North Vancouver Online Learning

Course Plan: Chemistry 11
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Course Description:

Science education is an activity-based process that provides an exciting method of teaching and learning.

The “blended” approach to teaching chemistry includes the vital laboratory component that is paramount to truly understanding the invisible world of atoms and molecules.

In addition to the laboratory component, students, through the use of technology, can access and learn the course material whenever they have time available which is flexibility not possible in a regular class.

Access to the teacher is not limited to only a scheduled class time as you can communicate and get help through e-mail and virtual tutorial times.

By utilizing the learning centre time provided and the powerful tools available on-line, students will be able to get the support that will give them the best chance for success.

Chemistry 11 is a course designed to introduce the main ideas, principles and verifying concepts in chemistry by extending the student’s knowledge of chemistry concepts, skills, and techniques. This course will focus on chemical principles in science and analyze many of them mathematically.
Topics include the mole concept, solutions, chemical reactions and organic chemistry. Abilities in problem solving, chemical calculations and lab report writing are also developed. The course is theory based with a strong emphasis on quantitative aspects and students will focus on chemical principles in science and analyze many of them

mathematically. Lab work and problem assignments will develop the student's skills in measurement, lab report writing, analysis and chemical calculations. Abilities in problem solving, chemical calculations and lab report writing are also developed.
For the complete Ministry curriculum Chemistry 11 document go to:
https://curriculum.gov.bc.ca/sites/curriculum.gov.bc.ca/files/curriculum/science/en_science_11_chemistry.pdf

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. Students will explore and understand the following four Big Ideas throughout the Chemistry 11 course:

Atoms and molecules are building blocks of matter.

Organic chemistry and its applications have significant implications for human health, society, and the environment.

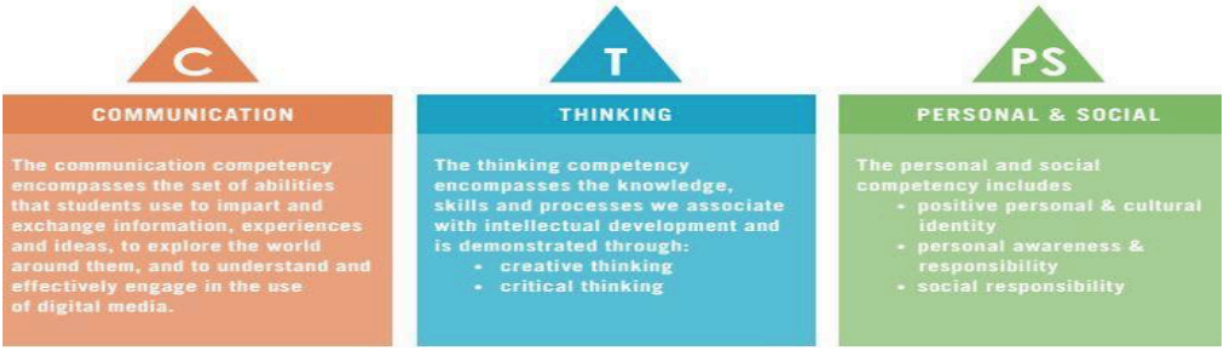
The **mole** is a quantity used to make atoms and molecules measurable.

Matter and energy are conserved in **chemical reactions**.

Solubility within a solution is determined by the nature of the solute and the solvent.

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 Thinking), and Personal & Social (Positive Personal & Cultural Identity, Personal Awareness & Responsibility, and Social Responsibility).



Course Expectations:

OPTIONAL Textbook Resource: ***(Ask the teacher for more information)*** HEBDEN: "Chemistry 11: A Workbook for Students"

Majority of course information is delivered online using a variety of methods (videos, interactive tutorials, text, external links to other websites) Accessing online materials is MANDATORY.

Attendance:

You are responsible for signing up for lab sessions that will be held at Mountainside Secondary School and will happen on a weekday* from 4:00 pm to 6:30 pm (*Note: A more detailed schedule of the lab sessions will be linked in the course). You also are encouraged to come into the OL Learning Centre, if you need a place to study and for tutorial support. A schedule is posted which details when I am in the Learning Centre so that you can hopefully come during those times so that you can get the most support.

Tutorials:

There will be a booking form available to book one to one tutorial times at the Mountainside DL Centre. Also "Virtual Tutorials / Lectures" may be scheduled to give students another opportunity to access help from the teacher. Please message me if you want to arrange any tutorial support.

