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PHYSICS & CHEMISTRY

Chemistry

Preliminary Course

2018 Course Outline

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1 Information about the course

Year of delivery	2018
Course name	Preliminary Chemistry
Level of course	Year 11
Assumed knowledge	None
Contact hours per week	1 hour 45 minutes
Number of weeks	44 weeks
Commencement date	07/08/17
Summary of course structure	Properties and Structure of Matter (18 weeks) Introduction to Quantitative Chemistry (10 weeks) Reactive Chemistry (9 weeks) Drivers of Reactions (7 weeks)

2 Class times

There are 7 classes currently running for the Preliminary Chemistry course:

Day	Time
Monday	5:00 pm - 6:45 pm
	6:45 pm - 8:30 pm
Saturday	9:00 am - 10:45 am
	10:45 am - 12:30 pm
Sunday	9:00 am - 10:45 am
	10:45 am - 12:30 pm
	6:45 pm - 8:30 pm

3 Staff in charge

The course authority for the Preliminary Chemistry course is Mr Roy Fu. The tutors for the course are:

- Miss Lisa Nguyen
- Mr Nigel Van
- Mr Andy Vong

All staff members can be contacted via email.

4 Course details

The Preliminary Chemistry course aims to give students a basic understanding of the principles of chemistry that govern the behaviour of matter. Students studying this course will gain an understanding of atoms and molecules, chemical naming, chemical structure and bonding, chemical reactions, the mole concept, solutions and the gas laws. Physical chemistry is also a major component of this course, where quantum mechanics, electrochemistry, kinetics and thermodynamics will be examined. The main topics covered in each module of the Preliminary Chemistry course are given below:

<p style="text-align: center;">Module 1 Properties and Structure of Matter</p>	<ul style="list-style-type: none"> ● Pure Substances and Mixtures: The particle theory, properties of pure substances and mixtures, separation of mixtures, gravimetric analysis ● Electronic Structure of Atoms: The Bohr model, quantised energy levels, flame tests, spectroscopy, the Schrödinger equation, electron configurations with sub-shell theory ● Chemical Structure and Bonding: Naming compounds, Lewis structures, chemical bonding in covalent molecular substances, covalent network lattices, metals and ionic compounds, allotropes ● Periodic Trends: Atomic radius, electronegativity, ionisation energy, states of matter at room temperature, reactivity ● Intermolecular Forces: Polar molecules, VSEPR theory, hydrogen bonds, dipole-dipole attractions, dispersion forces, boiling point anomalies, solubility in water ● Nuclear Chemistry: Isotopes, relative atomic mass, stable nuclei, alpha particles, beta particles, gamma rays, positron emission, electron capture, half-life
<p style="text-align: center;">Module 2 Introduction to Quantitative Chemistry</p>	<ul style="list-style-type: none"> ● Chemical Equations: Synthesis, decomposition, single replacement, double replacement ● Significant Figures and Dimensional Analysis: Rules for addition/subtraction and multiplication/division, analysis of units, unit conversions ● The Mole Concept: Relative atomic mass, Avogadro's number, molar mass, molar volume, stoichiometric calculations for reactions, empirical formula, molecular formula ● Concentration of Solutions: Measures of concentration, dilution, stoichiometric calculations for reactions, standard solutions ● The Gas Laws: Avogadro's law, Boyle's law, Charles' law, Guy-Lussac's law, the ideal gas law

Module 3 Reactive Chemistry	<ul style="list-style-type: none"> • Chemical Reactions: Physical and chemical changes, precipitation reactions, solubility rules • Electrochemistry: Reactions of metals, the activity series, metal displacement reactions, redox reactions, galvanic cells
Module 4 Drivers of Reactions	<ul style="list-style-type: none"> • Enthalpy Changes: Energy changes in reactions, energy profile diagrams, calorimetry • Chemical Kinetics: Rate of reaction, the collision theory, activation energy, factors that affect reaction rate • Hess's Law: Energy cycles, heat of formation, bond energy • Spontaneous Processes: Entropy, Gibbs free energy

5 Course schedule

5.1 Properties and Structure of Matter

Lesson	Topic
1	Pure Substances and Mixtures
2	Pure Substances and Mixtures
3	Electronic Structure of Atoms
4	Electronic Structure of Atoms
5	Electronic Structure of Atoms
6	Electronic Structure of Atoms
7	Chemical Structure and Bonding
8	Chemical Structure and Bonding
9	Chemical Structure and Bonding
10	Chemical Structure and Bonding
11	Periodic Trends
12	Periodic Trends
13	Intermolecular Forces
14	Intermolecular Forces
15	Intermolecular Forces
16	Nuclear Chemistry
17	Properties and Structure of Matter Module Exam
18	Properties and Structure of Matter Module Exam Feedback

5.2 Introduction to Quantitative Chemistry

Lesson	Topic
1	Chemical Equations
2	Significant Figures and Dimensional Analysis, The Mole Concept
3	The Mole Concept
4	The Mole Concept
5	Concentration of Solutions
6	Concentration of Solutions
7	The Gas Laws
8	The Gas Laws
9	Introduction to Quantitative Chemistry Exam
10	Introduction to Quantitative Chemistry Exam Feedback

5.3 Reactive Chemistry

Lesson	Topic
1	Chemical Reactions
2	Electrochemistry
3	Electrochemistry
4	Electrochemistry
5	Electrochemistry
6	Reactive Chemistry Module Exam
7	Reactive Chemistry Module Exam Feedback

5.4 Drivers of Reactions

Lesson	Topic
1	Enthalpy Changes
2	Enthalpy Changes
3	Chemical Kinetics
4	Hess's Law
5	Hess's Law
6	Spontaneous Processes
7	Spontaneous Processes
8	Drivers of Reactions Module Exam
9	Drivers of Reactions Module Exam Feedback

6 Homework

A homework sheet will be provided to students at the end of each lesson. The homework problems have been divided into three separate sections:

- **Foundation:** This section contains problems that are designed to test very basic concepts.
- **Development:** This section is the longest and it contains exam-style questions where students are required to apply their understanding of basic concepts. The problems in this section have marks allocated to them so that students can receive more specific feedback on the quality of their answers. Students who can comfortably solve the problems in this section can expect to do well in the assessment tasks.
- **Extension:** This section is optional as it contains problems that can be extremely difficult. These problems are mainly intended for high achieving students who are aiming to obtain a state rank and/or are studying the Chemistry Olympiad.

7 Assessment tasks

Students will be assessed with assignments, quizzes, module exams and a final exam. These components will contain problems consistent with those you are likely to face in your school assessments. The purpose of these assessments is to ensure students revise their content regularly and to help develop their critical thinking abilities. Students are expected to achieve a mark of at least 50% in all assessment tasks.

Details of each assessment task are given below:

Assessment Task	Duration	Weighting
Module 1 Exam	1 hour 30 minutes	15%
Module 2 Exam	1 hour 30 minutes	15%
Module 3 Exam	1 hour 30 minutes	15%
Module 4 Exam	1 hour 30 minutes	15%
Final Exam	2 hours	30%
Assignments and Quizzes	–	10%