

Adult Basic Education  
Science

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# Biology 2101B

## Biodiversity

### Curriculum Guide

**Prerequisites:** Biology 2101A

**Credit Value:** 1

**Biology Concentration**

Biology 1101

Biology 2101A

**Biology 2101B**

Biology 2101C

Biology 3101A

Biology 3101B

Biology 3101C



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## To the Instructor

### I. Introduction to Biology 2101B

Biology 2101B introduces the classification system of living things. Scientific opinion suggests that there may be anywhere between ten to thirty million species in existence. A system as large as this requires organization. Organisms exhibit a huge range of diversity, yet maintain a number of basic things in common. In this course, students are given the opportunity to experience the array of organisms in a logical way based on their anatomy, physiology, and life cycles.

Biology 2101B is the second of 3 courses (the others are Biology 2101A and Biology 2101C) that are equivalent to Biology 2201 in the current high school program.

**Biology 2101A is a prerequisite to this course.**

### II. Curriculum Guides

Each new ABE Science course has a Curriculum Guide for the instructor and a Study Guide for the student. The Curriculum Guide includes the specific curriculum outcomes for the course. Suggestions for teaching, learning, and assessment are provided to support student achievement of the outcomes. Each course is divided into units. Each unit comprises a **two-page layout of four columns** as illustrated in the figure below. In some cases the four-column spread continues to the next two-page layout.

#### Curriculum Guide Organization: The Two-Page, Four-Column Spread

Unit Number - Unit Title		Unit Number - Unit Title	
<b>Outcomes</b>  Specific curriculum outcomes for the unit.	<b>Notes for Teaching and Learning</b>  Suggested activities, elaboration of outcomes, and background information.	<b>Suggestions for Assessment</b>  Suggestions for assessing students' achievement of outcomes.	<b>Resources</b>  Authorized and recommended resources that address outcomes.

### **III. Study Guides**

The Study Guide provides the student with the name of the text(s) required for the course and specifies the sections and pages that the student will need to refer to in order to complete the required work for the course. It guides the student through the course by assigning relevant reading and providing questions and/or assigning questions from the text or some other resource. Sometimes it also provides important points for students to note. (See the *To the Student* section of the Study Guide for a more detailed explanation of the use of the Study Guides.) The Study Guides are designed to give students some degree of independence in their work. Instructors should note, however, that there is much material in the Curriculum Guides in the *Notes for Teaching and Learning* and *Suggestions for Assessment* columns that is not included in the Study Guide and instructors will need to review this information and decide how to include it.

### **IV. Resources**

#### ***Essential Resources***

*Text: Biology; Bullard, Chetty, et al; McGraw-Hill Ryerson, 2003.*

*McGraw-Hill Ryerson Biology, Teacher's Resource.*

#### ***Recommended Resources***

*McGraw-Hill Ryerson Biology, Teacher's Resource CD-ROM.*

*Biology 11/12 #D Science Animations.*

Department of Education web site:

[www.gov.nl.ca/edu/science\\_ref/main.htm](http://www.gov.nl.ca/edu/science_ref/main.htm)

#### ***Other Resources***

Textbook web site:

<http://www.mcgrawhill.ca/school/booksites/biology/>

*Center for Distance Learning and Innovation:*

<http://www.cdli.ca/>

<b>To the Instructor</b>
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**V. Recommended Evaluation**

Written Notes	10%
Labs/Assignments	20%
Test(s)	20%
Final Exam ( <i>entire course</i> )	<u>50%</u>
	100%

**The overall pass mark for the course is 50%.**





# **Biodiversity**

## Unit 1 - Patterns of Life

### Outcomes

1.1 List characteristics that distinguish living things from non-living things.

1.2 Explain the biological system of classification and binomial nomenclature.

1.2.1 Name the six kingdoms of living things.

1.2.2 Define taxonomy.

1.2.3 Name the 7 common groups (taxa) that are used to classify organisms.

1.2.4 Explain the term binomial nomenclature.

1.2.5 Explain phylogeny.

1.3 Describe how viruses differ from living organisms.

1.3.1 Explain why viruses are not classified into any kingdom.

1.3.2 Describe the characteristics of a representative virus.

### Notes for Teaching and Learning

Students will be introduced to many new terms throughout this course. Instructors could suggest that students start a vocabulary list and add to it regularly as they work through the unit.

