Adult Basic Education
Science

Science 3106

Disease Defense and Human Health

Curriculum Guide

Prerequisites: **None**

Credit Value: 1

Science Courses [General College Profile]
Science 2100A
Science 2100B
Science 2100C
Science 3101
Science 3102
Science 3103
Science 3104
Science 3105
Science 3106

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To the Instructor

I. Introduction to Science 3106

Science 3106, ***Disease Defense and Human Health***, is the second of two courses at this level that covers Life Science topics.

The course begins with a discussion of the causes of communicable diseases and how they can be transmitted from person to person. Students also study non-communicable diseases and how they result from bad environmental conditions, poor diets, unhealthy lifestyles, and the characteristics that an individual inherits. They learn that the best way to fight disease is to prevent it by being proactive and adopting healthy practices.

In Unit 2, students will investigate the impact of epidemics and pandemics on society and analyze the impact of public health initiatives and the importance of personal hygiene to maintain community health. They will assess the need for public health guidelines and the role of individuals to maintain personal and public health.

In Unit 3, students will investigate how the body responds to pathogens and prevents infection. The body's physical defenses and immune system will be examined. Students will learn about treatments for disease and about the role of immunization in protecting people from disease.

In the last unit, students will investigate genetics by studying the relationships among DNA, genes, and chromosomes, and by examining how characteristics are passed from parents to offspring. Students will learn about human diseases that result from changes to genetic make-up and about the importance of genetics and the environment for health. Issues related to genetic research will be explored.

Students will be required to complete two **Assignments** in this course. However, there are many topics included in the course that students may be interested in exploring further. They could be given additional assignments or the opportunity to investigate topics in group work. Coordination with the English program is possible in assigning and evaluating additional work. Instructors should note that the material covered in the assignments is **not** intended for testing.

Students will be required to complete two **Core Labs** in this course. Additional laboratory investigations may be added.

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**	
Outcomes Specific curriculum outcomes for the unit.	**Notes for Teaching and Learning** Suggested activities, elaboration of outcomes, and background information.	**Suggestions for Assessment** Suggestions for assessing students' achievement of outcomes.	**Resources** 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.

To the Instructor

IV. Resources

Essential Resources

science.connect2*; Colbourne, Fehres, et al; McGraw-Hill Ryerson; 2003. ISBN: 0070890943 (Includes Student Multimedia CD-ROM.)*

science.connect2 Teacher's Resource*, Unit C.*

Laboratory Supplies and Equipment

Recommended Resources

science.connect2 web site: http://www.mcgrawhill.ca/school/booksites/science.connect+2/

Computer with CD-ROM and Internet connection

Note: In addition to the text, this course is designed to make use of multimedia in the form of CD-ROM and the Internet to help reinforce important concepts. ***Disc Connects*** refer to the use of the CD-ROM that accompanies the text. It uses interactive methods that most students will find interesting and useful. ***Internet Connect*** (ICT) refer to the use of internet sites to assist in learning about topics covered in the course. ICT Masters are provided in the Teacher's Resource or at the text web site to assist in identifying important information.

V. Recommended Evaluation

Written Notes	10%
Labs/Assignments	20%
Test(s)	20%
Final Exam *(entire course)*	50%
	100%

Disease Defense and Human Health

Unit 1 - Human Disease

Outcomes

1.1 Describe how human diseases may arise from an interaction of variables.

1.1.1 Define disease, microbe, and pathogen.

1.1.2 Identify and describe pathogens, including bacteria, viruses, fungi, and protists.

1.1.3 Identify causes of diseases.

1.1.4 Recognize that disease may arise from a variety of factors, including poor nutrition, stress, pathogens, and environmental contamination.

1.2 Investigate and describe the conditions necessary for the growth of a specific pathogen.

1.3 Analyze the relationship between human health and environmental pathogens.

1.3.1 Distinguish between communicable and non-communicable diseases.

1.3.2 Describe how communicable diseases are transmitted and how they affect human health.

Notes for Teaching and Learning

Students could be introduced to this unit by completing the Starting Points Activity on page 157. The *Teacher's Resource* provides the necessary information for setting up this activity. BLM 9-1 should be provided to students to record their data and answer questions.

