Subject Description Form

Subject Code	ABCT2706
Subject Title	Inorganic Chemistry I
Credit Value	3
Level	2
Pre-requisite	General Chemistry II, Introductory Physical Chemistry or Physical Chemistry I
Objectives	This subject aims to introduce the basic concepts of modern inorganic chemistry. Emphasis is placed on the application of the principle of structure and bonding to rationalize reactivities of inorganic compounds. This subject should lay a foundation for the higher level subject of Inorganic Chemistry II
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. explain the structure and bonding of specific inorganic compounds by using Valence Bond Theory and Molecular Orbital Theory b. formulate electronic structures using the bonding theory and correlate physical properties their electronic structures c. describe and explain reactivities of inorganic compounds from a perspective of thermodynamics
Subject Synopsis/ Indicative Syllabus	**Indicative Content** Concepts of Bonding in Molecules Valence Bond Theory and Molecular Orbital Theory, chemical bonding of Homo – and Heterodiatomic molecules, molecular shapes and the VSEPR model, Valence Bond theory and Molecular Orbital Theory or polyatomic molecules, Concept of frontier orbitals Structure and Bonding of Simple Solids Description of the structures of crystalline solid; unit cells and crystal packing; structure and bonding of metals, alloys and semiconductors; Structures and bonding of ionic solids; energetics of ionic bonding; lattice energy and the Kapustinskii equation Acids and Bases Proton transfer equilibria of Brønsted acids and bases in aqueous media, thermodynamics of acid dissociation strength of Brønsted acids, reactions and properties of Lewis acids and bases; thermodynamic consideration of Lewis acid-base reactions, Hard and Soft acids and bases

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<u>Oxidation and Reduction</u>
Overview of redox reactions and oxidation states; reduction potentials and Gibbs energy, redox stability; diagrammatic presentation of potential data, applications of redox reactions to industrial processes

<u>Selected Main Group Chemistry</u>
General trends in Main Group Chemistry; Chemistry of Hydrogen, Chemistry of Group 1 and 2 metals, Chemistry of Non-metals: Group 13 - 18.
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<tr><td>Teaching/Learning Methodology</td><td>The lectures will be focused on the description and discussion of the fundamental ideas and the more important principles of inorganic chemistry. Students are expected to read their textbooks to gain better understanding of the key concepts of the subjects. A few problem sets will be provided throughout the course; students should try to solve them although it is not mandatory for them to submit the solutions. The students will be graded based upon their performance in two 2-hour tests and a 3-hour examination.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td></td><td></td><td></td></tr>
<tr><td>1.Examination</td><td>70</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>2. Continuous assessment</td><td>30</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="6"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assignments, quizzes and examinations are used to assess student’s learning in key theoretical concepts in inorganic structure and bonding theory and structure reactivity relationship of some main group elements and compounds. In-class discussion and homework assignments (e.g. end-of-chapter exercises and tutorial assignments) would encourage student to develop conceptual models for understanding structural transformations of inorganic compounds. Through these exercises, students can practice their conceptual skills for solving problems relating to inorganic structures and transformations.
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<tr><td rowspan="2">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>33 Hrs.</td></tr>
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	▪ Tutorial	6 Hrs.
	Other student study effort:	
	▪ Self-study	56 Hrs.
	▪ Homework / assignments	16 Hrs.
	Total student study effort	111 Hrs.
Reading List and References	Housecroft, C. E. and Sharpe A. G. Inorganic Chemistry, 4th ed, Pearson All students are encouraged to buy the textbook, which will be used as texts for the duration of level 2 and level 3 studies in inorganic chemistry courses.	