

CHEM1300: PRINCIPLES OF GENERAL CHEMISTRY

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Principles of General Chemistry

Subject Code

CHEM - Chemistry

Course Number

1300

Academic Unit

Chemistry (CHEM)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

BCH1100 Chemistry

Exclusive Courses

CHEM1101 Introduction to Chemistry

GE1357 Introduction to Chemistry

Part II Course Details

Abstract

This course aims to provide an introduction to the fundamental concepts in chemistry to undergraduate students major in chemistry and related disciplines, and prepare them to study more advanced chemistry courses.

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

- demonstrate an understanding of the basic concepts and principles of Chemistry,
- observe simple chemical reactions and understand their nature,
- gain knowledge and skills regarding chemistry experiments and awareness of common hazards.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the concept of atoms, molecules, and ions, neutrons, protons and electrons, the periodic table, chemical formula. Rationalize the electronic structures of atoms, ions, and molecules and chemical compounds through the formation of ionic and covalent bonds and explain their physical and chemical properties.	20	x	x	
2	Use organic nomenclature. Understand different types of chemical bond in organic chemistry. Describe and apply the concepts of molecular polarity and intermolecular forces in correlation with boiling and melting points of compound.	20	x	x	
3	Apply the principles of stoichiometry and moles and relate these to mass balance, empirical and molecular formula, and chemical equation. Realize the states of matter.	20	x	x	
4	Apply the principles of chemical kinetics to evaluate the reaction rate and evaluate equilibrium constants in chemical equilibria and predict the equilibria position with Le Châtelier' s principle.	20	x	x	
5	Realize the classification of acids and bases. Understand the oxidation and reduction reactions.	20	x	x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures, interactive questioning and tutorials, and videos	Enable students to recognize the basic knowledge and concepts and the relationship between them, and give them practice in explaining these to peers.	1	
2	Lectures, interactive questioning and tutorials, and laboratory sessions videos	Enable students to acquire the basic knowledge and concepts in inorganic and organic chemistry and give them practice in explaining these to peers. Allow students to carry our laboratory experiments.	2	
3	Lectures, interactive questioning and tutorials, and videos	Enable students to recognize the basic knowledge and concepts and the relationship between them, and give them practice in explaining these to peers.	3	
4	Lectures, interactive questioning and tutorials, and laboratory sessions videos	Enable students to appreciate the basic knowledge and concepts embedded in real-world issues with significant chemical context, and give them practice in explaining these to peers. Allow students to carry our laboratory experiments.	4	
5	Lectures, interactive questioning and tutorials, and laboratory sessions videos	Enable students to realize the basic knowledge and concepts and the relationship between them, and give them practice in explaining these to peers. Allow students to carry our laboratory experiments.	5	

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tutorials and assignments, online learning, peer reviewed quizzes, discussion	1, 2, 3, 4, 5	15	
2	Laboratory work and reports	1, 2, 3, 4, 5	15	

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

Starting from Semester A, 2015-16, students must satisfy the following minimum passing requirement for courses offered by CHEM:

“A minimum of 40% in both coursework and examination components.”

Assessment Rubrics (AR)**Assessment Task**

Tutorials and assignments, online learning, peer reviewed quizzes, discussion

Criterion

Capacity for self-directed learning to understand the basic principles of chemistry

Ability to apply basic knowledge and important concepts of chemistry for rationalization and to solve chemical problems

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Below marginal level

Assessment Task

Laboratory work and reports

Criterion

Ability to apply basic knowledge and important concepts of chemistry to explain in detail chemical phenomena

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Below marginal level

Assessment Task

Examination

Criterion

Ability to apply basic knowledge and important concepts of chemistry for rationalization and to solve chemical problems

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Below marginal level

Part III Other Information

Keyword Syllabus

Basic Concepts in Chemistry

Atoms, Ions, and Molecules

Periodic Table

Electronic Structure of Atoms

Chemical Bonding: Ionic and Covalent

Stoichiometry: Calculations with Chemical Formulas and Equations

States of Matters: Gases, Liquids, and Solids

Chemical Kinetics and Equilibrium

Thermochemistry

Acids and Bases

Oxidation and Reduction

Inorganic and Organic Chemistry

Electrochemistry

Reading List

Compulsory Readings

Title	
1	Nil

Additional Readings

Title	
1	“Chemistry: The Central Science” , 13th Edition, T. L. Brown, H. E. LeMay, Jr., B. E. Bursten, C. J. Murphy, P. M. Woodward, M. W. Stoltzfus, Pearson Education LimitedHall (ISBN 9781292057712)
2	“Introduction to Chemistry – A Conceptual Approach” , 2nd Edition, R. C. Bauer, J. P. Birk, P. S. Marks, McGraw-Hill (ISBN 9780070172623)
3	“Chemistry in Context: Applying Chemistry to Society” , 6th Edition, L. P. Eubanks, C. H. Middlecamp, C. E. Heltzel, S. W. Keller, McGraw-Hill (ISBN 9780071270137)
4	“Chemistry” , 9th Edition, S. S. Zumdahl, S. A. Zumdahl, Brooks/Cole Cengage Learning (ISBN 9781133611097)