Note: Blackline Masters (BLMs) and answers to all the BLMs are found in the *Teacher's Resource*.

Students could be directed to complete the **Internet Connect (ICT)** on page 161 to learn more about bacteria and viruses.

Note: Instructions and questions to accompany the ICT are available in the *Teacher's Resource*.

BLM 9-3 could be used as an additional investigation for this unit.

Students are directed to complete the **Disc Connect** *Bacteria* applet to find out more about bacteria.

Note: It is suggested that instructors have the CD-ROM installed on a server or on individual computers and that the computers the students will be using are connected to a printer.

A nurse or other health professional could be invited to discuss with students the spread of disease and the preventive actions individuals might take. Students should be directed to plan questions in advance of the visit.

Suggestions for Assessment

Instructors should review all the student answers to the questions in the *Study Guide* for this unit including the Summary and Certificate from the *Bacteria* applet. Their written work should be assigned a mark to be used as part of the final evaluation for the course. (**Note**: An overall mark of 10% is the recommended for the written work from the Study Guide, excluding lab reports and assignments. An overall mark of 20% is recommended for the labs and assignments.)

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 glossary can be used to provide definitions.

Students could be given a copy of ICT 9-1 to complete as they proceed through the web site.

Students are required to complete **Core Lab #1**, *Conditions for Growth of Bacteria*. BLM 9-2 should be provided to students to use as a lab report. Instructors should refer to the Teacher's Resource for information about the lab and for the answers to the questions.

BLMs 9-4 and 9-5 can be used for review and reinforcement of bacteria and viruses.

ICT 9-2 could be provided to students to complete as they work through the Disc Connect *Bacteria* applet.

Resources

science.connect2, Chapter 9, pages 156 - 173.

science.connect2 Teacher's Resource, Unit C.

science.connect2 web site: http://www.mcgrawhill.ca/school/booksites/science.connect+2/

BLM 9-1, *Spreading Microbes.*

ICT 9-1, *Bacteria and Viruses.*

Core Lab #1: *Conditions for Growth of Bacteria*.

BLM 9-2, *Making Yogurt*.

BLM 9-3, *Looking at Pathogens.*

BLM 9-4, *Pathogens Spread Disease*.

BLM 9-5, *Model a Virus.*

science.connect1 Student Multimedia CD-ROM, Bacteria applet.

ICT 9-2, *Bacteria.*

Unit 1 - Human Disease

Outcomes

1.3.3 Describe how non-communicable diseases are transmitted and how they affect human health.

1.4 Investigate methods for the prevention of the spread of disease.

1.4.1 Describe techniques for the safe handling of food.

1.4.2 Describe techniques used to kill germs.

Notes for Teaching and Learning

BLMs 9-6 and 9-10 should be copied and given as handouts to summarize some information about communicable and non-communicable diseases.

Students could be shown a movie, such as *Outbreak* or *Twelve Monkeys*, or a television series episode, chosen from shows such as the *X Files* or *The Outer Limits* about an outbreak of a disease. They could be asked to analyze it from a scientific viewpoint.

Instructors can access more information on food safety and aseptic and sterilization techniques through links on the text book web site.

Unit 1 - Human Disease

Suggestions for Assessment

BLMs 9-11 and 9-17 can be used for review and reinforcement.

Students could be asked to complete an assignment on the risks and impacts on human health of the Badger flood of 2003.

BLMs 9-12 and 9-13 can be used as review and reinforcement or as an assignment.

Investigation 9-B could be completed as an assignment. BLM 9-14 accompanies this investigation.

Investigation 9-C could be completed. BLMs 9-15 and 9-16 accompany this investigation.

Questions from the Chapter 9 Review on pages 172 - 173 could be assigned for review.

Instructors may give a test at the end of Unit 1. BLM 9-18 can be used as a basis for the test. The mark for the test would be used as part of the final mark for the course. Alternately, a test may be given at the end of unit 2 to cover units 1 and 2.