Lab Work (In-Class and Virtual):

If this is your first experience with a laboratory setting, some time should be spent getting you familiarized and comfortable in a laboratory setting, so please discuss any concerns or questions you may have before your first lab session. The emphasis is on SAFETY FIRST so that we can spend as much time as possible "*doing chemistry*" with

hands-on activities in the safest way possible.
There may also be some virtual labs that will be completed throughout the course using different programs available on-line. (Click here for a preview)
(https://phet.colorado.edu/en/simulations/category/chemistry)

Communication:

I strongly believe that open and regular communication is an important component for student success in any online course. I encourage the use of the *Remind texting tool and Brightspace messaging to maintain consistent contact. I will do my best to respond in a timely manner and the only "dumb question" is one that is not asked.

Exam Supervision:

NOTE: NVDL TEST POLICY: You must show picture id whenever writing a test
All unit exams are "closed book" and require supervision. Please make sure to use the "Test Sign Up" button to book a time for an IN PERSON test at the OL Centre in Mountainside or message Naresh to discuss the process of signing up for ONLINE assessments.

Assignments

Before you write a unit exam, you must send me all assignments and labs leading up to the exam. Digital copies are preferred and should be uploaded to the drop boxes in the course.

Assignment and lab submissions MUST be very neat and well organized.
All "Learning Guide" assignments MUST be self assessed and a marking rubric attached to the front of each one before submitting.

You also need to put a checkmark beside each answer indicating that you got it right and you know what you are doing. If you can't mark it right, you should be asking for help.

I assume that you will do all the required assignments. Success on the Unit, and Final Exams depends upon exposure to a large variety of questions and lots of practice.

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

• 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 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 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

Student Substantive Activities will cover the following **Learning Outcomes (Curricular Competencies).**

- Formulate multiple hypotheses and predict multiple outcomes
- Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)
- Apply the concepts of accuracy and precision to experimental procedures and data:
    — significant figures
    — uncertainty

— scientific notation

- Use appropriate SI units and appropriate equipment, including digital technologies, to systematically and accurately collect and record data
- 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

These are 7 of the 30 learning outcomes in the course curriculum, which comprises 20% of the course Learning Outcomes/Activities. (7/30 =23%)

LEARNING STANDARDS: Course Content

Students are expected to know the following:

• quantum mechanical model and electron configuration
• valence electrons and Lewis structures
•chemical bonding based on electronegativity
• bonds/forces
•organic compounds
•applications of organic chemistry
• the mole
• dimensional analysis
•reactions
• stoichiometric calculations using significant figures
• local and other chemical processes
•green chemistry
• solubility of molecular and ionic compounds
• stoichiometric calculations in aqueous solutions

Enduring Understandings/Big Ideas:

By the end of this course students will be expected to:

- relate the concept of the mole to the quantitative understand properties of matter

- explain changes to matter that occur in chemical reacting systems, use the mole ratio from balanced equations to calculate quantities of materials produced and consumed, and describe energy changes that occur during a physical or chemical change.
- demonstrate and explain solution formation, solubility, and the interactions between solute and solvent
- demonstrate an awareness of the variety and complexity of organic chemical systems, with specific reference to various functional groups.

UNIT OVERVIEWS AND LEARNING ACTIVITIES:

The course is broken down as follows:

U1: Introduction to Chemistry

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

The Introduction to Chemistry unit will focus on scientific method, measurements, lab preparedness and math methods related to the analysis of scientific data. The skills practiced in this unit will be applied throughout the course especially related to the in class lab experiments Representing data graphically and applying the concepts of significant figures, precision, and accuracy will be practiced in the assignment section. Graphs will be explored further to show how the same data can be manipulated to support or dis credit and the reader's task is to reach scientifically sound conclusions. The lab section will allow students to make observations in a safe and systematic manner and will collect and record data according to standard scientific technique, with special attention to significant figures and uncertainty.

U2: Atomic Theory

Big Ideas:

Atoms and molecules are building blocks of matter

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

The Atomic Theory unit begins with exploring the development of the model of the atom. Students will learn details about the sub-atomic structures of atoms, ions, and isotopes, using calculation where appropriate. Studying the development of the modern periodic table will lead students to draw conclusions about the similarities and trends in the properties of elements. Students will further explore the structure of the atom and the use of the periodic table to observed behaviours and trends in properties of various elements and this will explain the significance of covalent and ionic bond types for simple compounds. Molecular geometry will be studied with area of focus being VSEPR theory.

U3: Naming Compounds

Big Ideas:

Atoms and molecules are building blocks of matter

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

The Naming Compounds unit introduces the "language" of chemistry by relating the observable properties and characteristics of elements, compounds, and mixtures to the concept of atoms and molecules. Students will practice writing the names and formulae for ionic and covalent compounds, given appropriate charts or data tables.

