GE1357: INTRODUCTION TO CHEMISTRY

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Introduction to Chemistry

Subject Code
GE - Gateway Education
Course Number
1357

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

GE Area (Primary)
Area 3 - Science and Technology

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
CHEM1101 Introduction to Chemistry

Exclusive Courses
CHEM1300 Principles of General Chemistry

Part II Course Details

Abstract

This course aims to provide basic chemistry concepts to university students without or with minimal background in chemistry and convey its importance in daily life through discussions on current issues with significant emphasis on chemical context.

Upon completion of this course, students should be able to:
a. demonstrate an understanding of the basic concepts and principles of Chemistry,
b. appreciate Chemistry and realize its importance and applications in daily life.

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 and naming, acids and bases, states of matter, chemical reactions.	25	x	x	
2	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.	15	x	x	
3	Discuss the basic principles of chemistry embedded within current real-world issues, such as quality of air and water, global warming, acid rain, energy resources, plastics, foods and drugs.	30	x	x	x
4	Discover real-life examples and applications related to the basic principles of chemistry.	30	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.

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 videos	Enable students to acquire the basic knowledge and concepts in inorganic and organic chemistry and give them practice in explaining these to peers.	2	
3	Lectures, interactive questioning and tutorials, and laboratory demonstrations	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.	3	
4	Laboratory sessions Lectures, group discussions and literature surveys	Students are divided into groups in laboratory sessions to discover real-life examples and applications in different activities which are related to basic concepts of chemistry. Lectures, group discussions and literature surveys will provide support to 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.	4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tutorials and online assignments	1, 2, 3, 4	20	Including 4-5 online assignments

2	Laboratory work and reports	1, 2, 3, 4	15	Including an introduction on chemical safety and 3-4 experiments with in-class reports
3	Group discussions and online quizzes	1, 2, 3, 4	15	Including discussions on 3-4 selected topics with online quizzes

Continuous Assessment (%)

50

Examination (%)

50

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 online assignments

Criterion

Capacity for self-directed learning to understand 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 and reports

Criterion

Ability to practise basic 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 demonstrate excellent understanding of the 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 the 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 demonstrate excellent understanding of various discussed chemistry topics

Good (B+, B, B-)

Significant
with active participation in all group discussions and able to describe and explain various discussed chemistry topics

Fair (C+, C, C-)

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

Marginal (D)

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

Failure (F)

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

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
demonstrate excellent understanding of basic chemistry principles and able to correctly answer most of the examination questions

Good (B+, B, B-)

Significant
able to correctly answer 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

Fundamental Concepts:
Atoms, Ions, and Molecules
Periodic Table
Electronic Structure of Atoms
Chemical Bonding: Ionic and Covalent
States of Matters: Gases, Liquids, and Solids

Examples of Daily-Life Chemistry
The Air we breathe
Protecting the ozone layer and chemistry of global climate change
Water for life
Neutralizing the treat of acid rain
World of polymer and plastic
Molecules of life and design of drugs
Nutrition – food for thought
Energy from combustion and from electron transfer

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	“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)
2	“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)
3	“Introduction to Chemistry – A Conceptual Approach”, 2nd Edition, R. C. Bauer, J. P. Birk, P. S. Marks, McGraw-Hill (ISBN 9780070172623)
4	“Chemistry”, 9th Edition, S. S. Zumdahl, S. A. Zumdahl, Brooks/Cole Cengage Learning (ISBN 9781133611097)

Annex (for GE courses only)

A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

Please indicate which CILO(s) is/are related to this PILO, if any (can be more than one CILOs in each PILO)

PILO 1: Demonstrate the capacity for self-directed learning

3, 4

PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology

1, 2

PILO 3: Demonstrate critical thinking skills

3, 4

PILO 9: Value ethical and socially responsible actions

3, 4

PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation

3, 4

B. Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.

Selected Assessment Task

The reports of laboratory demonstration will be collected and retained.