

Course Outline

School Name: KEEWAYTINOOK INTERNET HIGH SCHOOL
Department Name: Sciences

Ministry of Education Course Title: Locally Developed Science

Grade Level: 10

Ministry Course Code: SNC2L

Teacher's Name: Sangchul Yun

Developed by: Mike Dool Date: December 2009

Revision Date: September 2022

Developed from:

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

Text: None

Prerequisite: SNC1L

Credits: One

Length: 110 hours

Principal's Name: Angela Batsford-Mermans

Principal's Approval:



Approval Date: September 14, 2022

Course Description/Rationale

This course reinforces and strengthens science-related knowledge and skills, including scientific inquiry, critical thinking, and the environmental impact of science and technology, to prepare students for success in everyday life, in the workplace, and in the Grade 11/12 Science Workplace Preparation courses. Students explore a range of topics, including science in media, chemical interactions of common household materials, interdependence of organisms in communities, and using electrical energy. Students have the opportunity to extend mathematical and scientific inquiry skills. Course work encourages development of reading, writing, and oral language skills through relevant and practical activities.

Overall Curriculum Expectations

Science Inquiry: Science in Media

- Explain how science-related information is presented in print and electronic media for different purposes and audiences;
- Investigate science-related information presented in print and electronic media using appropriate research and reporting skills;
- Evaluate claims and presentations of science-related information in media.

Chemistry

- Understand how chemicals in common household and workplace materials interact;
- Investigate the types and rates of interactions between commonly used materials through laboratory activities;
- Analyze how material interactions affect our daily lives.

Biology: Living Together

- Explain the strategies that organisms use for successful coexistence in populations and communities;
- Investigate, using appropriate laboratory and research skills, the implications of organisms existing in communities;
- Analyze the challenges that arise from organisms living in communities.

Physics: Using Electrical Energy

- Explain the generation, measurement, and conversion of electricity;
- Investigate the factors that affect the generation and use of electricity;
- Analyze the social, economic, and/or environmental implications of the sources and uses of electrical energy

Course Content

Unit	Length
1. Science Inquiry: Science in the Media	22 hours
2. Biology: Living Together	30 hours
3. Chemistry: Interactions of Common Materials	30 hours
4. Physics: Using Electrical Energy	28 hours
Total	110 hours

Unit Descriptions

Unit 1 – Science Inquiry: Science in the Media

Scientific literacy is critical for students in an increasingly technological and scientific world. Students are bombarded with science-based claims and a solid base of inquiry skills enables them to distinguish between fact and opinion and to understand media bias in order to make informed decisions. Students are exposed to a variety of opinions and messages. Particular attention is paid

to how students are exposed to media (Facebook and social media for example) and what's relevant for them in their local communities.

The scientific inquiry and critical thinking skills developed in this unit are revisited throughout the course and ensure students prepare for success in the final unit evaluation. Media and scientific literacy are emphasized throughout the unit, enabling students to question the presentation of science information in the media.

Students focus on reviewing the laboratory and investigation skills required to evaluate science-based claims through experimental research. Students examine various modes of science-related media and learn to analyze media for the messages portrayed and then investigate a science-related issue through media-based research. Throughout the unit, they practice the Essential Skills of reading text, document use, numeracy, oral communication, computer use, decision making, and working with others.

Unit 2 – Biology: Living Together

Living in a community presents challenges for and benefits to all living things – plants, animals, and humans. By observing examples from nature, students make connections to their role as responsible members of the world community. Students are introduced to the biological concept of population, focusing on the benefits and challenges of organisms of the same species living together. They investigate and report on the problems that arise when populations of microscopic organisms become overcrowded. Through the study of a pond, field, or other biological community, students see that natural populations do not exist in isolation and relate their observations to human populations, specifically within their local community and other communities in Northwestern Ontario. Students refine laboratory skills while investigating population growth and structure using larger organisms. These investigations become the basis for the school-based action plan developed in Unit 5 and in the Final Course Evaluation.

Unit 3 – Chemistry: Interactions of Common Materials

Using the various forms of media, students develop an awareness of the multitude of common chemical compounds found in everything they use and consume in their everyday lives, specific to their local community and personal life. They investigate the interactions among compounds and practice literacy skills by appropriately communicating the information learned. Students classify chemicals found in common materials through examination of Household Hazardous Product symbols (HHPs) and Workplace Hazardous Materials Information System (WHMIS) labels found at home, at their school, at work places etc. They learn and apply different classifications of physical and chemical interactions through research and laboratory activities. Students examine factors that affect rates of chemical and physical interactions qualitatively, through several laboratory investigations. Investigative skills are revisited in the culminating activity in Unit 5 through the research of environmental impacts. In the unit evaluation, students plan, conduct, and communicate the results of an investigation that compares both synthetic and natural materials and their effects on the environment.