U4 & 5: The Mole / Empirical Molecular formulas

Big Ideas:

The mole is a quantity used to make atoms and molecules measurable

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

This unit will introduce the concept of the mole and explain its significance and use. Students will perform calculations involving the mole including determining the relationships between molar quantities of gases at SATP / RTP. The mole concept will be

explored within the category of solutions where we describe concentration in terms of molarity and students will then perform calculations involving molarity. The concept of the mole will be extended to detail the process of determining the compound formulas for unknowns (known as the empirical formula). The connection molecular and empirical formulas will be explored and calculations will be performed to determine compound formulas based on experimental data.

U6: Chemical Reactions

Big Ideas:

Matter and energy are conserved in chemical reactions

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

This unit will explore changes to matter that occur in chemical reacting systems, use the mole ratio from balanced equations to calculate quantities of materials produced and consumed, and describe energy changes that occur during a physical or chemical change. Students will demonstrate an understanding that chemicals react in predictable ways and will investigate different types of chemical reactions including heat considerations.

U7: Solution Chemistry

Big Ideas:

Solubility within a solution is determined by the nature of the solute and the solvent

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

In this unit, students will demonstrate an understanding that properties of solutions can be described qualitatively and quantitatively, and can be predicted. Students will be able to distinguish between a solution and a pure substance and predict the relative solubility of a solute in a solvent, based on its polarity. Relate ion formation to electrical conductivity in aqueous solutions and calculate the concentration of ions in solution by

revisiting the molarity concept.

U8: Organic Chemistry

Big Ideas:

Organic chemistry and its applications have significant implications for human health, society, and the environment.

Core Competency Focus:

Communication, Critical Thinking

First Peoples Principle of Learning:

Learning involves recognizing the consequences of one's actions

Learning involves patience and time

Unit Overview:

This unit we will start by describing the characteristic features and common applications of organic chemistry. Students will demonstrate knowledge of the various ways that carbon and hydrogen can combine to form a wide range of compounds. The rules for generating the names and structures for simple organic compounds will be detailed. The various types of bonding between carbon atoms will be explored and more complex organic compounds will be introduced by focusing on some basic functional groups.

Student Learning Activities and Strategies:

Students may engage in the following learning activities and strategies:

- conduct appropriate experiments (*virtual or real*)
- systematically gather and organize data from experiments
- watch video explanations and interactive tutorials
- attend virtual classroom tutorial support
- write formal lab reports based on in class experiments
- participate in forum discussions related to course content and current trends in chemistry

Keys to Success:

1. Study the Lesson and take good notes for reference when working on homework. Make sure you can do and understand the problems you are shown in the many examples given in each lesson.
2. Once you have completed the assignments for a unit (labs and worksheets) to the best of your ability, submit it to your teacher and write the end of the unit assessment shortly after.
3. Make sure you understand any quiz / homework questions you get wrong. If you can't figure it out - ASK!

4. **IMPORTANT SCHEDULING / DEADLINE INFORMATION: This online course is a *partially self paced course.* You have the ability to control the pace of the course but must clearly communicate your intentions.** You will have to choose a pace that the course will move forward at. Once you have chosen a pace, you will have to try and meet the unit completion deadlines based on the pace you have chosen. *You can adjust your pace as required so do not feel too pressured to meet every deadline BUT our online courses are meant to be completed within 12 months of registering.Reach out to your teacher for assistance with staying on pace as our goal is for you to be successful and finish in a timely fashion.*

Assessment:

The course will include many formative assessment opportunities where students will self assess and will have the opportunity for teacher input as needed. Summative assessment will be used on individual performance tasks throughout each unit.

Assessment of student performance will include some or all of the following strategies:

Formative

o Learning Guides and practice assignments with detailed keys provided
o Online quizzes / tests checking for completion and understanding of lessons

Summative:

o online quizzes , unit exams and a final lab exam (written and M/C)
o worksheets, assignments and virtual labs
o In-class lab experiments, formal lab reports and practical lab exams

Evaluation:

* This weighting may change without notice

Item	Weight
Learning Guides / Practice Quizzes / Games	**~ 10%**
Meeting Deadlines / Course Pacing	**~ ? %**
Lab Work / Lab Exam	**~ 30 %**

Unit Exams	**~ 40%**
Assignments	**~ 15%**
OPTIONAL **Final Exam (covers Units 1-8) (M/C)** ***make-up marks"***	**~ ?%**