



north vancouver

Distributed Learning School

Course Plan: Earth Science 11

COURSE DESCRIPTION:

Earth Science 11 is a survey course exploring many facets of planet Earth - its structure, processes occurring upon and within it, and the space surrounding it. Geologic topics include the formation of rocks and minerals, plate tectonics and mountain building, volcanism and earthquakes weathering and erosion, and the geologic time scale. Climate, ocean and weather systems, as well as the Solar system, stars and galaxies are also explored.

The **Earth Science 11** course follows the BC Provincial curriculum and satisfies the requirements for graduation and entrance into many post-secondary institutions or programs. This pathway is designed to provide students with the scientific understandings and critical-thinking skills identified for graduation. Students will express their learning of the core competencies through reasoning and modelling, understanding and solving, communicating and representing, and reflecting. 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 **Earth Science 11** please go to <https://curriculum.gov.bc.ca/curriculum/science/11/earth-sciences>

BIG IDEAS:

The Big Ideas consist of generalizations and principles and the key concepts important in an area of learning. They reflect the “Understand” component of the Know-Do-Understand model of learning. The big ideas represent what students will understand at the completion of the curriculum for their grade. They are intended to endure beyond a single grade and contribute to future understanding.

Earth materials are changed as they cycle through the geosphere and are used as resources, with economic and environmental implications.

Plate tectonic theory explains the consequences of tectonic plate interactions.

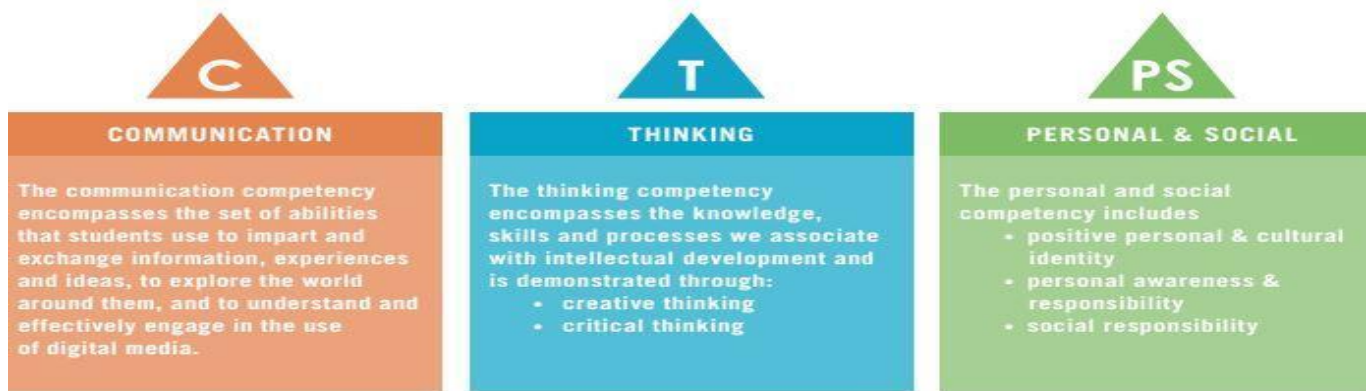
The transfer of energy through the **atmosphere** creates weather, and this transfer is affected by climate change.

The distribution of **water** has a major influence on weather and climate.

Astronomy seeks to explain the origin and interactions of **Earth and its solar system**.

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 in order to be successful in the course.
- Students must take care that their communication with the teacher and with other students through email, Moodle message, 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 be able to do 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

- Use local knowledge to 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
- Co-operatively 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

Unit 1 will cover the following Learning Outcomes (Curricular Competencies)

- Use knowledge of scientific concepts to draw conclusions that are consistent with evidence
- Analyze cause-and-effect relationships
- Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems
- Construct, analyze, and interpret graphs, models, and/or diagrams

These are 4 of the 33 learning outcomes in the course curriculum, which comprises 29% of the course Learning Outcomes/Activities. (4/33= 12%)

LEARNING STANDARDS: Course Content

Students are expected to know the following:

- **evidence of climate change**
- First Peoples knowledge of climate change and interconnectedness as related to environmental systems
- **water as a unique resource**
- First Peoples knowledge and perspectives of water resources and processes
- **properties of the ocean and the ocean floor**
- local and global **ocean currents**
- influences of large bodies of water on **local and global climates**

