National Taiwan University of Science and Technology

2020 Summer Program

CHEM 101 Introduction to Chemistry with Lab

Course Outline

Term: June 22-July 17, 2020

Class Hours: 8:00-10:30 (Monday through Friday)

Course Code: CHEM 101

Instructor: Prof. Wael Rabeh

Home Institution: New York University Abu Dhabi

Office Hours: Monday and Wed: hours TBD & by appointment

Email: wael.rabeh@nyu.edu

Credit: 4

Class Hours: This course will have 72 class hours, including 40 lecture hours, 10 lecturer office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

Course Description:

This is a general chemistry course that will cover: basic measurement, stoichiometry, atomic theory, bonding theory, molecular structure, electron configuration, periodicity, thermochemistry, and the study of matter and changes it undergoes. Here, you will learn chemical symbols, write formulas and equations of chemical reaction, and chemical properties and practical applications of problems encountered in our life.

Course Objectives

Chemistry is central to all sciences as it connects them to life and applied sciences. Some of the

main goals and objectives of this general chemistry course are for each student to:

- be able to classify states of matter and the physical and chemical properties of matter.

- the ability to convert different units of measurements between systems using different conversion techniques.

- understand the Dalton's Atomic Theory and Modern Atomic Theory.

- determine the atomic weights of atoms and molecules to describe their subatomic structures in relation to the Periodic Table.

- learn the trends of physical and chemical properties of elements using the periodic table.

- calculate the % composition and molecular formulas of chemical processes.

- the ability to write balanced chemical reaction equations.

- determine numbers of Moles, grams and particles in a chemical equation to find the limiting reagents.

- explain atomic structure using the quantum mechanical model of the atom.

- draw the structure of ions and molecules using the Lewis Dot Structure.

- acid base chemistry to apply them to chemical and biological systems.

- thermodynamics to convert different forms of energy states.

- identify different types of bonds and how they are formed.

- learn resonance structures, Valence Shell Electron Pair Repulsion Theory (VSEPR) and the 3D shapes of molecules.

- molecular polarity and its effect on behavior and shape of molecules.

- apply the chemical concepts learned in this course to different aspects of our life.

Course Materials:

The following online textbook will be used as the main source for the course. It can be downloaded at OpenStax Chemistry (open source e-book):
https://openstax.org/details/books/chemistry

Additional course materials will include extra readings, lecture PowerPoint slides and in-class practice problems.

Grading & Evaluation:

Lab (20%) – Quizzes (20%) – Midterm exam (30%) – Final exam (30%)

90-100% (A), 80-89% (B), 70-79% (C), 60-69% (D), ≤ 60% (F)

Course Schedule:

	Date	Topics	Assignments
Week 1	Jun 22, 2020	Fundamental Chemical Information, Atoms, Molecules, and Ions.	
	Jun 23, 2020	Atomic Structure: Electronic Configurations and Periodic Table.	
	Jun 24, 2020	Molecular Structure and Bonding.	
	Jun 25, 2020	Chemical Nomenclature.	Quiz 1
	Jun 26, 2020	Lab 1: Atomic Structure and the Periodic Table	
Week 2	Jun 29, 2020	Lewis Structure, Molecular Geometry and Bonding Theory.	
	Jun 30, 2020	Chemical Reactions and Equations.	Quiz 2
	July 1, 2020	Chemical Bonds: Ionic, Covalent and Noncovalent Bonds.	
	July 2, 2020	Chemical Equilibrium.	Quiz 3
	July 3, 2020	Lab 2: Molecular geometry and Valence-Shell Electron-Pair Repulsion (VSEPR) model	
Week 3	July 6, 2020	Midterm Exam	
	July 7, 2020	Stoichiometry & Molarity in Chemical Reactions.	
	July 8, 2020	Stoichiometry Practice Problems.	
	July 9, 2020	Thermochemistry: Enthalpy and Chemical Reactions.	Quiz 4
	July 10, 2020	Lab 3: Solutions and molarity calculation.	
Week 4	July 13, 2020	Properties of Liquids and Solutions.	
	July 14, 2020	Solutions: Dilutions, Concentrations and molarity.	Quiz 5
	July 15, 2020	Acid/base chemistry and pH.	
	July 16, 2020	Lab 4: Buffers and pK_a values.	
	July 17, 2020	Final Exam	