The binomial nomenclature system is a standardized, accepted way of naming organisms. Furthermore, similar organisms have similar names. For example, *Canis lupus* (wolf) is similar to *Canis latrans* (coyote). The first word is the genus and the second word is the specific epithet (an adjective used to describe the genus). It must be recognized that in addition to the categories used in this text, subcategories (superclass, suborder) exist, adding further layers of complexity to this system.

The use of common or local names for a species can be confusing. For example, bakeapple, *Rubus chamaemorus*, is also called cloudberry.

Recently, the Linnaeus system has changed as new knowledge about bacteria has been discovered. Linnaeus' adaptability is evident when it changed from a five-kingdom to a six-kingdom system. Students should also be aware that different interpretations can lead to defining additional kingdoms.

Instructors should be aware that viruses, according to the *McGraw-Hill Biology* text, are not classified in any kingdom of living things because, by definition, they are not organisms. They have no cellular structure (i.e., no cytoplasm, organelles, or cell membrane) and they are not able to grow, respire, or reproduce independently. They act as parasites, relying totally on their hosts for survival. As a result, they are classified based on the type of disease they cause (e.g., HIV virus, polio virus, and so on).

## Unit 1 - Patterns of Life

### Suggestions for Assessment

Questions 1.1 - 1.9 in the Study Guide should be assigned to cover Outcomes 1.1 - 1.3. Students will find the answers to these questions in Sections 4.1 - 4.3 of the text.

Instructors should assess the student's level of understanding by reading student answers to questions from the Study Guide and providing feedback.

Instructors should ensure that all necessary terms are being added to the student's vocabulary list and provide students with ideas about how to successfully remember definitions.

The Teacher's Resource provides answers to all the questions in the text.

The Teacher's Resource CD-ROM contains Blackline Masters (BLM's), Labs, Additional Investigations and Assessment Checklists.

### Resources

*McGraw-Hill Ryerson  
Biology, pages 100 -126.*

*McGraw-Hill Ryerson  
Biology, Teacher's  
Resource.*

*McGraw-Hill Ryerson  
Biology, Teacher's  
Resource CD-ROM.*

*Biology 11/12 #D Science  
Animations.*

[www.gov.nl.ca/edu/science\\_ref/main.htm](http://www.gov.nl.ca/edu/science_ref/main.htm)

<http://www.mcgrawhill.ca/school/booksites/biology/>

## Unit 2 - Micro-organisms

### Outcomes

2.1 Describe the characteristics of representative organisms from the Kingdom Bacteria and Kingdom Archaea.

2.1.1 Identify general characteristics of members of the Kingdom Bacteria and Kingdom Archaea. (Include cell type, body form, shape, and reproduction.)

2.1.2 Identify examples of members of the Kingdom Bacteria and Kingdom Archaea.

2.1.3 Explain the life cycle of a sample organism of the Kingdom Bacteria or the Kingdom Archaea.

2.2 Describe the characteristics of representative organisms from the Kingdom Protista.

2.2.1 Identify general characteristics of members of the Kingdom Protista.

2.2.2 Explain how protists are classified.

2.2.3 Identify examples of members of the Kingdom Protista.

### Notes for Teaching and Learning

Students should demonstrate an understanding that the six recognized kingdoms of living things represent a diversity of organisms exhibiting extensive variety in terms of form and function.

Instructors should note this section is intended to provide students with a brief overview of biodiversity

A variety of techniques including wet mounts, prepared slides, classification sets, models, specimens, dissections, computer simulations, etc., may provide hands-on activities to reinforce students' learning. Commercial charts are also available that summarize the anatomy, physiology and life cycles of many organisms.

Students should add terms from this unit to their vocabulary list.

## Unit 2 - Micro-organisms

### Suggestions for Assessment

Questions 2.1 - 2.2 in the Study Guide should be assigned to cover Outcomes 2.1 - 2.2. Students will find the answers to these questions in Section 5.1 of the text.

