CHEM1300: PRINCIPLES OF GENERAL CHEMISTRY

Effective Term
Semester A 2025/26

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:
a. demonstrate an understanding of the basic concepts and principles of Chemistry,
b. observe simple chemical reactions and understand their nature,
c. 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.	25	x	x	x
2	Use inorganic and organic nomenclatures. Classify and explain different types of chemical bond in basic inorganic and organic compounds. Describe and apply the concepts of molecular polarity and intermolecular forces with regards to boiling points and solubility of chemical compounds. Compare and contrast the states of matter.	25	x	x	x
3	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 Châterlier’ s principle.	25	x	x	x
4	Apply the principles of stoichiometry and moles and relate these to mass balance, empirical and molecular formula, and chemical equation. Classify acids and bases. Describe the oxidation and reduction reactions.	25	x	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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will engage in formal lectures about the basic knowledge and concepts in inorganic and organic chemistry, and the relationship between them.	1, 2, 3	
2	Tutorials	Students will engage in tutorials with interactive questioning and group discussion to acquire and practice in explaining the basic knowledge and concepts in inorganic and organic chemistry to peers.	1, 2, 3	
3	Laboratory sessions	Students will undertake laboratory sessions (in small groups) to acquire basic practical skills to carry out simple chemistry experiments (guided by instructors, teaching assistants, and lab staff, with online video demonstrations) and analyse, discuss, rationalize, and explain the experimental observations among peers, in order to deepen their basic knowledge and concepts.	1, 2, 3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Tutorials and online assignments	1, 2, 3, 4	5	-	Yes
2	Laboratory work / demonstration	1, 2, 3, 4	10	-	Yes
3	Small-group discussions and online quizzes	1, 2, 3, 4	15	-	Yes

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

40

Minimum Examination Passing Requirement (%)

40

Assessment Rubrics (AR)

Assessment Task

Tutorials and online assignments

Criterion

Capacity for self-directed learning (including preview and review of course materials) to describe the basic principles of chemistry

Excellent (A+, A, A-)

High
with active participation in all tutorials and able to correctly answer all online assignments

Good (B+, B, B-)

Significant
with active participation in most tutorials and able to correctly answer most of the online assignments

Fair (C+, C, C-)

Moderate
with active participation in some tutorials and able to correctly answer some of the online assignments

Marginal (D)

Basic
with active participation in a few tutorials and able to correctly answer a few online assignments

Failure (F)

Below marginal level
without active participation in most tutorials and unable to answer most online assignments

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Assessment Task

Laboratory work / demonstration

Criterion

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

Excellent (A+, A, A-)

High
with active participation in all lab sessions and able to describe and explain all principles and practices of various selected chemical phenomena

Good (B+, B, B-)

Significant
with active participation in all lab sessions and able to describe and explain most principles and practices of various selected chemical phenomena

Fair (C+, C, C-)

Moderate
with active participation in most lab sessions and able to describe and explain some key principles and practices of selected chemical phenomena

Marginal (D)

Basic
with active participation in a few lab sessions and able to describe and explain a few key principles and practices of selected chemical phenomena

Failure (F)

Below marginal level
without active participation in most lab sessions and unable to describe and explain most key principles and practices of selected chemical phenomena

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Assessment Task

Group discussions and online quizzes

Criterion

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

Excellent (A+, A, A-)

High
with active participation in all group discussions and able to describe, rationalize, compare, contrast, and explain all discussed chemistry topics

Good (B+, B, B-)

Significant
with active participation in all group discussions and able to describe, rationalize, compare, contrast, and explain most discussed chemistry topics

Fair (C+, C, C-)

Moderate
with active participation in most group discussions and able to describe, rationalize, compare, contrast, and explain some discussed chemistry topics

Marginal (D)

Basic
with active participation in a few group discussions and able to describe, rationalize, compare, contrast, and explain a few discussed chemistry topics

Failure (F)

Below marginal level
without active participation in most group discussions and unable to describe, rationalize, compare, contrast, and explain most discussed chemistry topics

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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
able to correctly answer almost all the examination questions

Good (B+, B, B-)

Significant
able to correctly answer a substantial number of the examination questions

Fair (C+, C, C-)

Moderate
able to correctly answer some of the examination questions

Marginal (D)

Basic
able to correctly answer a few of the examination questions

Failure (F)

Below marginal level
unable to correctly answer most of the examination questions

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 in SI Units, Global Edition”, 15th Edition, T. L. Brown, H. E. LeMay, Jr., B. E. Bursten, C. J. Murphy, P. M. Woodward, M. W. Stoltzfus, Pearson Education LimitedHall (ISBN 9781292407616)
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)