviews must be completed in the laboratory in the week that they are assigned. The laboratory reviews are intended to provide an opportunity to review particular material with each student. Completion of the review will result in a grade of P (Pass), or R (Review Recommended) being marked on the laboratory card. If **more than one review** is not completed satisfactorily, (P or R), **two marks will be deducted from the course total for each lab review in excess of one that is not completed. A student must complete 50% of the reviews to receive a P or better grade in the course.**

2. Comprehensive Examinations:
There will be one midterm worth 30 marks in week 7 which will cover the course content to that point. The final examination will cover the entire course. If the student achieves a better grade on the final exam than on the midterm examination, the midterm grade will be raised to equal that achieved on the final examination.

R: Prior Learning Assessment and Recognition: specify whether course is open for PLAR

There is no provision for PLAR, other than that normally done by examining transcripts and comparing course outlines of Biology courses taken within the last five years to the Biology 1310 course content.

Course Designer(s): Adrienne Peacock

Education Council / Curriculum Committee Representative

Dean / Director: Des Wilson

Registrar