

Course Outline

School Name: Keewaytinook Internet High School

Department Name: Science

Ministry of Education Course Title: Science

Grade Level: 10

Ministry Course Code: SNC2P

Teacher's Name: Raj Budhram

Developed by: Raj Budhram

Date: August , 2011

Revision Date: August, 2015

Developed from: The Ontario Curriculum, Grades 9 and 10: Science, 2008

Text: SciencePower 10, McGraw-Hill Ryerson, 2001

Prerequisite: Science Grade 9 Applied or Academic

Credits: 1.0 (One)

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature)



Approval Date: September 8, 2015

Course Description/rationale

This course enables students to develop a deeper understanding of concepts in biology, chemistry, earth and space science, and physics, and to apply their knowledge of science in real-world situations. Students are given opportunities to develop further practical skills in scientific investigation. Students will plan and conduct investigations into everyday problems and issues related to human cells and body systems; chemical reactions; factors affecting climate change; and the interaction of light and matter.

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 a variety of careers related to the fields of science under study, and identify scientists, including Canadians, who have made contributions to those fields.

B. BIOLOGY: TISSUES, ORGANS, AND SYSTEMS

- Analyze some current technologies or substances that have an impact on human tissues, organs, or systems, and evaluate their effects on human health.
- Investigate cell division, cell specialization, and the organization of systems in animals, including humans, using various laboratory techniques.
- Demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals, including humans.

C. CHEMISTRY: CHEMICAL REACTIONS AND THEIR PRACTICAL APPLICATIONS

- Analyze how chemical reactions are employed in common products and processes, and assess the safety and environmental hazards associated with them.
- Investigate, through inquiry, the characteristics of simple chemical reactions.
- Demonstrate an understanding of simple chemical reactions and the language and ways to represent them.

D. EARTH AND SPACE SCIENCE: EARTH'S DYNAMIC CLIMATE

- Analyze effects of human activity on climate change, and effects of climate change on living things and natural systems.
- Investigate various natural and human factors that have an impact on climate change and global warming.
- Demonstrate an understanding of various natural and human factors that contribute to climate change and global warming.

E. PHYSICS: LIGHT AND APPLICATIONS OF OPTICS

- Analyze how properties of light and colour are applied in technology and the impact of these

technologies on society.

- Investigate, through inquiry, properties of light, and predict its behaviour in mirrors and as it passes through different media.
- Demonstrate an understanding of characteristics and properties of light, particularly with respect to reflection and refraction and the addition and subtraction of colour.

Course Content

<i>Unit</i>	<i>Length</i>
1. Chemical reactions	28 hours
2. Light and Geometric Optics	28 hours
3. Climate Change	27 hours
4. Tissues, Organs & Systems	27 hours
Total	110 hours

Unit Descriptions

Unit 1 - Chemical Reactions

In this unit, students will investigate different classes of chemical reactions and develop models, word equations, and balanced chemical equations to represent them. Through investigation with a focus on laboratory and environmental safety, students will learn that chemicals react with each other in predictable ways and are subject to the Law of Conservation of Mass. Students will also identify practical applications of chemical reaction in the fire fighting profession.

Unit 2- Light and Geometric Optics

In this unit, students will study the nature of light. They will scrutinize computer animations and draw ray diagrams to understand the use of plane and curved mirrors, and convergent lenses. Also they will investigate how colours are related to the properties of light, refraction through different materials to gain an understanding of the index of refraction, and different forms of light emission and their uses. Students will explain how the properties of light are applied to the compound microscope, and in the end-of-unit task they will construct a solar oven to apply knowledge that they have acquired in this unit.

Unit 3- Climate Change

In this unit, students will describe components of the Earth's climate system and the natural and anthropogenic causes of climate change. They will conduct inquiry to determine how greenhouse gases affect climate change, and then they will examine current evidence of climate change including changes in their community. They will research the deforestation of forests in Brazil and how it causes global climate change. In the end-of-unit task students will compare the tools used in Canada to make decisions on climate change. In addition, they will analyze biases of petroleum industries on global warming.

