Table 3: Summary of information on each subject.

<table>
<tr><td>1.</td><td colspan="6">Name of Subject: General Chemistry</td></tr>
<tr><td>2.</td><td colspan="6">Subject Code: PCM0055</td></tr>
<tr><td>3.</td><td colspan="6">Status of Subject: Core</td></tr>
<tr><td>4.</td><td colspan="6">Stage: Foundation</td></tr>
<tr><td>5.</td><td colspan="6">Version: Date of Previous Version: – Dec 2010
Date of Current Version: – Oct 2011</td></tr>
<tr><td>6.</td><td colspan="6">Name (s) of academic staff:
Muharniza Azinita Binti Musa
Ho Sew Tiep</td></tr>
<tr><td>7.</td><td colspan="6">Rationale for the inclusion of the course/module in the programme:
To equip students with the ability to identify, formulate, apply knowledge and principles of science and engineering in order to solve related problems.</td></tr>
<tr><td>8.</td><td colspan="6">Semester and Year offered: Trimester 2</td></tr>
<tr><td rowspan="2">9.</td><td>Total Student Learning Time (SLT)</td><td colspan="4">Face to Face</td><td>Total Guided and Independent Learning</td></tr>
<tr><td>L = Lecture
T = Tutorial
P = Practical
O = Others (Mid Term + Final)</td><td>L

31</td><td>T

9</td><td>P

6</td><td>O

3</td><td>Guided (31+9+6+3) = 49
Independent = 87
Total = 136</td></tr>
<tr><td>10.</td><td colspan="6">Credit Value: 3 (136/40 = 3.4)</td></tr>
<tr><td>11.</td><td colspan="6">Prerequisite (if any): NIL</td></tr>
<tr><td>12.</td><td colspan="6">Learning outcomes:
i. State the fundamental principles of physical, and inorganic chemistry (Cognitive, Level 1)
ii. Illustrate chemical reactions and the use of quantitative aspects of general chemistry (Cognitive, Level 2)
iii. Interpret the laws, principles, concept and theories of Chemistry in relevant topics (Cognitive, Level 2)
iv. Explain various basic applications of bonds and periodicity (Cognitive, Level 2)</td></tr>
<tr><td>13.</td><td colspan="6">Synopsis:
This is an introductory course in the fundamental principles of physical and inorganic chemistry with special emphasis on the concepts, principles and methods of chemistry. It covers the mole concept, the major classes of chemical reactions, periodic table, chemical bonds, structure of solids & liquids, thermochemistry, reaction kinetics & equilibrium, and equilibrium of ions in solutions. Student will learn how to apply the formula and solve the different types of problems applicable to each topic.</td></tr>
<tr><td>14.</td><td colspan="6">Mode of Delivery: Lecture and tutorial</td></tr>
<tr><td>15.</td><td colspan="6">Assessment Methods and Types:
i. Quizzes 10%
ii. Assignment 10%
iii. Lab report 10%
iv. Midterm 20%
v. Final Examination 50%
Total 100%</td></tr>
<tr><td>16.</td><td colspan="5">Mapping of the course/module to the Programme Learning</td><td>% of contribution</td></tr>
</table>

	Outcomes:	
	• To acquire basic knowledge and principles of science and engineering.	50
	• To apply basic techniques, skills and engineering principles through class activities and project works.	50

