North Vancouver Online Learning

Course Plan: Science 9

COURSE DESCRIPTION:

Science is an exciting and ever-changing field of study, which provides opportunities for us to better understand our natural world. The effect that science has on us can be seen daily. Organism reproduction to promote survival of the species, impact of current and circuits in electricity distribution, solar radiation's impact on Earth's organisms, and matter cycles and sustainability of systems are just a few of the problems being worked by scientists. Science extends into all human endeavors, from the circuits to the sustainability of systems. The science curriculum includes content from biology, chemistry, physics, and earth science and provides students with the opportunity to develop skills involving observation, experimentation, and problem solving techniques that every person needs to develop. The Science 9 curriculum is broken down into the following sub-categories:

- Applications of Science - this is the framework within which all science is taught
- Life Science - the study of reproduction
- Chemical Science - the study of elements and compounds in the periodic table
- Physical Science - the study of electric flow in circuits
- Earth Science - the study of components and interactions of the Earth's major spheres

For the complete Ministry curriculum Science document, go to:
https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/pdf/science_learning_standards_elab.pdf

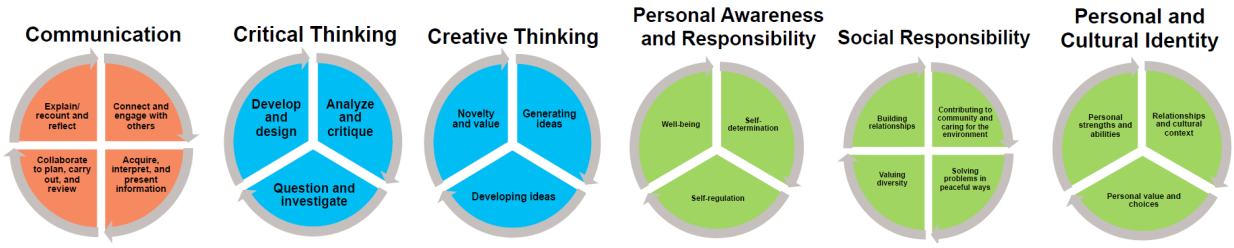
BIG IDEAS:

Big Ideas are the key understandings that students will achieve by the end of the course. These Big Ideas cover the following concepts: Formation of Cells, Organization of Elements, Electric Current, and Earth's Spheres. Students will explore and understand the following Big Ideas throughout the Science course:

Cells are derived from cells.	**The electron arrangement of atoms impacts their chemical nature.**	**Electric current is the flow of electric charge.**	**The biosphere, geosphere, hydrosphere, and atmosphere are interconnected, as matter cycles and energy flows through them.**

CORE COMPETENCIES:

A Core Competency is a skill that all learners need to have to be successful in all aspects of their life. There are 6 core competencies: Communication, Critical Thinking, Creative Thinking, Personal Awareness and Responsibility, Social Responsibility and Personal and Cultural Identity. Throughout the Science course, students will focus on one of these competencies in each unit.



COURSE EXPECTATIONS:

- The self-paced nature of the course requires that students manage their time effectively to complete the course by the deadline (June 1st or as determined by program requirements). Successful students engage in coursework at least an hour each day.

- Students must attempt all activities in the course to receive a passing grade, including quizzes, readings, research, reflections, and the documentation of learning in their course.

- Students should take care that their communication with the teacher and with other students, through email, or Moodle message, is course related, clear, and respectful in tone.

- It should be clear from the assignment submissions that the student has personally engaged with the course material and submitted only work that is his or her own. Course work must be original. Communicate with the teacher if you would like to complete a project with a partner or group.

- The core of this course is content and research based. Therefore, students are encouraged to make use of other resources on the internet, but they must cite their sources. A variety of

quality resources in the creation of your projects is a sign of academic depth, just make sure that you check the credibility of each source and acknowledge its use in your work.

LEARNING STANDARDS: Curricular Competencies

Students are expected to be able to do the following:

Questioning and predicting

- Demonstrate a sustained intellectual curiosity about a scientific topic or problem of personal interest
- Make observations aimed at identifying their own questions, including increasingly complex ones, about the natural world
- Formulate multiple hypotheses and predict multiple outcomes

Planning and conducting

- Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
- Assess risks and address ethical, cultural and/or environmental issues associated with their proposed methods and those of others
- Select and use appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- Ensure that safety and ethical guidelines are followed in their investigations

Processing and analyzing data and information

- Experience and interpret the local environment
- Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information
- Seek and analyze patterns, trends, and connections in data, including describing relationships between variables (dependent and independent) and identifying inconsistencies
- Construct, analyze and interpret graphs (including interpolation and extrapolation), models and/or diagrams
- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Analyze cause-and-effect relationships

Evaluating

- Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions
- Describe specific ways to improve their investigation methods and the quality of the data
- Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled
- Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and secondary sources
- Consider the changes in knowledge over time as tools and technologies have developed
- Connect scientific explorations to careers in science
- Exercise a healthy, informed skepticism, and use scientific knowledge and findings to form their own investigations and to evaluate claims in secondary sources
- Consider social, ethical, and environmental implications of the findings from their own and others' investigations
- Critically analyze the validity of information in secondary sources and evaluate the approaches used to solve problems

Applying and innovating

- Contribute to care for self, others, community, and world through individual or collaborative approaches

- Transfer and apply learning to new situations
- Generate and introduce new or refined ideas when problem solving
- Contribute to finding solutions to problems at a local and/or global level through inquiry
- Consider the role of scientists in innovation

Communicating

- Formulate physical or mental theoretical models to describe a phenomenon
- Communicate scientific ideas, claims, information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations
  Express and reflect on a variety of experiences, perspectives, and worldviews through place

