North Vancouver Online Learning

Course Plan: Science 10

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COURSE DESCRIPTION:

Science 10 is designed to empower students by providing them with strong communication skills and an understanding and appreciation of topics in four scientific disciplines: Biology, Chemistry, Physics and Astronomy. It will also form the basis for further studies in these areas.

Students are guided in learning to think critically, creatively, and reflectively; to construct a sense of personal and cultural identity; and to be respectful of a range of perspectives and worldviews.

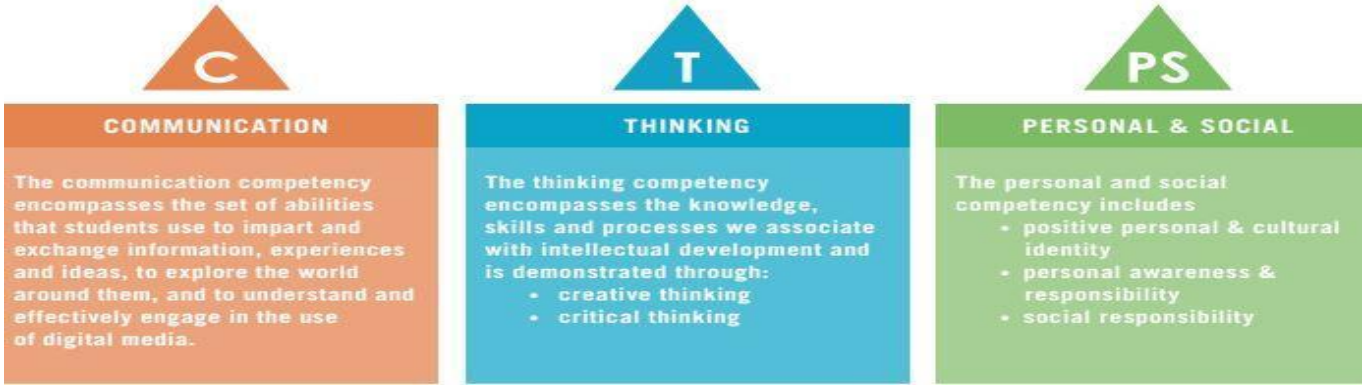
For the complete Ministry curriculum document for **Science 10** please go to https://curriculum.gov.bc.ca/curriculum/science/10/core

BIG IDEAS:

DNA is the basis for the diversity of living things.	Energy change is required as atoms rearrange in chemical processes.	Energy is conserved, and its transformations can affect living thigs and the environment.	The formation of the universe can be explained by the big bang theory.

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 3 core competencies: Communication (Communicating & Collaborating), Thinking (Critical Thinking, Creative and Reflective Thinking), Personal (Personal Awareness and Responsibility, Social Awareness and Responsibility and Positive Personal and Cultural Identity).



COURSE EXPECTATIONS:

- The self-paced nature of this course requires that students manage their time effectively to complete the course by the deadline (typically a year from the date of registration). Successful students make a weekly schedule to plan out the completion of the course.
- Students must read all the information and attempt all activities in the course to be successful in the course.
- Students must take care that their communication with the teacher and with other students through email or in person, is course related, clear and respectful.
- Students must take care that their work is their own and not plagiarized from any other source. This includes previous work submitted for another course, other people's assignments, Web or other resources etc.

LEARNING STANDARDS: Curricular Competencies

Students are expected to know 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.**

Introduction Assignment

The Assignment **will cover the following Learning Outcomes (Curricular Competencies)**

- Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled.
- Construct, analyze, and interpret graphs (including interpolation and extrapolation), models, and/or diagrams

These are 2 of the 29 learning outcomes in the course curriculum, which comprises 7% of the course Learning Outcomes/Activities. (2/29 = 7%)

LEARNING STANDARDS: Course Content

Students are expected to know the following:

- DNA structure and function
- patterns of inheritance
- mechanisms for the diversity of life:
- mutation and its impact on evolution
- natural selection and artificial selection
- applied genetics and ethical considerations
- rearrangement of atoms in chemical reactions
- acid-base chemistry
- law of conservation of mass
- energy change during chemical reactions
- practical applications and implications of chemical
- processes, including First Peoples knowledge
- nuclear energy and radiation
- law of conservation of energy
- potential and kinetic energy
- transformation of energy
- local and global impacts of energy transformations from
- technologies
- formation of the universe:
- big bang theory
- components of the universe over time
- astronomical data and collection methods

