Course Outline

School Name: KEEWAYTINOOK INTERNET HIGH SCHOOL Department Name: Science
Ministry of Education Course Title: Grade 9 Science, Locally Developed
Grade Level: 9
Ministry Course Code: SNC1L

Teacher's Name: Cathy Rodger

Developed by: Cathy Rodger Date: September 2017

Revision Date: Dec 2015

Developed from: Locally Developed Compulsory Credit Courses-2005

Text: None

Prerequisite: None

Credits: One

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature) 

Approval Date: September 11, 2017

Course Description/Rationale

This course emphasizes reinforcing and strengthening science-related knowledge and skills, including scientific inquiry, critical thinking, and the relationship between science, society, and the environment, to prepare students for success in everyday life and the workplace. The students may proceed from this course to a Grade 9 Science Applied or Academic course, or a Grade 10 optional Locally Developed course as a stepping stone to the Science Grade11 Workplace course.

Students explore a range of topics, including science in daily life, properties of common materials, life-sustaining processes in simple and complex organisms, and electrical circuits.

Students have the opportunity to extend mathematical and scientific process skills and to continue to develop their skills in reading, writing and oral language through relevant and practical scientific activities.

Overall Curriculum Expectations

Scientific Inquiry: Science in Daily Life

- Illustrate how science is a part of daily life.
- Use appropriate scientific skills, tools, and safety procedures to investigate problems.
- Examine the connections between science and activities in daily life.

Chemistry: Properties of Common Materials

- Explain the characteristics and classification of common materials, using appropriate scientific terminology.
- Investigate the physical and chemical properties of common materials through laboratory activities.
- Analyze how the use of various materials is based on their physical and chemical properties.

Biology: Staying Aliv

- Explain the systems and processes required by simple and complex organisms to sustain life.
- Investigate, through laboratory and field activities, the processes which simple and complex organisms use to sustain life.
- Analyze how personal health and safety in everyday life and in the workplace are protected through the proper use of equipment and safety practices.

Physics: Electrical Circuits

- Describe the characteristics of electrical circuits.
- Investigate simple electrical circuits, using safe practices.
- Analyze the practical uses of electrical circuits and their impact on daily life.

Course Content

Unit	Length
1. Scientific Inquiry: Science in Daily Life	15 hours
2. Biology: Staying Alive	25 hours
4. Physics: Electrical Circuits	25 hours
3. Chemistry: Properties of Common Materials	25 hours
5. Making Personal Decisions	20 hours
Total	110 hours

Unit Descriptions

Unit 1 – Science Inquiry: Science in Daily Life

Through study of science and its processes, students can acquire a valuable perspective on the workplace and everyday life. They use critical thinking and inquiry skills that include generating questions and being able to answer those questions experimentally with an understanding of the factors that might affect experimental results; the concept of a fair test. In addition, students learn to use common laboratory tools appropriately and safely and to make connections with how tools used in science are also used in daily life.

As students perform two simple experiments, they analyze the factors that affect the results of the experiments, change one factor, and observe the changes in the results. Students are introduced to a discrepant event, for which they brainstorm and analyze questions as: testable by experiment, answerable by research, or not answerable scientifically. They further analyze the testable questions for practicality. Students are introduced to General Lab Safety Rules. Students will devise a fair test method of comparison. They collect results and create bar graphs, which they use to discuss the materials and uses of the particular balls. They write a paragraph on the connection of science to everyday life.

Unit 2 – Biology: Staying Alive

This unit connects life-sustaining processes and systems to procedures important for personal safety in the workplace, the home, and everyday life. The skill emphasis is on the development of testable questions.

Students review the concept of life-sustaining processes while reinforcing the skills of observation, data collection, and communication. They pose questions and investigate simple life processes. Students expand their knowledge of the structures and systems required for these life-sustaining processes. The activities, including a safe dissection or simulation, build on an understanding that structures work together in organized systems to support life. Students connect this understanding to their personal lives and future work experiences. They identify the characteristics of a safe workplace and choose personal protective equipment appropriately. They build on Essential Skills needed in the workplace: document use, finding information, and decision making.

Unit 3 – Physics: Electrical Circuits
Students are made aware of the practical uses of electrical circuits in their daily lives. They develop an understanding of current electricity and the role it plays in everyday life. The scientific skill emphasis is on gathering, organizing, and working with qualitative and quantitative data.

Students investigate how the components of circuits work together and build simple circuits that model everyday circuits. They collect data as they measure current and potential difference in various circuits and relate this understanding to everyday electrical devices in circuits. Using a variety of household and workplace devices, they develop a logical checklist for troubleshooting electrical devices.

