

## Course Outline

School Name:	KEEWAYTINOOK INTERNET HIGH SCHOOL
Department Name:	Science
Ministry of Education Course Title:	Grade 11 Environmental Science, Workplace
Grade Level:	11
Ministry Course Code:	SVN3E

Teacher's Name: Cathy Rodger

Developed by: Cathy Rodger                      Date: September 2017

Revision Date: September 2018

Developed from: The Ontario Curriculum, Grade 11 and 12 Science, 2008

Text: None

Prerequisite: None

Credits: One

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature)



Approval Date:

## ***Course Description/Rationale***

This course provides students with the fundamental knowledge of and skills relating to environmental science that will help them succeed in work and life after secondary school. Students will explore a range of topics, including the impact of human activities on the environment; human health and the environment; energy conservation; resource science and management; and safety and environmental responsibility in the workplace. Emphasis is placed on relevant, practical applications and current topics in environmental science, with attention to the refinement of students' literacy and mathematical literacy skills as well as the development of their scientific and environmental literacy.

## ***Overall Curriculum Expectations***

### **Scientific Investigation 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 contributions of scientists, including Canadians, to those fields.

### **Human Impact on the Environment**

- analyze selected current environmental problems in terms of the role human activities have played in creating or perpetuating them, and propose possible solutions to one such problem;
- investigate air, soil, and water quality in natural and disturbed environments, using appropriate technology;
- demonstrate an understanding of some of the ways in which human activities affect the environment and how the impact of those activities is measured and monitored.

### **Human Health and the Environment**

- analyse the effects on human health of environmental contaminants and a significant environmental phenomenon;
- investigate how different environmental factors can affect people's health and their lifestyle choices;
- demonstrate an understanding of the ways in which environmental factors can affect human health and how their impact can be reduced.

### **Energy Conservation**

- evaluate initiatives and technological innovations related to energy consumption and conservation, and assess their impact on personal lifestyles, social attitudes, and the environment;
- investigate various methods of conserving energy and improving energy efficiency
- demonstrate an understanding of the basic principles of energy production, with reference to both renewable and non-renewable sources, and of various methods of energy conservation.

## **Natural Resource Science and Management**

- assess the environmental impact of the harvesting and/or extraction of resources, including ways of reducing this impact, and analyse threats to the sustainability of natural resources;
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- investigate methods scientists use to classify and monitor natural resources, and conduct investigations using those methods;
- demonstrate an understanding of the sustainable use of resources and its relationship to the biodiversity and sustainability of ecosystems.

## **The Safe and Environmentally Responsible Workplace**

- assess workplace situations with respect to safety and environmental issues, and propose a course of action to address unsafe working conditions;
- investigate a variety of safe and environmentally responsible workplace practices;
- demonstrate an understanding of general workplace safety procedures and environmentally responsible practices.

## ***Course Content***

<b>Unit</b>	<b>Length</b>
<b>1. Scientific Investigation Skills/Career Explorations</b>	20 hours
<b>2. Human Impact on the Environment</b>	20 hours
<b>3. Human Health and the Environment</b>	20 hours
<b>4. Energy Conservation</b>	20 hours
<b>5. Natural Resource Science and Management</b>	15 hours
<b>6. The Safe and Environmentally Responsible Workplace</b>	15 hours
<b>Total</b>	110 hours

## ***Unit Descriptions***

### **Unit 1 – Scientific Investigation Skills**

Students will demonstrate scientific investigation skills and practices (initiating and planning, performing and recording, analyzing and interpreting, and communicating) used throughout the other units. Use of scientific instruments, accessing virtual laboratories, data collection and presentation, inferencing, and the scientific method will be practiced in this unit. Students will interpret their data as well as communicate their results.

## **Unit 2 – Human Impact on the Environment**

Students will investigate current environmental problems in terms of the role human activities have played on the environment. Students will propose solutions to one such problem. Investigation of air, soil and water quality of local conditions will be examined using appropriate technology. Students will demonstrate an understanding of how human activities effect our environment.

## **Unit 3 – Human Health and the Environment**

This unit will focus on human health as a result of environmental contaminants and lifestyle choices. Special focus will be given to the Grassy Narrows First Nation Mercury Contamination, the role that industry plays, government and community. Students will demonstrate ways on how contamination reduction can reduce the impact on human health.

## **Unit 4 – Energy Conservation**

This unit will focus on evaluating initiatives and technological innovations related to energy consumption as well as conservation. Assessing personal lifestyle choices, social attitudes and current modern practices will be a focus. Investigation of energy conservation and energy efficiency at a local level, as well as the role government plays in reducing energy use by industries will be investigated. Understanding the basic principles of renewable and non-renewable resources will be covered.

