



**SCHOOL OF SCIENCE AND TECHNOLOGY**

**FIRST SEMESTER 2022/2023 ACADEMIC SESSION**

**CHM 101: GENERAL CHEMISTRY I (PHYSICAL) FOR COMPUTER SCIENCE II**

**Department:** Basic Science Unit

**Course Teacher:** Dr. Edith Ofor

**Course Unit:** 3 Units

**Time:** Tuesdays, 2.00pm-3.00pm

Thursdays, 2.30pm-4.30pm

Matter is anything that has weight and occupies space. Suffice to say that the small parts that come together to make up Matter are called Atoms. Given that atoms retain the properties of their parent matter, an understanding of how the atoms of a particular material (matter) behave will help to put these materials (matter) into excellent scientific and engineering use. To understand the fundamental physical principles that govern the way these atoms, molecules, and other chemical systems behave, physical chemistry is employed. Physical Chemistry uses underlying principles of physics to explain/interpret chemical phenomena. Physical chemistry lies at the interface of chemistry and physics, and it is central to understanding the other branches of chemistry. There is arguably no branch of chemistry (including biochemistry) that can be fully understood without interpretations provided by physical chemistry principles. This course introduces physical chemistry and provides students with the fundamental principles that will help them better understand and appreciate chemistry. Students will be able to confidently use the concepts learned, apply them to real-life situations and interpret accurately.

**Course Objective**

To develop student's imagination and ability to understand the basic principles of research and discovery/inventions, chemical equations, reactions & stoichiometry, thermodynamics, chemical bonding, kinetic theory of matter, and electrochemistry (redox reaction) and to know how to apply them to real life productions and challenges (service delivery & wealth creation). The course gives basic knowledge necessary for Computer Science and Mechanical/Electrical Engineering.

## Course Learning Outcomes

On completion of this course, students should be able to

- ❖ explain how modern electronic theory is employed in determining the electronic configurations and properties of elements.
- ❖ use stoichiometric mole concepts to solve calculations involving titrimetric analysis and amounts of reactants required or products produced during chemical reactions.
- ❖ describe atoms, molecules, ions, radicals and the various types of chemical equations and demonstrating them in the lab.
- ❖ discuss chemical bonding, valence forces and intermolecular forces.
- ❖ explain the kinetic theory of matter and structure of solids.
- ❖ solve problems relating to elementary thermochemistry and radioactivity.
- ❖ discuss types of acids, bases, salts and solve calculations involving acidic pH and pKa of buffers.

## Methods of Lecture Delivery/Teaching Aids

- ❖ Lectures and Tutorials
- ❖ Virtual Learning Environment
- ❖ Group Assignment & Presentation
- ❖ Tests & Hands-on assignments

## Learning Assessment

|   |            |
|---|------------|
| <i>Participation/Class engagement</i>   | <i>5%</i>  |
| <i>Class tests/Projects/Assignments</i> | <i>30%</i> |
| <i>End-of-semester examination</i>      | <i>65%</i> |

## Weekly Content

| <b>Week</b> | <b>Session content</b>  |
|-------------|---|
| 1           | • Modern Electronic Theory of Atoms   |
| 2           | • Electronic Configuration, Periodicity and building up of the Periodic Table |
| 3           | • Atoms, Molecules and Chemical Reactions                                     |
| 4           | • Chemical Equations and Stoichiometry/ <b>Class Test</b>                     |
| 5           | • Chemical Bonding and Intermolecular forces                                  |
| 6           | • Valence Forces and Structure of Solids                                      |
| 7           | • <b>Continuous Assessment I</b>  |
| 8           | • Kinetic Theory of Matter  |
| 9           | • Acids, Bases, and Salts   |
| 10          | • Elementary Thermochemistry and Chemical Kinetics                            |
| 11          | • Elementary Thermochemistry and Chemical Kinetics                            |
| 12          | • Radioactivity/ <b>Class Test</b>  |
| 13          | • Redox Reactions and Introduction to Electrochemistry                        |
| 14          | • <b>Continuous Assessment II</b>   |
| 15          | • Revision  |

## **Contact Details**

Teacher: *Dr. Edith Ofor*

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## **Required Textbooks**

Advanced Chemistry (Physical and Industrial) by Philip Matthews

Chemical Principles: The Quest for Insight by Peter Atkins and Loretta Jones.

## **Recommended Reading**

1. Atkins' Physical Chemistry Volumes 1&2.
2. General Chemistry (Dover Books on Chemistry) by Linus Pauling
3. Physical Chemistry – A Molecular Approach by D. A. McQuarrie and J.D. Simon
4. Physical Chemistry by Ira N. Levine
5. Chemistry: The Central Science in SI Units by Bruce, Patrick Woodward (author)
6. Chemistry by Blackman, Bottle, Schmid, Mocerino and Wille (latest edition).
7. Physical Chemistry, Understanding our chemical World, by Paul Monk.
8. Schaum's Outline of Physical Chemistry (2nd Edition): Clyde Metz.