COURSE SYLLABUS

Course Title: Chemistry
(10th Grade, Upper-Intermediate)
The Asian International School

I. INSTRUCTIONAL RESOURCES:

1. Text:

Conquering Chemistry, Preliminary Course Fourth Edition**,** Roland Smith **Publisher:** McGraw-Hill; 4Rev Ed edition (2006), Nelson Cengage Learning, Level 7,80 Dorcas street, South Melbourne ,Victoria Australia 3205ISBN:978-0170226790

2. Other recourses:

For learning solutions, visit cengage.com.au

II. COURSE PREREQUISITE:

- Minimum efficiency in Reading, Writing, Listening and Speaking skills in English. Functional use of a Dictionary.
- The content in each module must be addressed over the course.
- Experiences over the course must cover the scope of each skill.

III. COURSE DESCRIPTION

Conquering Chemistry Preliminary Course Fourth edition is the first in series of two books that addresses the revised New South Wales Stage 6 Chemistry syllabus. Written by experienced author Roland Smith, the new full color editions include a range of features that reflect the syllabus amendments, with a clear focus on chemical applications in the real world. Each book also includes a free student CD-ROM featuring the whole text in electronic format. The text is supported by a Nelson Net student website and a Nelson Net teacher website.

The Chemistry Syllabus has a Preliminary course and a HSC course. This year the students will focus on the Preliminary Course which is organized into a number of modules. The Preliminary modules consist of core content of four modules. In the current academic year Upper Intermediate students study Module 1 and some sections of Module2: The Chemical Earth and incorporates the study of following chapters

- Mixtures, elements and compounds in the Earth
- Atoms, molecules and ions
- Chemical reactions, names and formulae
- Module 2 - The Periodic Table

<u>The Chemical Earth</u>

Contextual Outline

The Earth includes a clearly identifiable biosphere, lithosphere, hydrosphere and atmosphere. All of these are mixtures of thousands of substances and the use of this pool of resources requires the separation of useful substances. The processes of separation will be determined by the physical and chemical properties of the substances.

In order to use the Earth's resources effectively and efficiently, it is necessary to understand the

properties of the elements and compounds found in mixtures that make up Earth materials. Applying appropriate models, theories and laws of chemistry to the range of Earth materials allows a useful classification of the materials and a better understanding of the properties of substances.
This module increases students' understanding of the nature, practice, applications and uses of chemistry.
Through the assigned readings, lectures, films and discussion sections, the course will emphasize the following Key Competencies:

- Chemistry provides the context within which to develop general competencies essential for the acquisition of effective, higher-order thinking skills necessary for further education, work and everyday life.
- Key competencies are embedded in the Chemistry Stage 6 Syllabus to enhance student learning and are explicit in the objectives and outcomes of the syllabus.
- The key competencies of **collecting, analyzing and organizing information** and communicating ideas and information reflect core processes of scientific inquiry and the skills identified in the syllabus assist students to continue to develop their expertise in these areas.
- Students work as individuals and as members of groups to conduct investigations and, through this, the key competencies **planning and organizing activities and working with others and in teams** are developed.
- During investigations, students use appropriate information technologies and so develop the key competency of using technology. The exploration of issues and investigation of problems contributes towards students' development of the key competency **solving problems.**
- Finally when students analyze statistical evidence, apply mathematical concepts to assist analysis of data and information and construct table and graphs, they are developing the key competency **using mathematical ideas and techniques.**

IV. COURSE OBJECTIVES

After completion of this course, students should be able to:

1. The living and non-living components of the Earth contain mixtures

- construct word and balanced formulae equations of chemical reactions as they are encountered
- identify the difference between elements, compounds and mixtures in terms of particle theory
- identify that the biosphere, lithosphere, hydrosphere and atmosphere contain examples of mixtures of elements and compounds
- identify and describe procedures that can be used to separate naturally occurring mixtures of:
    - solids of different sizes
    - solids and liquids
    - dissolved solids in liquids
    - liquids
    - gases
- assess separation techniques for their suitability in separating examples of Earth materials, identifying the differences in properties which enable these separations
- describe situations in which gravimetric analysis supplies useful data for chemists and other scientists
- apply systematic naming of inorganic compounds as they are introduced in the laboratory
- identify IUPAC names for carbon compounds as they are encountered