Resources

BLM 9-17, *Disease Crossword.*

BLM 9-6, *Communicable Diseases and Effects on Health.*

BLM 9-10, *Non-Communicable Diseases and Effects on Health.*

BLM 9-11, *Word Scramble.*

BLM 9-12, *Preventing Food Poisoning.*

BLM 9-13, *How Does Food Preservation Keep Food Safe?*

BLM 9-14, *Let's Go on a Picnic.*

BLM 9-15, *Do Antiseptics and Disinfectants Kill Microbes?*

BLM 9-16, *Preparing a Wet Mount Slide.*

BLM 9-17, *Disease Crossword.*

BLM 9-18, *Chapter 9 Chapter Test.*

Unit 2 - Disease and Society

Outcomes	Notes for Teaching and Learning
2.1 Analyze the social and economic impact of widespread disease on society.	Students may be interested in exploring the effects of disease brought by European explorers and immigrants on Aboriginal people. This provides a good opportunity for research, which could be done in conjunction with the English program. Instructors may invite an elder from the Aboriginal community to discuss traditional practices to control the spread of disease.
2.1.1 Distinguish between epidemic and pandemic.	
2.1.2 Identify the social conditions that lead to the spread of epidemic and pandemic diseases.	SARS is another disease that became a pandemic in 2003. More information on SARS can be accessed on various web sites including http://www.who.int/csr/sars/en/. The information can be used for discussion or as the basis for an assignment.
2.1.3 Identify the impacts of epidemic and pandemic diseases.	
2.2 Analyze the impact of public health initiatives on fostering healthy individuals and societies.	The topic of public health also can be explored in more detail than is covered in the text. An abundance of information is available on the Canadian Public Health Association web site at: http://www.cpha.ca/english/index.htm .
2.2.1 Explain the role of public health in Canada.	BLM 10-1 can be used as a handout to help explain how the public health care system developed.
2.2.2 Describe programs and services provided by public health organizations.	
2.3 Examine how public health policies and guidelines improve human health	A local official could be invited in to discuss the source of the local water supply, how it is treated, inspected and monitored.
2.3.1 Describe how public health guidelines help protect humans against disease and promote wellness.	Investigation 10-C can be done as a demonstration to convince students of the importance of proper hand washing.
2.3.2 Describe ways that health authorities communicate with the public.	

Unit 2 - Disease and Society

Suggestions for Assessment

Investigation 10-B could be done as an assignment to learn more about AIDS. BLM 10-2 can be used to organize the information. Alternately, students could use ICT 10-1 to accompany this activity.

Students could use ICT-2 as a worksheet or assignment.

The work outlined in the Study Guide for this unit could be given as an assignment. This would mean that the final exam for the course would cover the material in the other three units only. The mark given for the assignment would be used to help determine the final mark for the course. Evaluating in this way would allow weaker students to have a more manageable amount of material to study for testing purposes.

Resources

science.connect2, Chapter 10, pages 174 - 191.

science.connect2 Teacher's Resource, Unit C.

science.connect2 web site: http://www.mcgrawhill.ca/school/booksites/science.connect+2/

BLM 10-1, *Time Line of Medicine and Public Health.*

BLM 10-2, *AIDS and the Law.*

ICT 10-1, *How AIDS is Spread.*

ICT 10-2, *Epidemics.*

BLM 10-7, *Word Puzzle*.

Unit 2 - Disease and Society

Outcomes

2.4 Assess the role of individuals in maintaining personal and public health.

Notes for Teaching and Learning

Unit 2 - Disease and Society

Suggestions for Assessment

Questions from the Chapter 10 Review on pages 190 - 191 could be assigned for review.

BLM 10-7 could be used for review and reinforcement of some of the terms covered in this unit.

Resources

Canadian Public Health Association web site: http://www.cpha.ca/english/index.htm.

