



North Vancouver Online Learning

Course Plan: Life Sciences 11

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COURSE DESCRIPTION:

In this course, we focus on the diversity of life. We start by exploring experimental design and then classification of life. We explore ecological interactions and the process of evolution. We look at life on the microscopic scale with prokaryotic and eukaryotic organisms, and then on the macroscopic scale exploring the world of plants and animals. We will learn about evolutionary trends in complexity, while developing an appreciation for the incredible biodiversity on this planet. There are a few virtual labs in this course as well as some “at home” hands on components.

For the complete English version of the Ministry curriculum document for **Life Sciences 11** please go to <https://curriculum.gov.bc.ca/curriculum/science/11/life-sciences>

BIG IDEAS:

Life is a result of interactions at the molecular and cellular levels.

Evolution occurs at the population level.

Organisms are grouped based on common characteristics.

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, local, or global interest
- Make observations aimed at identifying their own questions, including increasingly abstract 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
- Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- Apply the concepts of accuracy and precision to experimental procedures and data:
 - significant figures
 - uncertainty
 - scientific notation

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, performing calculations, and identifying inconsistencies
- Construct, analyze, and interpret graphs, 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 their 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 in primary 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 to evaluate claims in primary and secondary sources
- Consider social, ethical, and environmental implications of the findings from their own and others' investigations
- Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems
- Assess risks in the context of personal safety and social responsibility

Applying and innovating

- Contribute to care for self, others, community, and world through individual or collaborative approaches
- Cooperatively design projects with local and/or global connections and applications
- Contribute to finding solutions to problems at a local and/or global level through inquiry
- Implement multiple strategies to solve problems in real-life, applied, and conceptual situations
- Consider the role of scientists in innovation

Communicating

- Formulate physical or mental theoretical models to describe a phenomenon
- Communicate scientific ideas and 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)**

- Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world.
- Formulate multiple hypotheses and predict multiple outcomes.
- Describe specific ways to improve their investigation methods and the quality of their data.
- Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled.

These are 4 of the 31 learning outcomes in the course curriculum, which comprises 13% of the course Learning Outcomes/Activities. (4/31 = 13%)

LEARNING STANDARDS: Course Content

Students are expected to know the following:

- **levels of organization**
- **cell structure and function**
- sexual and asexual **reproduction**
- **energy transformations** in cells
- **viruses**
- First Peoples understandings of **interrelationships between organisms**
- **microevolution:**
 - adaptation to changing environments
 - **changes in DNA**
 - **natural selection**
- **macroevolution:**
 - **speciation**
 - **processes of macroevolution**
 - **evidence for macroevolution**
- artificial selection and **genetic modifications**
- **single-celled and multi-celled organisms**
- **trends in complexity** among various life forms
- **evidence for phylogenetic relationships**
- **taxonomic principles** for classifying organisms
- binomial nomenclature
- **First Peoples knowledge on classification**
 - similarities and differences between **domains and kingdoms**

UNIT OVERVIEWS AND LEARNING ACTIVITIES:

Unit 1: Characteristics of living things

Unit 1 is broken down into four sections: (1) biology as the study of life; (2) the scientific method; (3) cell theory; and (4) basics of evolution.

Big Idea: Life is a result of interactions at the molecular and cellular levels.

Core Competency: *Thinking.*

First Peoples Principle of Learning: Learning involves recognizing the consequences of one's actions.

Unit 2: Cells are the building blocks of life.

Unit 2 is broken down into four sections: (1) cell structure; (2) types of cells; (3) cellular respiration; and (4) photosynthesis.

Big Idea: Life is a result of interactions at the molecular and cellular levels.

Core Competency: *Thinking, Communicating*

First Peoples Principle of Learning: Learning involves patience and time.

Unit 3: Viruses

Unit 3 is broken down into three sections: (1) structure and function; (2) reproduction; and (3) preventing viral diseases.

Big Idea: Life is a result of interactions at the molecular and cellular levels.

Core Competency: *Thinking, Communicating*

First Peoples Principle of Learning: Learning involves patience and time.

Unit 4: Evolution

Unit 4 is broken down into three sections: (1) evolutionary change; (2) macroevolution; and (3) role of DNA

Big Idea: Evolution occurs at the population level.

Core Competency: *Thinking, Communicating, Personal and Social*

First Peoples Principle of Learning: Learning involves recognizing the consequences of one's actions.

Unit 5: Taxonomy

Unit 5 is broken down into two sections: (1) organization of taxons; and (2) important groups.

Big Idea: Organisms are based on common characteristics.

Core Competency: *Thinking, Communicating, Personal and Social*

First Peoples Principle of Learning: Learning involves recognizing the consequences of one's actions.

Unit 6: Taxonomy

Unit 6 is broken down into five sections: (1) general characteristics of plants; (2) non-seed-bearing plants; (3) vascular plants and seeds; (4) gymnosperms; and (5) angiosperms.

Big Idea: Organisms are based on common characteristics.

Core Competency: *Thinking, Communicating, Personal and Social*

First Peoples Principle of Learning: Learning recognizes the role of indigenous knowledge.

Unit 7: Simple organisms

Unit 7 is broken down into five sections: (1) porifera; (2) cnidaria; (3) flat worms; (4) roundworms; and (5) segmented worm.

Big Idea: Organisms are based on common characteristics.

Core Competency: *Thinking, Communicating, Personal and Social*

First Peoples Principle of Learning: Learning recognizes the role of indigenous knowledge.

Unit 8: Advanced organisms

Unit 8 is broken down into five sections: (1) mollusks; (2) echinoderms; (3) arthropods; (4) chordates; and (5) vertebrates.

Big Idea: Organisms are based on common characteristics.

Core Competency: *Thinking, Communicating, Personal and Social*

First Peoples Principle of Learning: Learning recognizes the role of indigenous knowledge.

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://nvsc44curriculumhub.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 Guide	10
Practice Quizzes	10
Projects	15
Unit Quizzes	30
Midterm	15
Final Exam	20
<i>Course Total</i>	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.