2. Although most elements are found in combinations on Earth, some elements are found uncombined

- explain the relationship between the reactivity of an element and the likelihood of its existing as an uncombined element
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- account for the uses of metals and non-metals in terms of their physical properties

3. Elements in Earth materials are present mostly as compounds because of interactions at the atomic level

- identify that matter is made of particles that are continuously moving and interacting
- describe qualitatively the energy levels of electrons in atoms
- describe atoms in terms of mass number and atomic number
- describe the formation of ions in terms of atoms gaining or losing electrons
- apply the Periodic Table to predict the ions formed by atoms of metals and non-metals
- apply Lewis electron dot structures to:
  - the formation of ions
  - the electron sharing in some simple molecules
- describe the formation of ionic compounds in terms of the attraction of ions of opposite charge
- describe molecules as particles which can move independently of each other
- distinguish between molecules containing one atom (the noble gases) and molecules with more than one atom
- describe the formation of covalent molecules in terms of sharing of electrons
- construct formulae for compounds formed from:
  - ions
  - atoms sharing electrons

4. Energy is required to extract elements from their naturally occurring sources

- identify the differences between physical and chemical change in terms of rearrangement of particles
- summarize the differences between the boiling and electrolysis of water as an example of the
- identify light, heat and electricity as the common forms of energy that may be released or absorbed during the decomposition or synthesis of substances and identify examples of these changes occurring in everyday life
- explain that the amount of energy needed to separate atoms in a compound is an indication of the strength of the attraction, or bond, between them

5. The properties of elements and compounds are determined by their bonding and structure

- identify differences between physical and chemical properties of elements, compounds and mixtures
- describe the physical properties used to classify compounds as ionic or covalent molecular or covalent network
- distinguish between metallic, ionic and covalent bonds
- describe metals as three-dimensional lattices of ions in a sea of electrons
- describe ionic compounds in terms of repeating three-dimensional lattices of ions
- explain why the formula for an ionic compound is an empirical formula
- identify common elements that exist as molecules or as covalent lattices
- explain the relationship between the properties of conductivity and hardness and the structure of

ionic, covalent molecular and covalent network structures

In addition, students should also have developed the following skills…

- Be able to make observations from a scientific perspective
- Be knowledgeable about scientific concepts and theories
- Be able to think scientifically and use scientific knowledge to make decisions in real world problems.
- Think analytically by evaluating evidence using relevant criteria ; develop appropriate conclusions as well as new questions
- Communicate ideas clearly, both written and verbal
- Be able to read, interpret & examine scientific claims
- Be able to pose questions & form hypotheses based on personal observations, scientific articles, experiments & knowledge

V. COURSE REQUIREMENTS

1. Assessments

Students will take the course throughout the entire academic year. To assess students progress made in this course, there will be two achievement tests, mid-term (30%) and final (30%) in each semester, accounting for the assigned percentage of the overall course grades. The remaining percentages (40%) of student grades will come from homework, class performance (e.g., participation and attendance), behavior and attitude, and in-class formative assessments (e.g., quizzes and projects). In-class assessments as presentation of knowledge and ideas will cover text materials assigned. The summary of the assessments is the following:

- Midterm Exam (30% of grade)
- Final Exam (30% of grade)
- Other (40% of grade): Homework, class activities, class performance, class discipline and participation etc.

2. Additional Activities

At least one open- ended investigation/research portfolio integrating the skills and knowledge and understanding outcomes must be included in the course.

VI. EVALUATION AND GRADING

Student progress made during the course taking will be assessed through achievement tests as well as other assessments designed, planned, and implemented by classroom teachers. The following grading scale will be operated separately in each semester.

A. Achievement Tests (60%)
   - Mid-term (30%)
   - Final Exam (30%)

B. Other Assessments (40%)
   - Homework
   - In-class assessments: Quizzes, review activities, project, etc.
   - Class Performance: Attendance and Participation
   - Power point presentation on any topic related with Chemistry

VII. GRADING SCALE

This scale is operated to translate letter grades into point values, and vice versa, when calculating student final grades.