Unit 3 - Protection from Disease

Outcomes

3.1 Describe the natural mechanisms that protect the human organism from pathogens.

3.1.1 Explain the role of the human organism's physical defenses in preventing infection by pathogens.

3.1.2 Investigate and explain the role of blood components in controlling pathogens.

3.1.3 Identify the main cellular and chemical components of the human immune system.

3.1.4 Describe how the immune system protects the body by attacking foreign or abnormal proteins.

3.1.5 Compare forms of immunity in the human organism and explain how immunity is established.

3.2 Describe how antibiotics and vaccinations prevent or treat disease.

3.2.1 Distinguish between prescription and over-the-counter drugs.

3.2.2 Describe the proper use of over-the-counter drugs.

Notes for Teaching and Learning

Students could complete the Starting Point Activity, *Your Skin's Role*, page 193, to begin this unit. If completing this activity, they should be provided with BLM 11-1 to record their observations.

Students could do Find Out Activity, *Comparing Bacterial Growth*, page 196. They should be provided with BLM 11-2 to analyze the activity.

Instructors should photocopy and distribute copies of BLM 11-3 for a summary of the body's immune defense. (Could also be used as an overhead.)

Students could work through the Find Out Activity, *Detecting Infection* on page 198. They should be provided with BLM 11-4 to record their data.

Instructors should photocopy and distribute copies of BLM 11-5 for a summary of the various types of immunity. (Could also be used as an overhead.)

Unit 3 - Protection from Disease

Suggestions for Assessment

Instructors should review all the student answers to the questions in the *Study Guide* for this unit including the Summary and Certificate from the *Immunity* applet.

Students are required to complete **Core Lab #2**, *Blood Transfusions*. BLM 11-6 should be provided to students to use as a lab report. BLM 11-7 should also be provided to help students understand blood types. Instructors should refer to the Teacher's Resource for information about the lab and for the answers to the questions.

Students could be asked to work through BLM 11-8 to help them analyze the relationship between infant death rate and immunization in several countries.

Resources

science.connect2, Chapter 11, pages 192 - 209.

Core Lab #2: *Blood Transfusions*, page 200.

science.connect2 Teacher's Resource, Unit C.

science.connect2 web site: http://www.mcgrawhill.ca/school/booksites/science.connect+2/

BLM 11-1, *Your Skin's Role.*

BLM 11-2, *Comparing Bacterial Growth.*

BLM 11-3, *How Your Body Responds to Antigens.*

BLM 11-4, *Detecting Infection*.

BLM 11- 6, *Blood Transfusions.*

BLM 11-7, *Blood Types*.

Unit 3 - Protection from Disease

Outcomes

3.2.3 Explain the use of antibiotics.

3.2.4 Identify problems with the use of antibiotics.

Notes for Teaching and Learning

Students could be asked to complete Investigation 11-B to assess the advertising claims of over-the-counter medications. They should be provided with BLM 11-10 to help them complete the investigation.

Unit 3 - Protection from Disease

Suggestions for Assessment

Students are required to work through the **Disc Connect**, Immunity. They should be provided with a copy of ICT 11- 4 to complete as they work on the computer.

BLM 11-12 can be used for review and reinforcement.

Questions from the Chapter 11 Review on pages 208 - 209 could be assigned for review.

Instructors may give a test at the end of Unit 3. BLM 11-13 can be used as a basis for the test. The mark for the test would be used as part of the final mark for the course.

Resources

Science.connect2 Student Multimedia CD-ROM, Immunity applet.

ICT 11- 4 , *Immunity*.

BLM 11-10, *Over-the-Counter Drugs.*

BLM 11-12, *Defense Crossword.*

BLM 11-13, Chapter 11 Chapter Test.

Unit 4 - Genetics and Health

Outcomes

4.1 Describe how physical characteristics are inherited in humans.

4.1.1 Describe the role of chromosomes and genes in inherited characteristics.

4.1.2 Identify the relationships among DNA, genes, and chromosomes.

4.1.3 Describe the structure of a DNA molecule.

4.1.4 Identify the role of chromosomes in determining the sex of human offspring.

4.1.5 Interpret a Punnett square to illustrate dominant and recessive monohybrid autosomal crosses.

4.1.6 Interpret a pedigree illustrating the inheritance of autosomal single gene traits

Notes for Teaching and Learning

If a group of students is working together on this course, they could be introduced to this unit by completing the Starting Point Activity on page 211. They should be provided with BLM 12-1 to complete this activity. If working individually, students could complete the activity by examining members of their own family.

