



Course Descriptor CHEM101 Chemistry I

Proposed Academic Year	2021/2022	Last Reviewed Academic Year	2020/2021
Course Code	CHEM101	Course Title	Chemistry I
Credit hours	3	Level of study	Undergraduate
College / Centre	College of Health and Applied Sciences	Department	Basic science
Co-requisites	CHEM181	Pre-requisites	-

1. COURSE OUTLINE

Chemistry is regarded as the central science as it is the study about the composition, properties, structure and reactivity of various forms of matter. CHEM 101 is an introductory chemistry course focusing on basic principles and concepts in chemistry. It provides the basis for further studies in physical and biological sciences, environmental sciences, various engineering disciplines, applied/industrial sciences such as food sciences and nutrition, geology and metallurgy, pharmaceuticals, interdisciplinary areas like nano-science and technology, etc. It includes topics such as chemical foundations, units and measurements, naming and formulae of inorganic compounds and ions, stoichiometry and mole concept, gases, chemical energetics, atomic structure and periodic table, chemical bonding, etc. It is designed for students who will continue their undergraduate degree programs in Engineering and Applied Sciences.

2. AIMS

[The primary objective in this course is to:

1. To build a firm foundation in chemical science and the basic principles that allow one to make qualitative and quantitative inquiries into various topics in natural/physical sciences.
2. To demonstrate how observation and experimentation lead to the development of scientific theories.
3. To develop critical thinking, problem solving and communication skills.

3. LEARNING OUTCOMES, TEACHING, LEARNING and ASSESSMENT METHODS

Learning Outcomes (Definitive)	Teaching and Learning methods (Indicative)	Assessment (Indicative)
Upon successful completion of this course, students will be able to:		
1. Understand various measurement systems, common metric prefixes, scientific notations, dimensional analysis with proper attention to units and significant figures and describe accuracy and precision, physical and chemical properties	<i>Class lectures, work sheets, lab work</i>	<i>Written Examinations- Quiz/Mid-term/Final</i>



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2. Describe the characteristics of sub atomic particles like electrons, protons and neutrons, isotopes, and to identify different types of elements in the periodic table. Demonstrate the understanding of concepts central to chemistry including the periodic table, chemical bonding, the mole, energy, gases, water, and acid-base concepts.	Group work, Lecture, power point presentations, assignments	Written Examinations-Quiz/Mid-term/Final
3. Apply understanding of the mole concept and stoichiometry to solving problems involving molar mass, molarity, and mass to mole conversions etc and in balancing chemical equations	Class lectures, power point presentations, discussions, problem-based learning	Written Examinations-Quiz/Mid-term/Final
4. Understand characteristics of gases, gas laws and basic chemical energetics and apply them in solving problems.	Group work, Lecture, power point presentations, assignments	Written Examinations-Quiz/Mid-term/Final
5. Explain atomic structure: quantized energy levels, quantum numbers, orbitals, electronic configuration of elements and their periodic properties.	Group work, Lecture, power point presentations, assignments	Written Examinations-Quiz/Mid-term/Final

4. ASSESSMENT WEIGHTING

Assessment	Percentage of final mark (%)
Assignment(s)	10
Online work	10
Quizzes	20
Mid-term Exam	20
Final Exam	40
TOTAL	100%

5. ACHIEVING A PASS

Students will achieve **03** credit hours for this course by passing **ALL** of the course assessments [*alternatively, list the compulsory pass assessments**] and achieving a **minimum overall score of 50%**

NB *Ensure that ALL learning outcomes are taken into account

6. COURSE CONTENT (Indicative)

LECTURE TOPIC	TIME (HOURS)
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Types of matter, Measurement; quantities and units. Uncertainties in measurements, significant figures.	3
Conversion of units, Properties of substances. Components of the atom, Introduction of the periodic table, Molecules and ions, Formula of the ions & ionic compounds.	3+3
Naming of compounds, Stoichiometry – Atomic, formula and molecular masses and the mole concept.	3
Problems involving mole concept, Mass relations in chemical formula, Molar mass relations in reactions.	3
Simplest (empirical) formula and determination of molecular formula, Limiting reactant and Theoretical yield. Types of chemical reactions.	3+3
Solution stoichiometry- Aqueous solutions, Strong and weak electrolytes. Acid base reactions, Balancing Chemical reactions and problems based on balancing reaction.	3+3
Precipitation reactions, Oxidation - reduction reactions. The ideal gas laws, and ideal gas equation and calculation.	3+3
Stoichiometry of gaseous reactions, Gas mixtures: partial pressures and mole fractions, Kinetic theory of gases, Real gases.	3
The nature of energy, law of conservation of energy (first law of thermodynamics), and the concept of Enthalpy	3
Enthalpy changes, Calorimetry, Hess's law, Standard enthalpy of formation and thermo chemical calculations.	3
Introduction to atomic structure- electromagnetic waves, Rutherford's model and Bohr model of atom Quantum mechanical model.	3
Quantum numbers, energy levels and orbital, Electron configuration in atoms Orbital diagrams and orbital shapes. Electron arrangements in mono-atomic ions.	3
Final Exam	
TOTAL HOURS	43
Plus, RECOMMENDED INDEPENDENT STUDY HOURS	
TOTAL COURSE HOURS	63

7. RECOMMENDED REFERENCES

Chemistry by S.S. Zumdahl and S.A. Zumdahl (9th edition), 2014 Houghton Mifflin Company, MA, USA

Library + online resources:

Moodle,

[https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_\(Zumdahl_and_Decoste\)](https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_(Zumdahl_and_Decoste))

Open Educational Resources:

<https://www.khanacademy.org>



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