LEARNING STANDARDS: Course Content

Students are expected to know the following:

- asexual reproduction:
  - mitosis
  - different forms
- sexual reproduction:
  - meiosis
  - human sexual reproduction
- element properties as organized in the periodic table
- The arrangement of electrons determines the compounds formed by elements
- circuits — must be complete for electrons to flow
- voltage, current, and resistance
- effects of solar radiation on the cycling of matter and energy
- matter cycles within biotic and abiotic components of ecosystems
- sustainability of systems
- First Peoples knowledge of interconnectedness and sustainability

UNIT OVERVIEWS AND LEARNING ACTIVITIES:

Unit 1: Life Science

Big Idea:
Cells are derived from cells.
Core Competency Focus:
Personal and Social
Essential Questions:
Why do living things need different methods for reproduction, not just one?
First Peoples Principle of Learning:
Learning ultimately supports the well being of the self, the family, the community, the land, the spirits, and the ancestors.

Unit Overview:
The Life Science Unit will focus on learning about reproduction performed at the cellular level. They will understand the advantages and disadvantages of sexual and asexual reproduction, as well as the

importance of variation on evolution, adaptation, and genetic diversity. Performance tasks will include creating a storybook illustrating how organisms adapt as it relates to sexual reproduction, as well as informative video on cell reproduction. By communicating and reflecting on their understanding on cell reproduction, students will gain a better understanding on how organisms reproduce and adapt to their environment.

Unit 2: Chemical Science

Big Idea:
The electron arrangement of atoms impacts their chemical nature.
Core Competency Focus:
Communication
Essential Questions:
What are the different ways we could categorize?
First Peoples Principle of Learning:
Learning involves patience and time.

Unit Overview:
The Chemical Science unit will focus on the understanding of the organization of the periodic table and what characteristics are being used to categorize elements in the periodic table. Some characteristics used for organization are atomic number, mass, metals, non-metals, and metalloids. Students will also gain a basic understanding on the components of atoms and use of the Bohr model to illustrate different elements. Chemical bonding and naming will also be discussed. Performance tasks will include creating a concept map on matter, as well as building a 3D model of an atom. By creating and communicating on their understanding of matter, atom, and characteristics of elements in the periodic table, students will be able to analyze other ways that matter and categorization could be used in other aspects of life.

Unit 3: Physical Science

Big Idea:
Electric current is the flow of electric charge.
Core Competency Focus:
(Creative) Thinking
Essential Question:
How are parts of the system related to the entire system?
First Peoples Principle of Learning:
Learning involves patience and time.

Unit Overview:
The Physical Science unit will focus on the understanding of light as a type of energy, as well as the different properties of light. Students will understand how light energy could travel via different mediums and object and the resulting effect on image. Students will also explore the components of their eyes and how it contributes to their sight. Performance tasks will include creating a magnifying periscope and creating a pinhole camera to manipulate images. By thinking creatively, students will build their understanding of energy transfer.

Unit 4: Earth Science

Big Idea:
The biosphere, geosphere, hydrosphere, and atmosphere are interconnected, as matter cycles and energy flows through them.
Core Competency Focus:
(Critical) Thinking
Essential Questions:
To what extent is the Earth an active, changing system?
First Peoples Principle of Learning:
Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships and a sense of place).

Unit Overview:
The Earth Science unit will focus on the understanding of Earth's layer, plate tectonics and interactions, and its influences on the Earth's geological processes. Students will understand how historical events occurred as a result of the interaction of Earth's layers and plate movements. Performance tasks will include creating an educational game focusing on the understanding of plate tectonics and creating a wold map of hot spots of volcanic and earthquake activities.

STUDENT LEARNING ACTIVITIES AND STRATEGIES:

- course readings
- unit learning guides
- practice quizzes
- interactive videos/activities
- communicate information and results (e.g., graphs, diagrams, models, formulae)
- projects
- unit exams
- midterm exam, final exam

ASSESSMENT:

Science 9 has been re-structured to a holistic, letter grade based system. Therefore, assignments will be marked on holistic rubrics, without the use of percentages. The course will include formative assessment opportunities where students will receive teacher feedback and also have the opportunity to incorporate self-reflection and self-assessment tools. The formative tasks are designed to help students correct, hone and improve on their work before being assessed. After each submission of work, the teacher will provide feedback based on criteria and standards that can then be incorporated into the final summative assignment. Summative assessment will take place after formative assessments and be used on final performance tasks and tests throughout each unit. This course will be using specific rubrics for different tasks and students will have access to these rubrics before submission of the assignments. The North Vancouver Assessment and Evaluation Handbook will be used as a guideline for assessment.

Formative:

- Learning guides and self-assessment (checking for understanding of lessons)
- practice quizzes (checking for completion and understanding of lessons)

Summative:

- Projects – (written feedback, rurbric assessment)

- Unit Exams, Midterm Exam and Final Exam

EVALUATION:

Based on performance standards and criteria as outlined in each assignment:

Evaluation	Percentage of Final Mark
Activation Assignment 20%	
Formative Assessment:	20%
Learning Guides 10%	
Practice Quizzes 10%	
Summative Assessment:	80%
Unit Tests/Exams 40%	
Projects 20%	
Final Exam 20%	
Course Total	100%

RESOURCES:

There is no required textbook for this course. Students will access the course material in their Moodle website. Students need access to a computer with Internet capabilities. Students will also need to evaluate and research on additional resources for their projects. Throughout the course, students will have the choice to engage with a variety of applications and online digital tools/activities. The DL Centre is available for students who do not have computer access at home or who would like to meet with the teacher for academic and tech support.