Many students have difficulty with the concepts introduced in this unit. They are only expected to understand the structure of DNA and the relationships among DNA, genes, and chromosomes at an introductory level.

Instructors will need to explain Figures 12.3 and 12.5 carefully. BLM 12-6 can be used as an overhead or a handout to assist in teaching about Mendel's discoveries and the use of Punnett squares.

Students are expected to be able to construct simple Punnett squares for monohybrid crosses only. Many sources, including web sites and Biology text books, can be used to find extra practice for students. You will need to be careful to choose questions using the terminology that students are familiar with.

Suggestions for Assessment

Students could be asked to complete BLMs 12-3 and/or 12-4 to help them understand the structure of DNA.

Students are directed in the Study Guide to complete BLMs 12-7 and 12-8. These are included in the Appendix of the Study Guide as worksheets. Instructors should check that students have completed these properly and provide extra practice if necessary.

Outcome 4.1.7 is covered by completing the Activity, *Interpreting a Pedigree* as an Assignment. The assignment should be marked and the mark used as part of the evaluation for the course. Students should **not** be tested on the material covered in the assignment.

Students are directed to complete the **Disc Connect** *Genetics* applet for review and reinforcement of many of the concepts presented in this unit. They should work carefully through the applet and print out the **Summary** and the **Certificate** to be included with their notes. ICT 12-4 can be copied and given to students to complete as they work on the computer.

Resources

science.connect2, Chapter 11, pages 210 - 229.

science.connect2 Teacher's Resource, Unit C.

science.connect2 web site: http://www.mcgrawhill.ca/school/booksites/science.connect+2/

BLM 12-1, *Which Characteristics Are Most Common?*

BLM 12-3, *DNA Model*.

BLM 12-4, *Building a Model of DNA.*

BLM 12-6, *Mendel's Pea Plants.*

BLM 12-7, *Predicting the Sex of Offspring.*

BLM 12-8, *Drawing Punnett Squares.*

BLM 12-9, *Interpreting a Pedigree.*

Unit 4 - Genetics and Health

Outcomes

4.2 Investigate the effect of mutagens and radiation and the implications for inheritance of genetic disorders.

4.2.1 Define mutation and mutagen.

4.2.2 Describe how mutations on genes and chromosomes result in disorders.

4.2.3 Describe how mutations in DNA result in disorders.

4.2.4 Investigate factors that affect gene expression.

4.3 Analyze social and ethical issues related to genetic research.

Notes for Teaching and Learning

Outcome 4.3 is covered by completion of the Assignment (questions 1 to 5) as outlined in the Study Guide. Instructors may choose to give an alternate assignment to cover this topic.

An abundance of information is available on the Human Genome Project. Good web sites are:

http://www.ornl.gov/sci/techresources/Human_Genome/education/education.shtml

http://www.doegenomes.org/

Students are directed to complete *Try This* on page 220. This will give them more practice in using Punnett squares and allow them to see how genetic diseases may be inherited.

BLM 12-13 can be copied and given to students to provide more examples of genetic disorders.

If working with a group of students, you may want to have them complete Investigation 12-C, *Are Your Genes or Environment More Important?* Students should be provided with BLM 12-14 to record their data.

Unit 4 - Genetics and Health

Suggestions for Assessment

The mark for the required assignment should be used to help determine the final mark for the course. The material covered by the assignment should **not** be tested.

BLM 12-19 can be used for review and reinforcement of topis covered in this unit.

A final exam that covers the entire course (excluding the material covered by assignments) should be given and the mark used as at least 50% of the final mark for the course.

BLM 12-20 might be used to supply some test questions for Unit 4.

Resources

Human Genome Project web site: http://www.doegenomes.org/

BLM 12-13, *Inherited Genetic Disorders.*

BLM 12-14, *Are Your Genes or Environment More Important?*

BLM 12-19, *Genetics Crossword.*

BLM 12-20, *Chapter 12 Chapter Test.*