

Course Outline

School Name:KEEWAYTINOOK INTERNET HIGH SCHOOL

Department Name: Science

Ministry of Education Course Title: Science

Grade Level:10

Ministry Course Code: SNC2D

Teacher's Name: Raj Budhram

Developed by: Raj Budhram Date: August, 2011

Revision Date: September 2018

Developed from: The Ontario Curriculum, Grade 10 Science, 2008

Text:

Prerequisite: SNC1D

Credits: One

Length: 110 hours

Principal's Name: Kevin Dempsey

Principal's Approval (signature)



Approval Date: September 4, 2018

Course Description/Rationale

This course enables students to enhance their understanding of concepts in biology, chemistry, earth and space science, and physics, and of the interrelationships between science, technology, society, and the environment. Students are also given opportunities to further develop their scientific investigation skills. Students will plan and conduct investigations and develop their understanding of scientific theories related to the connections between cells and systems in animals and plants; chemical reactions, with a particular focus on acid-base reactions; forces that affect climate and 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 OF LIVING THINGS

- Evaluate the importance of medical and other technological developments related to systems biology, and analyze their societal and ethical implications.
- Investigate cell division, cell specialization, organs, and systems in animals and plants, using research and inquiry skills, including various laboratory techniques.
- Demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals and plants.

C. CHEMISTRY: CHEMICAL REACTIONS

- Analyze a variety of safety and environmental issues associated with chemical reactions, including the ways in which chemical reactions can be applied to address environmental challenges.
- Investigate, through inquiry, the characteristics of chemical reactions.
- Demonstrate an understanding of the general principles of chemical reactions, and various ways to represent them.

D. EARTH AND SPACE SCIENCE: CLIMATE CHANGE

- Analyze some of the effects of climate change around the world, and assess the effectiveness of initiatives that attempt to address the issue of climate change.
- Investigate various natural and human factors that influence Earth's climate and climate change.

- Demonstrate an understanding of natural and human factors, including the greenhouse effect, that influence Earth's climate and contribute to climate change.

E. PHYSICS: LIGHT AND GEOMETRIC OPTICS

- Evaluate the effectiveness of technological devices and procedures designed to make use of light, and assess their social benefits.
- Investigate, through inquiry, the properties of light, and predict its behaviour, particularly with respect to reflection in plane and curved mirrors and refraction in converging lenses.
- Demonstrate an understanding of various characteristics and properties of light, particularly with respect to reflection in mirrors and reflection and refraction in lenses.

Course Content

Unit	Length
1. Chemical reactions	26.00 hours
2. Light and Geometric Optics	29.25 hours
3. Climate Change	29.25 hours
4. Tissues, Organs & Systems	29.25 hours
Total	113.75 hours

Unit Descriptions

Unit 1 - Chemical Reactions

In this unit, students will 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, students will learn that chemicals react with each other in predictable ways and are subject to the Law of Conservation of Mass. Students will also conduct inquiry to identify chemical change and describe a variety of chemical reactions.

Unit 2 - Light and Geometric Optics

In this unit, students will study the nature of light. They will scrutinize computer animations and draw ray diagrams to understand the use of plane and curved mirrors, and convergent lenses. Also they will investigate how colours are related to the properties of light, refraction through different materials to gain an understanding of the index of refraction, and different forms of light emission and their uses. Students will explain how the properties of light are applied to the compound microscope, and in the end-of-unit task they will identify ways in which the properties of lenses determine their use in cameras.

Unit 3 - Climate Change

In this unit, students will describe components of the Earth's climate system and the natural and anthropogenic causes of climate change. They will conduct inquiry to determine how greenhouse gases affect climate change, and then they will examine current evidence of climate change, including changes in their community. They will research the effectiveness of some current initiatives that addresses climate change. In the end-of-unit task students will design and build a model to illustrate the natural greenhouse effect, and use the model to explain the anthropogenic greenhouse effect.

Unit 4 - Tissues, Organs, and Systems

In this unit, students will 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.). Also, students will research ethical issues related to stem cell research. As an end-of-unit task, students will describe public health strategies related to systems biology.

