

Course Outline

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

Teacher's Name: Brian Savoy

Developed by: Cathy Rodger

Date: September 2019

Revision Date: September 2021

Developed from:

Ontario Ministry of Education. (2004). *Guide to locally developed courses, grades 9 to 12: Development and approval procedures.*

<http://www.edu.gov.on.ca/eng/document/curricul/secondary/localdev/locdeve.pdf>

Ontario Ministry of Education. (2008). *The Ontario curriculum, grades 9 and 10: Science.*

http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf

Text: None

Prerequisite: None

Credits: One

Length: 110 hours

Principal's Name: Angela Batsford-Mermans

Principal's Approval:



Approval Date: September 14, 2021

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 Grade 11 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

Science 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 Alive

- 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
3. Physics: Electrical Circuits	25 hours
4. 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, specifically about how science impacts their lives in northern, isolated and remote communities.

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 as Indigenous youth and future work experiences they aspire to. 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, for example in their homes if they live with electricity. 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. Questions to consider include how to dispose of materials safely when living in isolated and remote communities. 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 that’s relevant to their lives as Indigenous youth in northern communities, 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 into an eight-week series of lessons and activities that is presented to students in remote northern communities via the internet. The eighth week is used for course consolidation, review, and the final examination. Teacher and students communicate over the internet through timely activity feedback, emails, messages, video and audio calls. Classroom mentors assume the role of liaison between the teacher and student while also supporting a holistic approach to motivate, engage and support each individual student.

A variety of strategies will be used in the online delivery of this course. Some instructional strategies include:

- Direct instruction 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

Learning goals will be discussed at the beginning of each assignment and success criteria will be provided to students. The success criteria are used to develop the assessment tools in this course, including rubrics and checklists.

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 percent 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. 41).

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

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 Evaluation (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
	Exam (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 *for* learning and assessment *as* learning 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 (assessment of learning) 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

The Ministry of Education's 2010 document, *Growing Success*, outlines the seven fundamental principles that guide best practice in the assessment and evaluation of students. KiHS teachers use practices that:

- are fair, transparent, and equitable for all students;
- support all students, including those with special education needs, those who are learning the language of instruction (English or French), and those who are First Nation, Métis, or Inuit;
- are carefully planned to relate to the curriculum expectations and learning goals and, as much as possible, to the interests, learning styles and preferences, needs, and experiences of all students;
- are communicated clearly to students and parents at the beginning of the course and at other points throughout the school year or course;
- are ongoing, varied in nature, and administered over a period of time to provide multiple opportunities for students to demonstrate the full range of their learning;
- provide ongoing descriptive feedback that is clear, specific, meaningful, and timely to support improved learning and achievement;
- develop students' self-assessment skills to enable them to assess their own learning, set specific goals, and plan next steps for their learning (p.6).

Resources

Association for the Advancement of Science. (n.d.). Home. <https://www.aaas.org/>

Consumer Search. (n.d.). Home. <https://www.consumersearch.com/>

Gizmos. (n.d.). Home. <https://gizmos.explorelarning.com/>

Government of Canada. (2020, Jan. 22). Workplace Hazardous Materials Information System (WHMIS). <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/occupational-health-safety/workplace-hazardous-materials-information-system.html>

Government of Canada. (2021, June 17). *Canadian Space Agency*. <https://www.asc-csa.gc.ca/eng/>

How Stuff Works. (n.d.). Home. <https://www.howstuffworks.com/>

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

Ontario Ministry of Education. (2008). The Ontario curriculum, grades 9 and 10: Science. http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf

Ontario Ministry of Education. (2010). *Growing success: Assessment, evaluation and reporting in Ontario schools*. <http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf>

Ontario Ministry of Education. (2016). *Ontario schools, kindergarten to grade 12: Policy and program requirements*. <http://edu.gov.on.ca/eng/document/policy/os/index.html>

ThoughtCo. (n.d.). *Chemistry*. <https://www.thoughtco.com/chemistry-4133594>

Toulouse, P.R. (2016). What matters in Indigenous education: Implementing a vision committed to holism, diversity and engagement. <https://peopleforeducation.ca/wp-content/uploads/2017/07/MWM-What-Matters-in-Indigenous-Education.pdf>

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

Program Planning

This course is offered to Indigenous students living in isolated, northern Ontario communities. It is offered by qualified teachers in a blended classroom with a balance of academic, wellness, land-based learning, local language and culture to support the success of the whole student. 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 support as required.

Indigenous and local content is used throughout the course to meet students' learning needs. Opportunities for outdoor activities and land-based learning are also incorporated and students are encouraged to use local knowledge in their products. Considerations are made to the learning preferences of the student population and lessons can be adjusted for individual students as required. Opportunities have been provided for students to apply ideas and concepts encountered in this course to their lives as an individual and as a member of a First Nations community. Teachers consult the Ontario Ministry of Education policies, guidelines and important initiatives when planning a comprehensive program in this area.