Unit 4 – Physics: Using Electrical Energy

The growing demand for electrical energy has important implications for all communities, influencing quality of life and the state of the environment. Students increase awareness and understanding of issues linked to the generation and use of electrical energy. Specifically, students consider how their community produces and uses energy. The activities emphasize the skills of collaboration, safe investigation, numeracy, media literacy, and communicating with an audience. The first activity, which continues throughout the unit, helps students to build an understanding of the terminology used in the study of Electrical Energy. Students gain an awareness of our reliance on electrical energy and an understanding of the energy conversions associated with the use of electricity. They compare electrical appliances and simple machines with respect to energy, power, current, and potential difference through laboratory investigations. Students design and build a device that generates electrical energy and make modifications to increase its output. They expand their understanding of stewardship and their responsibility as energy conservers by researching methods of generating electricity; analyzing social, economic, and/or environmental implications; identifying consumption patterns; and designing and implementing a plan to reduce the

consumption of electrical energy. This is particularly important for students in isolated and remote communities where diesel generators continue to provide power.

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 (online lecture);
- Adapting to learning styles/multiple intelligences;
- Analysis of student work;
- Discovery/Inquiry based learning;
- Generating and testing hypotheses;
- Graphic organizers;
- Hands on learning;
- Homework and practice;
- Identifying similarities and differences;
- Modelling;
- Sketching to learn;
- Mentoring;
- Visualization;
- Independent research;
- Discussion via forums.

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	Understanding of concepts, principles, laws and theories; Knowledge of facts and terms;	13

		Transfer of concepts to new contexts; Understanding of relationships between concepts.	
	Thinking	Application of the skills and strategies of scientific inquiry; Application of technical skills and procedures; Use of tools, equipment and materials.	19
	Communication	Expression and organization of ideas and information; Communication for different audiences and purposes in oral, visual, and/or written forms; Use of conventions, vocabulary, and terminology of the discipline in oral, visual, and/or written forms.	19
	Application	Understanding connections among science, technology, society and the environment; 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%)	Knowledge/Understanding	3
		Thinking	4
		Communication	4
		Application	4
	Exam (15%)	Knowledge/Understanding	3
		Thinking	4
		Communication	4
		Application	4
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:

- Ongoing descriptive feedback
- Small-group conversations to develop their opinions and communication skills
- Mentor observations of student's performance while conducting experiments and scientific research
- Conversations with student on a regular basis to verbalize observations, ask questions, and clarify understanding
- Self-assessment (e.g., weekly self-assessment of learning)

Evidence of student achievement (assessment *of* learning) is collected from various sources, including the following:

- Ongoing assessment/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

Amoeba Sisters. (2017, Aug. 13). *General lab safety* [Video]. YouTube.

<https://www.youtube.com/watch?v=MEIXRLcC6RA>

Basics Explained, H3Vtux. (2020, Jun. 24). *How does a battery work? Electricity and batteries explained* [Video]. YouTube. <https://www.youtube.com/watch?v=AckbovTAdYY>

Bradford, A. (2017, Aug. 4). *What is science?* Live Science. <https://www.livescience.com/20896-science-scientific-method.html>

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Friedman, D. (2009, Dec. 2). *Some vitamins can be bad for you!* [Video]. YouTube. <https://www.youtube.com/watch?v=F4gocE-R6oM>

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HollyB1331. (2010, Ap. 13). *Bubble bomb experiment* [Video]. YouTube. <https://www.youtube.com/watch?v=nNtkFEWfDIg>

IvyRose Holistic. (n.d.). *Common chemicals found in the home*. http://www.ivyroses.com/Chemistry/GCSE/Common-Chemicals-in-the-Home_Molecular-Formulae.php

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- 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
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- paulrobesonlibrary. (2007, Nov. 13). *What is plagiarism?* [Video]. YouTube. <https://www.youtube.com/watch?v=4P05vgxDoPU>
- Porter, J. (2012, Apr. 19). *Walls crumble, mould infects First Nation school*. CBC. <https://www.cbc.ca/news/canada/thunder-bay/walls-crumble-mould-infects-first-nation-school-1.1283304>
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- Yu, S. (2019, Sept. 22). *Practice* [Video]. YouTube. <https://www.youtube.com/watch?v=FnEFp3yvfpl>
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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.