UNIT OVERVIEWS AND LEARNING ACTIVITIES:

Biology Unit

The Biology Unit is broken down into four sections: (1) DNA structure and function; (2) patterns of inheritance; (3) genetic variability, adaptability, and Natural Selection; and (4) applied genetics and ethical considerations. Some of topics students will explore include: the link between DNA, chromosomes, genes, proteins, and traits; inheritance patterns under different genetic systems; mutation and its impact on evolution; and the pros and cons of genetic engineering.

Big Idea: Genetic (DNA) variability is necessary for evolution by Natural Selection and is responsible for the diversity of living organisms.

Core Competency: *Communication*, *Thinking, Personal and Social competencies.*

First Peoples Principle of Learning: Learning involves patience and time. Learning involves recognizing the consequences of one' actions.

Chemistry Unit

The Chemistry Unit is broken down into two sections: (1) chemical reactions rearrange atoms; and (3) acid-base chemistry. Some of topics students will explore include types of chemical reactions; law of conservation of mass; pH; properties of acids and bases.

Big Idea: Chemical reactions require energy and produce new compounds but no change in mass.

Core Competency: *Communication*, *Thinking.*

First Peoples Principle of Learning: Learning involves recognizing the consequences of one' actions. Learning involves generational roles and responsibilities.

Physics Unit

The Physics Unit is broken down into three sections: (1) properties and types of energy; (2) energy transformations; and (3) impact of energy transformations on humans and their environment. Some of topics students will explore include potential vs kinetic energy; transfer vs transformation of energy; energetics of chemical reactions; local and global impacts of energy transformations from technologies.

Big Idea: Energy is conserved, and its transformations can affect living thigs and the environment.

Core Competency: *Thinking and Personal and Social competencies.*

First Peoples Principle of Learning: Learning involves generational roles and responsibilities. Learning involves patience and time.

Astronomy Unit

The Physics Unit is broken down into three sections: (1) The origin of the universe; (2) birth and properties of galaxies and stars; (3) astronomical data and collection methods. Some of topics students will explore include the Big Bang theory; components of the universe over time; red and blue Doppler shift; radio telescopes.

Big Idea: The universe began as a single point, then expanded, stretched to its current size and is still stretching!

Core Competency: *Communicating and thinking.*

First Peoples Principle of Learning: Learning recognizing that some knowledge is sacred and only shared with permission and/or in certain situations.

STUDENT LEARNING ACTIVITIES AND STRATEGIES:

- Course readings
- Quizzes
- Interactive activities
- Reflective writing
- Assignments may include:
    - Essay/multi-paragraph writing
    - Paragraph writing
    - Verbal speeches/marketing ideas
    - Projects using a variety of technology
    - Podcasts, digital recordings
    - Presentations using a variety of tools (PowerPoint, Prezi etc)

ASSESSMENT:

The course will include many formative assessment opportunities where students will receive teacher feedback and 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 full submission of work, the teacher will provide feedback based on criteria and performance standards that can then be incorporated into the final summative assignment.

Summative assessment will take place after extensive formative assessment 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 Curriculum Hub Principles of Assessment - http://nvsd44curriculumhub.ca/assessment/

Formative:

- Teacher – student conferences (online or in person) to discuss drafts and progress.
- Online quizzes to check for completion and understanding of lessons.

Summative:

- Assignments and projects – written feedback, rubric assessment, and grade.
- Final performance task – written feedback, rubric assessment, and grade.
- Tests to check for comprehension, analysis, and synthesis of course learning.

EVALUATION:

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

Evaluation	Percentage of Final Mark
Learning Guides	10
Practice Quizzes	10
Unit Projects	20
Unit Tests	40
Final Exam	20
Course Total	100

RESOURCES:

Resources for readings and assignments are listed in the instructions of each lesson. These include websites maintained by government and non-profit organizations, as well as individuals. Students need access to a computer with Internet capabilities. Throughout the course, students will have the choice to engage with a variety of applications and online digital tools. The Online Learning Centre at Mountainside School 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.