

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: K. A. 'Eli' Pivnick

Developed by: K. A. 'Eli' Pivnick

Date: Sept 2009

Revision Date:

Developed from: The Ontario Curriculum, Grades 9 and 10: Science, 2007

Profile Name: Science Grade 10 Applied (Public District School Board Writing Partnership); Science Grade 10 Applied (Catholic School Board) Supplementary used in Unit 2

Text: Sciencepower 10, McGraw-Hill Ryerson, 2001

Prerequisite: Science Grade 9, Academic or Applied

Credits: One (1.0)

Length: 110 hours

Principal's Name: Darrin Potter

Principal's Approval (signature) _____

Approval Date:

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, analysing 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

- analyse 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

- analyse 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

- analyse 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

- analyse 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

Unit	Length
1. Chemical reactions	24 hours
2. Light and Geometric Optics	24 hours
3. Climate Change	24 hours
4. Tissues, Organs & Systems	24 hours
5. Making Connections	14 hours
Total	110 hours

Unit Descriptions

Unit 1: Chemical Reactions

In this unit, students 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, they learn that chemicals react with each other in predictable ways and are subject to the Law of Conservation of Mass. Students research some of the negative impacts on the environment which are caused by chemical reactions.

Unit 2: Light and Geometric Optics

In this unit, students study the nature of light. They design and conduct experiments and analyze results to understand the use of plane and curved mirrors, and convergent lenses in many kinds of optical technology. They investigate how colours are related to the properties of light and investigate refraction through different materials to gain an understanding of the index of refraction. They also investigate different forms of light emission and their uses. Students analyse the difference between a telescope and microscope in theory and construction. The end-of-unit task requires students to examine local night lighting: its purpose, energy consumption, design and the unnecessary light pollution it causes.

Unit 3: Climate Change

In this unit, students develop an understanding of the physical factors that create and affect global weather systems, both normal and extreme. They will examine and create a model of the greenhouse effect, and then to move on to an examination of the current evidence for climate change and its causes. For perspective, they will research one of the other human-caused atmospheric environmental concerns (ozone depletion, acid rain, smog). In the end-of-unit task, students will assess Canadian and Ontario government efforts to reduce Canadians' impact on global warming as well as the current choices that our governments face.

Unit 4: Tissues, Organs and Systems

In this unit, students 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.

Unit 5: Making Connections

In this culminating unit, students focus on the environmental and economic issues related to local Greenhouse Gas Production. There are two parts to this. In the first, students gather data and analyse one aspect of their community's contribution to greenhouse gases. In the second part, they come up with a proposal to significantly reduce the community's greenhouse gas production backed by both discussion with community leaders and the required calculations. This unit integrates Relating Science to Technology and Society and the Environment expectations from all four strands and can be used as a major component of the final summative (30%) evaluation.

Teaching/Learning Strategies

The delivery of the units and activities of this course will follow the course profile for public schools very closely but a few of the activities in the chemistry unit were based on the Catholic School's course profile.

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:

- *Animated on-line lessons
- *Direct Instruction (on-line lecture)
- *Interactive lessons (Elluminate)
- *On-line inquiry
- *Demonstration (both laboratory work in the classroom as well as animated on-line demonstrations)
- *Case study
- * Outside data collection
- *Internet research
- *Group work
- *Independent Study Evaluation
- *Interviews of local individuals

Evaluation

<i>Type of Assessment</i>	<i>Category</i>	<i>Details</i>	<i>Weighting (%)</i>
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

	<i>Inquiry</i>	<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; 		<i>17.5</i>
	<i>Communication</i>	<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); 		<i>17.5</i>
	<i>Making Connections</i>	<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; 		<i>23</i>
<i>Summative (30%)</i>	<i>Culminating Activity (15%)</i>	D1. analyse effects of human activity on climate change, and effects of climate change on living things and natural systems;	<i>knowledge/ understanding</i>	<i>2.5</i>
		D2. investigate various natural and human factors that have an impact on climate change and global warming;	<i>inquiry</i>	<i>4</i>
		D3. demonstrate an understanding of various natural and human factors that contribute to climate change and global warming.	<i>communication</i>	<i>4</i>
		A1. 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);	<i>making connections</i>	<i>4.5</i>
	<i>Final Exam (15%)</i>	<i>Written examination designed to cover all of the overall expectations of the course</i>	<i>knowledge/ understanding</i>	<i>2.5</i>
			<i>inquiry</i>	<i>4</i>
			<i>communication</i>	<i>4</i>
			<i>making connections</i>	<i>4.5</i>

<i>Total</i>	<i>100%</i>
--------------	-------------

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:

Online submissions
 Checklists
 Paper and pencil activities (scanned for submission)
 Rubrics (general and task specific)
 Projects
 Drawing or Map-making (photographed for submission)
 Rating scales
 Tests
 Worksheets
 Achievement chart
 Exams

Resources listed in Bibliographical style

Text book: SciencePower 10, McGraw-Hill + Ryerson, 2001

Other key resources:

<http://boyles.sdsmt.edu/>

Site shows on-line chemical lab experiments

http://tech.nscdiscovery.org/newtech/science_links.htm

<http://www.theweathernetwork.com/>

<http://www.sciencejoywagon.com/physicszone/>

Ministry's web site.

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

Education Network of Ontario

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

Education resources on the web

<http://www.educ.uvic.ca/depts/snsc/pages/weblinks/weblinks.htm>

<http://www.howstuffworks.com/>

<http://www.grc.nasa.gov/WWW/K-12/teacher.htm>

Ontario Ministry of Education (EDU) - curriculum documents page

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

Regional Education Teachers Association of Ontario (STAO) links to science sites

<http://www.stao.org/hotlinks.htm>

Animated interactive science

<http://www.explorelearning.com/>

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, on-line 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: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 including two weekly interactive sessions (one videoconference and one using Elluminate) involving the entire class and the teacher. 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.