- **effects of climate change** on water sources
- the nebular hypothesis (explanation of the formation and properties of our solar system)
- **Earth as a unique planet** within its solar system
- **stars** as the centre of a solar system
- impacts of the **Earth-moon-sun system**
- application of space technologies to the study of changes in Earth and its systems

UNIT OVERVIEWS AND LEARNING ACTIVITIES:

Unit 1 – Introduction to Astronomy, Stars and Galaxies

The following are some of the skills developed in this unit:

- Difference is between astrology and astronomy in the studying stars?
- Determine from spectra if a star is approaching or receding from Earth.
- Identify galaxy type by shape.
- Describe the evolution of a star.
- Describe the Big Bang Theory

Big Idea: Astronomy seeks to explain the origin and interactions of Earth and its solar system.

Core Competency: *Thinking*

First Peoples Principle of Learning: Learning involves generational roles and responsibilities and learning is embedded in memory, history and story

Unit 2 – Bodies of the Solar System

The following are some of the skills developed in this unit:

- Explain the Nebular Hypothesis
- Classify planets as Terrestrial or Jovian.
- Name all planets and provide information about each one
- Explain why some theories suggest a moon may be an object captured from another part of the solar system

Big Idea: Astronomy seeks to explain the origin and interactions of Earth and its solar system.

Core Competency: *Thinking*

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 3 – Earth, Sun and Moon as a System

The following are some of the skills developed in this unit:

- Cite and explain evidence that the Earth orbits the sun.
- Explain how seasonal variation in the stars shows Earth's motion
- Describe the cause of seasons on Earth and some effects of those seasons.
- Draw and explain why the Moon has phases

Big Idea Astronomy seeks to explain the origin and interactions of Earth and its solar system.

Core Competency: *Thinking*

First Peoples Principle of Learning: Learning involves generational roles and responsibilities and learning is embedded in memory, history and story.

Unit 4 - Plate Tectonics and Internal Processes of the Earth

The following are some of the skills developed in this unit:

- Describe 8 pieces of evidence to prove or support the Theory of Plate Tectonics
- Diagram all features associated with the various plate boundary types
- Explain how hot spots can be used to show the direction of plate motion
- Explain responses of the crust to stress based on given conditions

Big Idea: Plate tectonic theory explains the consequences of tectonic plate interactions.

Core Competency: *Thinking*

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 5 – Surface Processes (Weathering and Erosion)

The following are some of the skills developed in this unit:

- Classify features as erosional or depositional
- Differentiate between weathering and erosion
- Explain how physical weathering affects the rate of chemical weathering
- Identify mass wasting events

Big Idea: Earth materials are changed as they cycle through the geosphere and are used as resources, with economic and environmental implications.

Core Competency: *Thinking*

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

Unit 6 – Minerals, Rocks and the Rock Cycle

The following are some of the skills developed in this unit:

- Identify minerals given a variety of properties
- Relate cooling rate and crystal size in igneous rock
- Identify igneous rock given texture and mineral composition.
- Identify and classify sedimentary rock and metamorphic rock and its associated parent rocks
- Name and describe a use for rock and mineral resources

Big Idea: Earth materials are changed as they cycle through the geosphere and are used as resources, with economic and environmental implications.

Core Competency: *Thinking*

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 7 – Oceanography

The following are some of the skills developed in this unit:

- Draw and label ocean floor and continental margin diagrams
- Relate continental margins and their features to plate tectonics
- Explain formation of the various features of the seafloor including atolls
- Relate age of seafloor rocks, mid-ocean ridges and plate tectonics.

The distribution of water has a major influence on weather and climate.

Unit 8 – Atmospheric Science and Climate

The following are some of the skills developed in this unit:

- Draw and label a cross-section of the atmosphere
- Name the most abundant gases in the atmosphere
- Explain the process by which the sun heats Earth's atmosphere
- Describe three human activities, the effects those activities have on the atmosphere and possible repercussions of the effects on the atmosphere.

Big Idea: Earth materials are changed as they cycle through the geosphere and are used as resources, with economic and environmental implications.

Core Competency: *Thinking*

First Peoples Principle of Learning: Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness)

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, Glogs, Prezi etc)

ASSESSMENT:

The course will include many 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 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
Introductory Unit - Substantive Assignments	10
Learning Guides	30
Unit Projects	40
Unit Tests	20
<i>Course Total</i>	100

RESOURCES:

There are some required texts for this course, which will be available either online or can be signed out from the teacher. 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 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.