

# Course Outline

**School Name:** Keewaytinook Internet High School

**Department Name:** Science

**Ministry of Education Course Title:** Science

**Grade Level:** 12, College/University Preparation

**Ministry Course Code:** SNC4M

Teacher's Name: Raj Budhram

Developed by: Raj Budhram      Date: July, 2012

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Developed from: The Ontario Curriculum, Grade 12: Science

Text: None

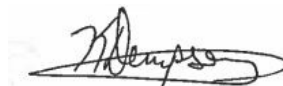
Prerequisite: Science, Grade 10, Academic, or any Grade 11 university, university/college, or college preparation course in science

Credits: One (1.0)

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature)



Approval Date: September 8, 2015

## ***Course Description/rationale***

This course enables students, including those pursuing postsecondary programs outside the sciences, to increase their understanding of science and contemporary social and environmental issues in health-related fields. Students will explore a variety of medical technologies, pathogens and disease, nutritional science, public health issues, and biotechnology. The course focuses on the theoretical aspects of the topics under study and helps refine students' scientific investigation skills.

## ***Overall Curriculum Expectations***

### A. Scientific Investigation Skills and Career Exploration

- demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analyzing and interpreting, and communicating);
- identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.

### B. Medical Technologies

- assess the impact of medical technologies and therapies, both conventional and alternative, used to diagnose and treat human health conditions;
- investigate the uses of, and analyse the information provided by, a variety of medical technologies;
- demonstrate an understanding of the function and use of a variety of medical technologies and the information they provide about the human body.

### C. Pathogens and disease

- evaluate the impact of scientific and technological knowledge and individual behaviour on the control of pathogens and the prevention of disease;
- investigate the nature and growth of pathogens and the effectiveness of measures intended to prevent their spread;
- demonstrate an understanding of pathogens, the diseases they cause, and ways of controlling their spread.

### D. Nutritional Science

- assess how personal and societal factors affect eating behaviours, and evaluate the social and economic impact of the use of non-nutrient food additives;
- investigate chemical components of and energy in food, and the processes by which food is

digested;

- demonstrate an understanding of chemical components of and energy in food, and the processes by which food is digested.

#### E. Science and Public Health Issues

- assess the impact of scientific research, technological advances, and government initiatives on public health;
- investigate various strategies related to contemporary public health issues;
- demonstrate an understanding of major public health issues, past and present.

#### F. Biotechnology

- analyse a variety of social, ethical, and legal issues related to applications of biotechnology in the health, agricultural, or environmental sector;
- investigate various techniques used in biotechnology and how they are applied in the food industry and the health and agricultural sectors;
- demonstrate an understanding of biological processes related to biotechnology and of applications of biotechnology in the health, agricultural, and environmental sectors.

## *Course Content*

<i>Unit</i>	<i>Length</i>
1. Medical Technologies	23 hours
2. Pathogens and disease	23 hours
3. Nutritional Science	23 hours
4. Science and Public Health Issues	20 hours
5. Biotechnology	21 hours
<b>Total</b>	110 hours

# *Unit Descriptions*

## **Unit 1 - Medical Technologies**

In this unit, students use a variety of medical technologies to collect data. They will learn that medical technologies can have positive and negative effects on society, human health, the economy, and the environment. Moreover, the knowledge of medical technologies, and the science behind them, can help students better understand their diagnoses and treatment options.

## **Unit 2 - Pathogens and Disease**

In this unit, students will analyze the effectiveness of various mouthwashes, and the properties, characteristics, and virulence of bacteria. They will learn that appropriate technologies and informed choices with respect to personal behaviour can limit the spread of pathogens and diseases. Additionally, they will learn that the methods used to control the spread of pathogens and diseases can have both positive and negative effects on human health.

## **Unit 3 - Nutritional Science**

In this unit, students will investigate titration to determine the effects of various antacids on hydrochloric acid. They will also investigate the energy content in selected food samples. They will develop an understanding of the role of nutrients and other substances found in food that will enable them to make healthy lifestyle choices.

## **Unit 4- Science and Public Health Issues**

In this unit, students will analyze the effectiveness of safe injection sites, and they will investigate health strategies that were used to combat SARS in Toronto. Students will be aware that threats to public health helps individual and societies adopt appropriate practices to protect their health and the health of others. Furthermore, students will conceive that a global approach to public health is necessary to help prevent future pandemics.

## **Unit 5-Biotechnology**

In this unit, students will inquire the use of yeast in bread-making, the use of gel electrophoresis for separating and purifying DNA fragments, and the use of various technologies in the cloning of corn. They will learn about the wide applications of biotechnology. However, students will also learn that in order to determine the appropriate uses of biotechnology many social, ethical, and legal issues and conflicting interests should be taken into consideration.

## *Teaching/Learning Strategies*

This course is organized in an eight-week series of lessons delivered to students via Internet to computers set up at an access site in their communities. The eighth week is used for topic consolidation, review, and the final examination. The delivery of lessons, assignments, questions, and course material uses the Internet connection. Most communication between students and the teacher is done using the Internet connection with the teacher mentor assuming the role as liaison between the instructor and the student. The teaching of the lessons incorporates the following list of teaching approaches:

- Retelling
- Collage
- Sketching to Learn
- Mentoring
- Peer Teaching
- Discussion
- Advance Organizer
- Demonstration
- Mnemonic Devices
- Read Along
- Read Aloud
- Textbook
- Visual Stimuli
- Visualization
- Worksheets
- Reports
- Decision Making Models
- Inquiry Process
- Mathematical Problem Solving
- Scientific Method
- Writing Process

## *Evaluation*

**Seventy per cent (70%)** of the grade will be based on evaluations conducted throughout this course. This portion of the grade should reflect the students' *most consistent level of achievement* throughout the course, although special consideration should be given to the more recent evidence of achievement.