### Resources

*McGraw-Hill Ryerson  
Biology, pages 130 - 139.*

## Unit 2 - Micro-organisms

### Outcomes

- 2.2.4 Explain the life cycle of a sample organism of the Kingdom Protista.
- 2.3 Describe the characteristics of representative organisms from the Kingdom Fungi.
- 2.3.1 Identify general characteristics of members of the Kingdom Fungi.
- 2.3.2 Explain how fungi are classified.
- 2.3.3 Identify examples of members of the Kingdom Fungi.
- 2.3.4 Explain the life cycle of a sample organism of the Kingdom Fungi.

### Notes for Teaching and Learning

Instructors could develop a summary table showing the Kingdoms and the characteristics of each kingdom that students will be expected to remember.

## Unit 2 - Micro-organisms

### Suggestions for Assessment

Question 2.4 in the Study Guide should be assigned to cover Outcome 2.3. Students will find the answers to this question in Section 5.3 of the text.

This is the end of Unit 2. Instructors may assign questions from the Section Reviews and/or the Chapter Review and assess student answers.

Answers for all questions in the text are provided in the Teacher's Resource.

Instructors could give a test on the first two units. The mark for this test could be used as part of the final mark for the course.

### Resources

*Biology 11/12  
Computerized Assessment  
Banks.*

## Unit 3 - Plants and Animals

### Outcomes

3.1 Describe the characteristics of representative organisms from the Kingdom Plantae.

3.1.1 Identify general characteristics of members of the Kingdom Plantae.

3.1.2 Explain how plants are classified.

3.1.3 Describe the differences that exist between the major groups of plants (bryophytes, ferns, gymnosperms, and angiosperms).

3.1.4 Identify examples of members of the Kingdom Plantae.

3.1.5 Explain why angiosperms are the most diverse plant group.

3.1.6 Explain the life cycle of plants.

### Notes for Teaching and Learning

The first part of this unit illustrates the characteristics of plants by comparing the characteristics of the 4 major groups; mosses, ferns, conifers, and flowering plants. It is not intended that students will learn the details of the structure of all plants, but rather achieve a general knowledge of plants and how they are classified.

Instructors should note that reproduction in flowering plants is covered in a later course and will not be covered here.



## Unit 3 - Plants and Animals

### Suggestions for Assessment

Students could be provided with blank copies of a summary table and asked to complete it.

### Resources

*McGraw-Hill Ryerson  
Biology, pages 162 - 196 .*

## Unit 3 - Plants and Animals

### Outcomes

3.2 Describe the characteristics of representative organisms from the Kingdom Animalia.

3.2.1 Identify general characteristics of members of the Kingdom Animalia.

3.2.2 Explain how animals are classified.

3.2.3 Identify examples of members of the Kingdom Animalia.

3.2.4 Explain why arthropods are the most successful phylum of animals.

3.2.5 Identify the distinguishing features of the classes of chordates (Phylum Chordata, Subphylum Gnathostomata).

3.3 Identify similarities and differences among members of a class of chordates.

### Notes for Teaching and Learning

The emphasis in studying the animal kingdom is on arthropods, the most successful group of organisms, and on vertebrates, the group that humans belong to.

In studying the diversity of arthropods, reference can be made to insects which, biologically, are the most successful class of arthropods. Note the variety of characteristics contributing to the success of insects including adaptations for feeding, reproduction, and movement. Small body size, a short life cycle, social behaviour, and adaptations in appearance are also mentioned.

Preserved specimens of a wide variety of animals would interest students. Pictures could be used as an alternative. Instructors could develop an identification exercise using these specimens.

It is not intended that students will learn the details of the structure of all animals, but rather achieve a general knowledge of animals and how they are classified.

Investigation 6.C, “Classifying Arthropods”, should be assigned to achieve Outcome 3.3. If preserved specimens are not available, diagrams may be substituted.

## Unit 3 - Plants and Animals

### Suggestions for Assessment

Instructors should assess the student's lab report. A mark should be assigned for lab work and used as part of the evaluation for the course.

Instructors should assess the student's level of understanding by reading student answers to questions from the Study Guide and providing feedback.

Student answers for review questions should be assessed to determine their readiness for a final exam.

Instructors should give a final examination at the end of the course which covers all units of the course.

### Resources

#### **Core Lab:**

*McGraw-Hill Ryerson  
Biology,  
Investigation 6.C,  
"Classifying Arthropods",  
pages 188 - 189.*

*Biology 11/12  
Computerized Assessment  
Banks.*