Letter	Range	Percentages
A	90-100	90% (High Distinction)
B	80-89	80% (Distinction)
C	65-79	70% (Pass with merit)
D	50- 64	60% (Pass)
F	0- 49	Below 60% (Fail)

VIII. COURSE SCHEDULE

CHAPTER	SECTION	CONTENT	PERIODS	NOTES
Module 1: The chemical Earth Atoms, molecules and ions		*Introduction*- Atoms, molecules and ions		
	2.1	Particulate nature of matter	1	
	2.2	Atoms and molecules	1	
	2.3	Sizes of Atoms and molecules	1 5	
	2.4	Symbols for elements	. 5	
	2.5	Formulae	1	
	2.6	Molecules of Elements	.	
	2.7	An atom - a nucleus and an electron cloud	1	
	2.8	Some simple atoms	..	
	2.9	Atomic number and mass number	1 5	
	2.10	Energy levels for electrons	1	
	2.11	Electron configurations	1	
	2.12	Stable electron configurations	1	
	2.13	The Periodic Table	1	
	2.14	Achieving noble gas configurations	. 5	
	2.15	Formation of ions	. 5	
	2.16	Ionic bonding and the periodic table	1	

	2.17	Covalent bonding	1	
	2.18	Covalency and the periodic table	1	
	2.19	Electron- dot structures for ions	.5	**MIDTERM**
	2.20	Drawing electron -dot structures	1	
	2.21	Ionic equations with electron-dot structures	1	
	2.22	Properties of covalent molecular and ionic substances	2	
	2.23	Covalent network solids	1	
	2.24	Metallic bonding	1	
	2.25	Solids summarized	1	
Module 1 ***The chemical Earth*** **Chemical reactions, names and formulae** ***The chemical Earth*** **Atoms, molecules and ions**		*Test Yourself-Chapter Testing 2*	2	
	3.1	Physical and chemical changes	2	
	3.2	Decomposition reactions	2	
	3.3	Direct combination reactions	1	
	3.4	Explanation for energy changes	.	
	3.5	Everyday applications	1	
	3.6	Equations for chemical reactions	2	
	3.7	Formulae and names for compounds	1	
	3.8	Formulae for ionic compounds	.	
	3.9	Naming simple ionic compounds	1	
	3.10	Ions that are not monatomic	1	
	3.11	Formulae for covalent compounds	1	
	3.12	Naming covalent binary compounds	1	**FINAL TEST**
		Test Yourself-Chapter Testing 3	2	
		Exam Style Questions	2	
		Revision Test	2	
Module 2 **Metals** **Chemical reactions, names and**		The periodic table		
	6.1	Historical Development of the periodic table	1	
	6.2	Periodic variation in some physical properties	1	
	6.3	Ionization energy	1	
	6.4	Valency and position in the periodic table	1	

formulae	6.5	Further trends	1	
	6.6	Summary of trends	1	
		Test Yourself-Chapter Testing 3	2	
		Exam Style Questions	2	
Module 1: The chemical Earth **Mixtures, elements and compounds in the Earth**	1.1	Mixtures and pure Substances	1	
	1.2	Elements and Compounds	.	
	1.6	Separation of solids of different sizes	1	
	1.7	Separating solids and liquids	.	
	1.8	Separating dissolved solids in liquids	.	
	1.9	Distillation	1	**MIDTERM**
	1.10	Separating liquids	.	
	1.11	Separating Immiscible liquids	1	
	1.12	Separation Based on solubility	-	
	1.13	Separating gases	1	
	1.14	Summary of methods of separation	.	
	1.15	Properties used to identify pure substances	1	
	1.16	Color	.	
	1.17	Physical State at room temperature	.	
	1.18	Melting and Boiling points	.	
	1.21	Elements occurring on Earth as free elements	1	
	1.22	Why most elements on Earth occur as compounds	.	
	1.23	Metals and Non-metals		
	1.24	Physical Properties and uses of elements	1	
		Test Yourself-Chapter Testing 1	2	**FINAL TEST**