**Thirty per cent (30%)** of the grade will be based on a final evaluation in the form of an examination, performance, essay and /or other method of evaluation suitable to the course content and administered towards the end of the course.

Type of Assessment	Category	Details	Weighting (%)
<b>Formative</b>  <b>(70%)</b>	Knowledge/ Understanding	<ul style="list-style-type: none"> <li>• identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields.</li> <li>• demonstrate an understanding of the function and use of a variety of medical technologies and the information they provide about the human body.</li> <li>• demonstrate an understanding of pathogens, the diseases they cause, and ways of controlling their spread.</li> <li>• demonstrate an understanding of chemical components of and energy in food, and the processes by which food is digested.</li> <li>• demonstrate an understanding of major public health issues, past and present.</li> <li>• demonstrate an understanding of biological processes related to biotechnology and of applications of biotechnology in the health, agricultural, and environmental sectors.</li> </ul>	12

	Thinking/ Inquiry	<ul style="list-style-type: none"> <li>• demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analyzing and interpreting, and communicating);</li> <li>• investigate the uses of, and analyse the information provided by, a variety of medical technologies;</li> <li>• investigate the nature and growth of pathogens and the effectiveness of measures intended to prevent their spread;</li> <li>• investigate chemical components of and energy in food, and the processes by which food is digested;</li> <li>• investigate various strategies related to contemporary public health issues;</li> <li>• investigate various techniques used in biotechnology and how they are applied in the food industry and the health and agricultural sectors.</li> </ul>	17
	Communication	<ul style="list-style-type: none"> <li>• expression and organization of ideas and information;</li> <li>• communication for different audiences and purposes in oral, visual, and/or written forms;</li> <li>• use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms.</li> </ul>	

	Application	<ul style="list-style-type: none"> <li>• assess the impact of medical technologies and therapies, both conventional and alternative, used to diagnose and treat human health conditions;</li> <li>• evaluate the impact of scientific and technological knowledge and individual behaviour on the control of pathogens and the prevention of disease;</li> <li>• assess how personal and societal factors affect eating behaviours, and evaluate the social and economic impact of the use of non-nutrient food additives;</li> <li>• assess the impact of scientific research, technological advances, and government initiatives on public health;</li> <li>• analyse a variety of social, ethical, and legal issues related to applications of biotechnology in the health, agricultural, or environmental sector;</li> </ul>		24
<b>Summative (30%)</b>	Culminating Activity	A series of short questions which will enable the students to cover all the overall expectations of the course.	Knowledge/ Understanding	2.5
			Thinking/ Inquiry	4
			Communication	4
			Application	4.5
	Final Exam	A series of short problems and scenarios where the students will be able to use the skills and knowledge gained in the course.	Knowledge/ Understanding	2.5
			Thinking/ Inquiry	4
			Communication	4
			Application	4.5
<b>TOTAL</b>				100 %



## ***Assessment/Evaluation Strategies***

A variety of assessment and evaluation methods, strategies and tools are required as appropriate to the expectation being assessed. These include diagnostic, formative and summative tools such as the following:

- Graphs
- Tables
- Essays
- Tests
- Exams
- Diagrams
- Reports
- Essays
- Performance Task
- Concept maps and other graphic organizers
- Letters
- Select Response

## ***Resources***

### **Document for assessment, evaluation, and reporting:**

Growing Success, Queen's Printer for Ontario, 2010

### **Websites:**

[http://www.phschool.com/science/biology\\_place/labbench/lab5/respwork.html](http://www.phschool.com/science/biology_place/labbench/lab5/respwork.html)

<http://en.wikipedia.org/wiki>

<http://www.cancer.org/Treatment/TreatmentsandSideEffects/ComplementaryandAlternativeMedicine/MindBodyandSpirit/native-american-healing>

<http://en.wikipedia.org/wiki>

<http://digestive.niddk.nih.gov/ddiseases/pubs/bacteria/#8>

<http://www.cellsalive.com/cells/bactcell.htm>

<http://www.health.gov.au/internet/healthyactive/publishing.nsf/content/vitamins-minerals>

<http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/myguide-monguide/index-eng.php>

[http://www.mcdonalds.ca/ca/en/menu/full\\_menu/sandwiches/mcchicken.html](http://www.mcdonalds.ca/ca/en/menu/full_menu/sandwiches/mcchicken.html)

<http://www.youtube.com/watch?v=nVmIHU-r1cM&feature=relmfu>

<https://www.explorelearning.com>

<http://www.hc-sc.gc.ca>

<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0004460/>

<http://www.dnai.org/b/index.html>

<http://www.youtube.com/watch?v=8rXizmLjegI>

## ***Program Planning***

This course is offered to students living in isolated northern Canadian communities which do not have access to normal high school facilities, equipment or teachers associated with secondary education. The course uses the global connections of the Internet for some instruction, direction, online field trips and research. It utilizes a student centered semi-virtual classroom which capitalizes on the strengths of internet program delivery to minimize the disadvantages of geographic remoteness. It has the advantage over regular classrooms of allowing the student to become at home with a wide variety of computer software and internet based resources.

The student attends school in full days similar to traditional face-to face programming. The classroom is similar to a computer classroom with a student to computer ratio of 1:1. The delivery of lessons, assignments, questions and course material uses the Internet connection. Most communication between students and the teacher instructor is done using an Internet connection. Support is enhanced by the teacher mentor, a trained teacher present in the classroom for the full day. The mentor assists the student in completing tasks on a timely basis, and providing tutoring where required.