Safety, experimentation, literacy, and collaboration are integral components of the activities. Students build on the following Essential Skills needed in the workplace: oral and written communication; document use; and thinking skills, including problem solving and decision making.

Unit 4 – **Chemistry: Properties of Common Materials**
Students are made aware that both hazardous and nonhazardous materials surround them in their home, school, and workplace environments and that making decisions about the safe use, handling, and disposal of these materials is an important life skill. The skill emphasis is on inquiry, drawing conclusions, and making decisions based on data. Students develop an understanding of the importance of Household Hazardous Product symbols (HHPs) and Workplace Hazardous Materials Information System (WHMIS) symbols and of following safe procedures when handling common materials.

By designing and conducting laboratory investigations, they gain an understanding of the physical and chemical properties of various common materials and decide on how they can refine their investigation. Students plan and conduct a safe investigation of two similar materials and recommend the best material for a specified purpose based on its physical and chemical properties. Students practice and refine their literacy and communication skills. The Essential Skills needed in the workplace are problem solving, decision making, and writing.

Unit 5: Making Personal Decisions
Students demonstrate the laboratory and technical inquiry skills, communication skills, and the concept of “fair test” that they developed throughout the course. By investigating a personally chosen topic, students collect qualitative and quantitative

data through scientific investigations, research a product of their choice, and provide a recommendation for choosing a product.

Students use existing product comparisons to review questioning skills for decision making. They submit a proposal outlining the questions they plan to test and focus on the design of the personal investigation. Students carry out their investigation, evaluate and refine their investigation, and make recommendations. They summarize their investigations and recommendations in a report. Throughout the process, they self-assess and receive teacher and peer feedback to improve their final product.

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:

- Direct instructor from mentor
- Interactive lessons (videoconference)
- On-line instruction (self-paced lessons)
- Demonstration (both laboratory work in the classroom as well as animated on-line demonstrations)
- Case study
- Field trips for data collection
- Internet research
- Group work
- Independent Study Units (ISU's)
- Interviews of local individuals

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.

Growing Success: Assessment, Evaluation and Reporting in Ontario Schools. Ontario Ministry of Education Publication, 2010

Type of assessment	**Category**	**Details**		**Weighting (%)**
Term Work (70%)	Knowledge/ Understanding	- Illustrate how science is a part of daily life. - Explain the systems and processes required by simple and complex organisms to sustain life. - Describe the characteristics of electrical circuits.		18%
	Thinking	- Use appropriate scientific skills, tools, and safety procedures to investigate problems. - Investigate the physical and chemical properties of common materials through laboratory activities. - Investigate simple electrical circuits, using safe practices.		14%
	Communication	- Communication of information and ideas. - Use of scientific terminology, symbols, conventions and standard (SI) units. - Use of various forms of communication. - Use of information technology for scientific purposes.		19%
	Application	- Analysis of social and economic issues involving science and technology. - Assessment of impacts of science and technology on the environment. - Proposing courses of practical action in relation to science- and technology-based problems.		19%
Final Assessment (30%)	Culminating Activity (15%)	The cumulative activity is made up of two parts where all of the skills learned throughout the course will be demonstrated.	K/U	5%
			T	4%
			C	6%
			A	5%
	Final Examination (15%)	The final exam consists of a series of short problems and scenarios where the students will be able to use the skills and knowledge gained in the course.	K/U	2.5%
			T	2%
			C	3%
			A	2.5%
			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 within the course and within each unit.

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

- pre-unit subject assessment, discussion, KWL, mind-maps, prior student records, surveys,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), Projects, Drawing or Map-making (photographed for submission) , Surveys, Worksheets, Reports, Performance Tasks, Achievement chart, Field Observations
- labs, experiments, Independent Study Units (ISU's), group work.
- Assignments: written submissions; audio, visual presentation, 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
- Conversations with students
- Ongoing observations of most consistent work, with consideration given to most recent work
- Culminating Activity
- Final exam

Resources

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 9 and 10: Science.* Toronto, ON: Queen's Printer for Ontario.

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

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

Print Resources:

- Wolfe, E., Clancy, C., Jasper, G., Lindenberg, D., Lynn, D., Mustoe., F., & Smythe, R. (1999). *Science Power 9*. Whitby, ON: McGraw-Hill Ryerson.

Internet Resources:

- Association for the Advancement of Science www.aaas.org/
- Product Review and Reports http://www.consumersearch.com/
- Canadian Space Agency Resource Centre http://www.asc-csa.gc.ca/eng/
- About Chemistry www.chemistry.about.com
- Explore Learning www.explorelearning.com
- How Stuff Works www.howstuffworks.com

Program Planning

This version of SNC1L 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.

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.