# CHEM1101: INTRODUCTION TO CHEMISTRY

**Effective Term**
Semester A 2023/24

## Part I Course Overview

**Course Title**
Introduction to Chemistry

**Subject Code**
CHEM - Chemistry
**Course Number**
1101

**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**
GE1357 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<br><br>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.<br>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 | |
| 2 | Laboratory work and reports | 1, 2, 3, 4 | 15 | |
| 3 | Group discussions and online quizzes | 1, 2, 3, 4 | 15 | |

**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

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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
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

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# 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 Limited (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) |