17. **Content outline of the course/module and the SLT per topic:**

TOPIC	Content Outline	Lecture	Tutorial	Self study
1	**The Components of Matter and Stoichiometry** Elements, Compounds and Mixtures, An atomic View of Matter, Dalton's Atomic Theory, The Atomic Theory Today, Compounds; Formulas, Names, and Masses, Mixtures: Classification and Separation, The Mole, Determining the Formula of an Unknown Compound, Writing and Balancing Chemical Equations, Calculating Amounts of Reactant and Product	4	1	5
2	**The Major Classes of chemical Reactions** The Role of Water as a Solvent, Writing Equation for Aqueous Ionic Reactions, Precipitation Reactions, Acid-Base Reactions, Oxidation-Reduction (Redox) Reactions, Reversible Reactions	3	1	4
3	**Thermochemistry: Energy Flow and Chemical Change** Forms of Energy and Their Interconversion, Entalpy: Heats of reaction and Chemical Change, Calorimetry, Stoichiometry of Thermochemical Equation, Standard Enthalpy of Formation and Reaction	3	1	4
4	**Atomic Structure and Chemical Periodicity** Atomic Spectra, The Quantum-Mechanical Model of the Atom, Characteristics of Many-Electron Atoms, The Quantum-Mechanical Model and the Periodic Table, Trends in Three Key Atomic Properties, Atomic Structure and Chemical Periodicity	6	1	7
5	**Chemical Bonding** Atomic Properties and Chemical Bonds, The Ionic Bonding model, The Covalent Bonding Model, Between the Extremes: Electronegativity and Bond Polarity, An Introduction to Metallic Bonding, Depicting Molecules and Ions With Lewis Structure, Valence-Shell Electron-Pair Repulsion (VSEPR) Theory and Molecular Shape, Valence Bond (VB)	4	2	6

	Theory and Orbital Hybridization			
6	**Intermolecular Forces: Liquids, Solids and Phase Changes** An Overview of Physical States And Phase Changes, Quantitative Aspects of Phase Changes, Types of Intermolecular Forces, Properties of Liquid State, The Solid State: Structure, and Properties	3	1	4
7	**Kinetics and Equilibrium** Factors That Influence Reaction Rate, Expressing The Reaction rate, The Rate Law And Its Components, Integrated Rate Law: Concentration Changes Over Time, Catalysis, The Dynamic Nature Of The Equilibrium State, Expressing Equilibria With Pressure Terms: Relation Between K_c And K_p, Reaction Conditions And The Equilibrium State: Le Châtelier's Principles	4	1	5
8	**Acid-Base Equilibria** Acids and Bases in Water, The pH Scale, The Bronsted-Lowry Acid-Base Definition, Solving Problems Involving Weak-Acid Equilibria, Molecular Properties and Acid Strength , Acid-Base Properties of Salt Solutions, The Lewis Acid-Base Definition Acid dissociation constant, pKa, and the relative strength of acids and bases, Henderson-Hasselbalch equation	4	1	5

TOPIC	**Content Outline**	**SLT**	
		Practical	**Self-study**
1	**Acid-Base Titration: Preparation of Primary Standard and Standardisation of a Solution.** Preparation of a primary standard and standardisation of NaOH solution. Determination of the concentration of HCl solution.	2	2
2	**Thermochemistry: Determining the Heat of Reaction** Determination of the heat of neutralization of HCl and NaOH.	2	2
3	**Reaction Rates** Studying the effect of concentration, temperature and catalyst on the rate of reaction.	2	2

		Lecture	Tutorial/ Practical	Self-study
	Quizzes			6
	Assignment	0	0	10
	Midterm	1	0	5
	Final	2	0	20
	Total	34	15	87

18. **Teaching and Learning Activities/Total Student Learning Time (SLT):**

	Face to Face	**Self Learning**
Lecture	31	31
Tutorial	9	9
Laboratory	6	6
Quiz (3)		6
Assignment (2)		10
Midterm Test (1)	1	5
Final (1)	2	20
Sub-total	49	87
Total SLT(hours)	136	

19. **Main references supporting the course:**

Chang, R. (2009) *Chemistry 10th Ed.* New York: McGraw-Hill.

Additional references supporting the course:

Brown, T. L. (2006) *Chemistry; The Central Science (10th Ed.)* Upper Saddle River, NJ: Pearson Prentice Hall.

Bauer, R. C. (2007) *A conceptual Introduction to Chemistry.* Boston: McGraw-Hill.

Chang, R. (2006) *General Chemistry: The Essential Concepts. (4th Ed.)* Boston, Mass: McGraw–Hill.

Hill, Petrucci, McCreary, Perry (2005) *General Chemistry (4th Ed.)*, Upper Saddle River, NJ: Pearson Prentice Hall.

Moore, J. W. (2005) *Chemistry: The Molecular Science (2nd Ed.)* Belmont, CA: Thompson.

Silberberg, M. S. (2006) *Chemistry: The Molecular Nature of Matter and Change (4th Ed.)* Boston: McGraw-Hill.