Unit 4- Tissues, Organs, and Systems

In this unit, students will carry out investigations with microscopes and lab dissections to examine cells, tissues, organs and organ systems in animals. They will compare and link the organ systems, their functions and interactions. Students will use this information to research an animal or plant disease and to understand medical imaging technologies (MRI, Ultrasound, etc.). As an end-of-unit task, students will research the link between smoking and lung cancer or sugar consumption/ obesity and diabetes.

Teaching/Learning Strategies

This course is organized in a nine-week series of lessons delivered to students via Internet to computers set up at an access site in their communities. The ninth 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:

- Field Trip
- Retelling
- Sketching to Learn
- Interview
- 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

Type of Assessment	Category	Details	Weighting (%)
Formative (70%)	Knowledge/ Understanding	<ul style="list-style-type: none"> ▶ Identify and describe a variety of careers related to the fields of science under study, and identify scientists, including Canadians, who have made contributions to those fields. ▶ Demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals, including humans. ▶ Demonstrate an understanding of simple chemical reactions and the language and ways to represent them. ▶ Demonstrate an understanding of various natural and human factors that contribute to climate change and global warming. ▶ Demonstrate an understanding of characteristics and properties of light, particularly with respect to reflection and refraction and the addition and subtraction of colour. 	12
	Thinking/ Inquiry	<ul style="list-style-type: none"> ▶ Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating). ▶ Investigate cell division, cell specialization, and the organization of systems in animals, including humans, using various laboratory techniques. ▶ Investigate, through inquiry, the characteristics of simple chemical reactions. ▶ Investigate various natural and human factors that have an impact on climate change and global warming. ▶ Investigate, through inquiry, properties of light, and predict its behaviour in mirrors and as it passes through different media. 	17.5

	Communication	<ul style="list-style-type: none"> ▶ Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating). 	17.5
	Application	<ul style="list-style-type: none"> ▶ Analyse some current technologies or substances that have an impact on human tissues, organs, or systems, and evaluate their effects on human health. ▶ Analyse how chemical reactions are employed in common products and processes, and assess the safety and environmental hazards associated with them. ▶ Analyse effects of human activity on climate change, and effects of climate change on living things and natural systems. ▶ Analyse how properties of light and colour are applied in technology and the impact of these technologies on society. 	23

Summative (30%)	Culminating Activity	Consists of short questions that covers all the overall expectations of the course.	Knowledge/ Understanding	2.5
			Thinking/ Inquiry	4
			Communication	4
			Application	4.5
	Final Exam	Written examination designed to cover all of the overall expectations of the course.	Knowledge/ Understanding	2.5
			Thinking/ Inquiry	4
			Communication	4
			Application	4.5
			TOTAL	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

Text books:

- SciencePower 10, McGraw-Hill + Ryerson, 2001
- Investigating Science 10, Pearson, 2009
- Science Links 10, McGraw-Hill + Ryerson, 2010

Document for assessment, evaluation, and reporting:

- Growing Success, Queen's Printer for Ontario, 2010

Ministry's Web Site:

- <http://www.edu.gov.on.ca/eng/webmap.html>

Education Network of Ontario:

- <http://www.enoreo.on.ca/>

Ontario Ministry of Education (EDU):

- <http://www.edu.gov.on.ca/eng/document/curricul/curricul.html>

Animated Interactive Science:

- <http://www.explorelearning.com/>
- <http://frog.edschool.virginia.edu/Frog1/menu.html>

Resources on the Web:

- <http://www.cellsalive.com/>
- <http://www.diabetes.ca/>
- <http://www.hc-sc.gc.ca/hc-ps/dc-ma/diabete-eng.php>
- <http://www.rfu.org/cacw/PulpPrimer.htm>
- <http://www.science.ca/scientists/scientistprofile.php?PID=185>
- <http://www.howstuffworks.com/>

Program Planning

This course is offered to students living in isolated northern Canadian communities that 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.

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 via an Internet connection. Support is enhanced by a 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 when required.