Teaching/Learning Strategies

This course is organized into an eight-week series of lessons and activities that will be presented to students in remote northern communities via the internet. The eighth week will be used for course consolidation, review and the final examination. Teacher and students will communicate over the internet, while mentors in the classrooms will assume the role of liaison between the teacher and student.

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

- Academic vocabulary and language
- Cooperative learning
- Adapting to learning styles/multiple intelligences
- Analysis of student work
- Conferencing
- 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

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 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.

Type of assessment	Category	Details	Weighting (%)
Term Work (70%)	Knowledge/ Understanding	-Demonstrate an understanding of the hierarchical organization of cells, from tissues, to organs, to systems in animals and plants; -Demonstrate an understanding of the general principles of chemical reactions, and various ways to represent them; -Demonstrate an understanding of natural and human factors, including the greenhouse effect, that influence Earth's climate and contribute to climate change; -Demonstrate an understanding of various characteristics and properties of light, particularly with respect to reflection in mirrors and reflection and refraction in lenses.	12
	Thinking	-Investigate cell division, cell specialization, organs, and systems in animals and plants, using research and inquiry skills, including various laboratory techniques; -Investigate, through inquiry, the characteristics of chemical reactions; -Investigate various natural and human factors that influence Earth's climate and climate change. -Investigate, through inquiry, the properties of light, and predict its behaviour, particularly with respect to reflection in plane and curved mirrors and refraction in converging lenses.	18
	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.	18
	Application	-Evaluate the importance of medical and other technological developments related to systems biology, and analyse their societal and ethical implications. -Analyse a variety of safety and environmental issues associated with chemical reactions, including the ways in which chemical reactions can be applied to address environmental challenges. -Analyse some of the effects of climate change around the world, and assess the effectiveness of initiatives that attempt to address the issue of climate change. -Evaluate the effectiveness of technological devices and procedures designed to make use of light, and assess their social benefits.	22
Final Evaluation (30%)	Culminating Activity (15%)	Knowledge/Understanding	2.5
		Thinking	4
		Communication	4
		Application	4.5
	Final Examination (15%)	Knowledge/Understanding	2.5
		Thinking	4
		Communication	4
		Application	4.5
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 are 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

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://www.edu.gov.on.ca/eng/aboriginal/>

Text books:

Ritter, B., Plumb, D., Jenkins, F., Kessel, H.V., Hirsch, A.J. (2001) *Science 10*. Toronto, ON: Nelson Thompson Company.

Grace, E., Mustoe, F., Ivanco, J., Gue, D., Brown, F. D. (2001). *SCIENCEPOWER 10*. Toronto, ON: McGraw Hill Ryerson Limited.

Websites

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

<https://ojibwe.lib.umn.edu/>

https://www.google.ca/search?q=beaver+representing+wisdom&source=lnms&tbm=isch&sa=X&ved=0ahUKEwif69PR0J3dAhUKzoMKHd1OCWEQ_AUICigB&biw=1347&bih=604#imgrc=sFQMgqDtQfVczM:

Interactive Simulations

<https://www.explorellearning.com/>

http://mhhe.com/biosci/genbio/virtual_labs/BL_16/BL_16.html

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

YouTube Videos by Students from Deer Lake

Video on Molecular Model of a Chemical Equation by David Harper

Finding pH of vinegar, water, and soap liquid by David Harper

Viewing Onion Cells by Riley Meekis

Chemical or Physical Change Adding Baking Soda to Vinegar by Lyndon Rae

Other YouTube Videos

<https://www.youtube.com/watch?v=VADhF7M8bJ8>

<https://www.youtube.com/watch?v=qKiMGBT1JQc>

<https://www.youtube.com/watch?v=KVpSCICCD9A>

<https://www.youtube.com/watch?v=0T3CVPlv1D8>

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

<https://www.youtube.com/watch?v=tjNxBH1qsRM>

Program Planning

This course is offered to 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. Students may also receive support from various programs at KHHS, including the First Nation Student Success Program and the Special Education Program.

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