## **Unit 5 – Natural Resource Science and Management**

This unit will expose students to the environmental impact of harvesting and/or extraction of resources. Focus will be given to extraction of resources in the North (Ring of Fire mining, forestry, and fishing). Students will learn about the sustainable use of resources and its relationship to sustainable ecosystems, as well as biodiversity. Scientific methods will be used to demonstrate classification and monitoring of resources, as well as conducting investigations in local ecosystems (i.e. use of increment borers for dendrochronology).

## **Unit 6 – The Safe and Environmentally Responsible Workplace**

Students will assess workplace situations with respect to safety and environmental issues, and propose a course of action to address unsafe work conditions. Investigation of a variety of safe and environmentally responsible work place practices will be covered with emphasis on northern remote challenges (i.e. cleaning fuel leaks, toxic substances that are abandoned in surrounding community dumps and bush). Understanding of provincial workplace safety measures, practices and procedures will be covered (i.e. WHIMIS MSDS, HHPS, etc.)

# ***Teaching/Learning Strategies***

This course is organized in an eight-week series of lessons delivered to students via Internet. Desktop computers are set up at an access site in their communities. The 8th week is used for topic consolidation, review, culminating activity and the final examination.

Most communication between students and the teacher is performed through the Moodle. In each classroom, the teacher/mentor assumes the role of liaison between the instructor and the student. There will also be on-line interactive sessions between teacher and students, and additional on-line tutorials as needed.

The teaching of the lessons incorporates the following list of on-line delivery approaches:

- The use of flexible groupings
- Cooperative learning: a range of team based learning approaches where students work together to complete a task. i.e. lab activities and experiments will be done as a group with fellow classmates in each community to encourage team problem solving and execution of experiments and labs.
- Ecological approach: involves all aspects of a student's life, including classroom, family, neighborhood, and community, in teaching the student scientific and technological skills.
- Graphic organizers: visual displays to organize information into things like trees, flowcharts, webs, etc. They help students to consolidate information into meaningful whole and they are used to improve comprehension of stories, organization of writing, and understanding of difficult concepts in word problems.
- Hands-on, active participation: Designing activities so that students are actively involved in the project or experiment. Hands-on participation is as important as verbal participation in the activity.
- K-W-L: know, want to know, learned, routine. A form of self-monitoring where students are taught to list what they know already about a subject, what they want to know, and later what they learned.
- Modeling/teacher demonstration: Teacher demonstrates how to do a lab or experiment before having the students try it on their own. . Modelling use of Science equipment and technology such as microscopes and Ipad attachments
- Multimedia: Use of digital media including text, links to web sites, video, word processing, dynamic visualization programs (i.e., Virtual Dissection, Virtual Lab).
- The use of manipulatives and models provided in each classroom. There will be a focus on personal safety and the use of scientific tools and equipment.
- Response journal: Students record what they learned that day or strategies they learned or questions they have. Students can share their ideas in the class, with partners, and with the teacher.

# Evaluation

The final grade will be determined as follows (Ontario Ministry of Education, 2010):

- Seventy per cent of the grade will be based on evaluation conducted throughout the course. This portion of the grade should reflect the student's most consistent level of achievement throughout the course, although special consideration should be given to more recent evidence of achievement.
- Thirty per cent of the grade will be based on a final evaluation administered at or towards the end of the course. This evaluation will be based on evidence from one or a combination of the following: an examination, a performance, an essay, and/or another method of evaluation suitable to the course content. The final evaluation allows the student an opportunity to demonstrate comprehensive achievement of the overall expectations for the course (p. 47).

Ontario Ministry of Education. (2010). *Growing Success: Assessment, evaluation and reporting in Ontario schools*. Toronto ON: Queen's Printer for Ontario.

<b>Type of Assessment</b>	<b>Category</b>	<b>Details</b>	<b>Weighting (%)</b>	
<b>Term Work (70%)</b>	Knowledge/Understanding	Information obtained from lessons, websites linked to from lessons, textbook readings. Knowledge & understanding demonstrated through work submitted and through the ability to answer questions requiring targeted knowledge of concepts	<b>12%</b>	
	Thinking	Independent projects, experiments, answering questions requiring application of concepts to novel situations	<b>18%</b>	
	Communication	Report writing, Science journal, Short essay questions	<b>17%</b>	
	Application	Knowledge is applied and connected to everyday life through investigating careers, observing the night sky, examining home electricity use and practices, and examining the properties of everyday materials.	<b>23%</b>	
<b>Summative (30%)</b>	<b>Culminating Activity (15%)</b>	Summative Research + Report which is designed to recall and apply the concepts, approaches, skills and connections learned	K/U	2.5%
			T	3.8%
			C	3.7%
			A	5%
	<b>Final Exam (15%)</b>	Written examination designed to cover all of the overall expectations of the course.	K/U	2.5%
			T	3.8%
			C	3.7%
			A	5%
		<b>TOTAL</b>	<b>100%</b>	

# 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 within the course and within each unit.

Assessment information is obtained through a variety of means, including the following:

- Discussion forums, KWL, mind-maps, anecdotal records, check lists (performance observed, self-assessment), rubrics (what to demonstrate and how they will be assessed).
- Students are given specific, descriptive, and timely feedback: they can assess their own learning and become active participants (Assessment as learning.)
- Online submissions, Rubrics (general and task specific), Surveys, Reports, Performance Tasks, Achievement chart, Field Observations,
- Experiments, labs, Independent Study Units (ISU's), group work.
- Mentor observations
- Assignments: written submissions; audio, visual presentations, software program results (i.e., virtual chemistry and electricity submissions) and models.
- Performance (i.e., safe use of scientific equipment, proper use of equipment to collect, organize and analyze data).

Evidence of student achievement is collected from various sources, including the following:

- Observation of individual contribution in a group labs
- Ongoing observations of most consistent work, with consideration given to most recent work
- Culminating Activity
- Final exam

## Resources

Ontario Ministry of Education. (2017). *Indigenous education strategy*. Retrieved from <http://www.edu.gov.on.ca/eng/aboriginal/>

Ontario Ministry of Education. (2016). Ontario School, Kindergarten to Grade 12: Policy and Program Requirements. Retrieved from <http://www.edu.gov.on.ca/eng/document/policy/os/index.html>

Ontario Ministry of Education. (2010). *Growing Success: Assessment, Evaluation and Reporting in Ontario Schools*. Toronto, ON: Queen's Printer for Ontario.

Ontario Ministry of Education. (2008). *The Ontario Curriculum Grades 11 and 12: Science*. Toronto, ON: Queen's Printer for Ontario.

*Mold in Housing - Information for First Nation Residents CMHC 2011*

### **A Selection of Science and Education Internet Sites**

<https://www.canada.ca/en/services/environment/pollution.html>

<http://www.cbc.ca/news/business/canadians-produce-more-garbage-than-anyone-else-1.1394020>

<https://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=684B44DD-1>

<http://www.davidsuzuki.org/issues/climate-change/science/canada-climate-change/canadas-emissions/>

<http://news.nationalpost.com/news/canada/years-after-2500-tonnes-of-canadian-trash-landed-in-manila-philippines-demanding-we-take-it-back>

<http://www.cbc.ca/news/politics/grassy-narrows-old-mercury-report-1.4001775>

<http://footprint.wwf.org.uk/>

<http://ecologicalfootprint.com/>

<https://www.ontario.ca/page/why-we-need-fight-climate-change>

<http://www.northernpolicy.ca/upload/documents/media-coverage/2017/17.11.29-sudbury.com-rate-of-climate-cha.pdf>

<https://news.vice.com/article/canadas-ice-roads-are-melting-and-that-is-terrible-news-for-aboriginal-communities>

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

<https://www.conferenceboard.ca/hcp/provincial/environment.aspx>

<https://www.nrcan.gc.ca/energy/products/energuide/label/13609>

**Note:** Images, videos, examples and discussions have been inserted to focus on Northern and First Nation environmental issues related to human impact on the environment.

## ***Program Planning***

This course is offered to Indigenous students living in isolated northern Ontario communities which do not have access to regular high school facilities, equipment or teachers associated with secondary education. This course uses the internet for instruction, demonstration 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.



Students are presented with 1320 minutes of instruction/activity via the internet over the period of one week. All lessons, assignments, questions and course material is presented in this manner, with approved print materials available as a student resource in each classroom. The student and instructor communicate via the internet, while a classroom mentor (a fully qualified teacher) assists students in completing tasks in a timely manner and provides tutoring as required.

In science, an understanding of “terminology and concepts” is a precursor to developing skills of investigation and communication. In addition, relating science to society and the environment requires a clear understanding of all three topics. Students must therefore have a firm foundation in scientific terminology and concepts to successfully complete the curriculum. Emphasis in programming will focus on building a strong foundation for future success rather than trying to move routinely through the curriculum. Each student will struggle and excel at various points, and sometimes the class as a whole will need extra time to gain proficiency in a topic. Progress does not need not be linear in order to be successful.

The program may be altered based on specific student interests, techniques or resources that proved successful in a previous unit. As much effort as possible will be made to integrate community concerns and interest in the curriculum. Open discussion is encouraged – in fact, it can be used to assess communication skills.

This course is offered to Indigenous students living in isolated communities who do not have access to normal high school facilities, equipment or teachers associated with secondary education. The course uses Internet connectivity for most instruction and feedback. 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. Students may also receive support from various programs at KIHS, including the First Nation Student Success Program and the Special Education Program.

Indigenous and local content is used throughout the course to meet the students’ learning needs. Considerations are made to the learning preference of the population and lessons can be adjusted for individual students as required.