



SYLLABUS

A. Course Description

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Language
CHM	101	General Chemistry (1)	4	2	2	2	5	None	1 ¹	English

This introductory and general chemistry course covers fundamental observations, laws, and theories of chemistry at the basic level. Topics include atoms/molecules, stoichiometry, acids/bases, solutions, equilibrium, gases, solids, liquids, thermodynamics, the periodic table, and chemical bonding. The chemistry lab is taken in parallel with the course and covers the following basic experiments: density, mass-mass relationship, limiting reactant, acid-base titrations, solubility product, reactions in aqueous solution, Calorimetry and redox reactions.

At the end of this course the student will be able to:

- To recognize the atomic theory and structure of the atom.
- To describe different phenomena related to chemical reactions and its stoichiometry.
- To identify the concept of oxidation-reduction.
- To memorize gases laws and their physical properties.
- To name inorganic compounds and ions.

B. References: Required Textbook & Internal Website

I shall use

Chemistry, Raymond Chang, Williams College Mc Graw Hill, (9th Ed.) , Higher Education, 2010, 2008033016.

Students are required to purchase the textbook/materials (it is an obligation). The book contains the lecture notes as well as activities for the students to take part in; the book serves as a workbook. **Other essential references are:**

- **Chemistry**, Steven S. Zumdahl and Susan A. Zumdahl, (7th Ed.), 2006, Houghton Mifflin.
- **Laboratory Manual for Principles of General Chemistry**, J. A. Beran, (7th Ed.), 2004, John Wiley & Sons Inc.
- **Chemistry: Principles and Reactions**, William L. Masterton, Cecile N. Hurley, Hardcover: 756 pages, Publisher: Brooks Cole, (5th Ed.), 2003.
- Electronic Materials, Web Sites *etc*
 1. http://highered.mcgrawhill.com/classware/ala.do?isbn=0073048518&alaid=ala_1136810&protected=true&showSelfStudyTree=true
 2. <http://www.chem1.com/acad/webtext/virtualtextbook.html>
 3. <http://www.shodor.org/UNChem/index.html>

Google Classroom Webpage: <http://www.imamm.org/>

¹Level 1 For the B.Sc. in Chemistry, B.Sc. in Applied Mathematics, B.Sc. in Physics, and B.Sc. in Biology



C. Topics Outline

Disclaimer: this is a very fast-paced course. There will be little time—if any—for review. What follows is an approximate outline of the pace of the course. We may go faster or slower, contingent on the class response. The tentative list of topics to cover:

a; Theory:

- 1. The Study of Change:** Science for the twenty-first century, the study of chemistry, the scientific method and hypothesis, a law and theory, matter and substance, mixture, physical means, elements and compounds, classification of matter, The three state of matter, Types of changes, Physical and chemical properties of matter, Extensive and Intensive properties, Measurement, handling numbers, Accuracy and precision.
- 2. Atoms, Molecules and Ions:** The atomic theory, Dalton's atomic theory, Cathode ray tube, Millikan's experiment, Types of radioactivity, Thomson's model, Rutherford's experiment, The structure of the atom, Atomic number, Masse number, Isotopes, The periodic table, Molecules and ions, Formulas and models, Chemical formulas, molecular formula, empirical formula, Formula of Ionic compounds, Chemical nomenclature, Naming compounds, Organic chemistry.
- 3. Masse Relationships in chemical reactions (Stoichiometry):** The mole, Avogadro's number, Molar mass, Molecular mass, Formula mass, the mass spectrometer, Percent composition and empirical formula, Experimental determination of empirical formulas, Chemical reaction, Chemical equations, Balancing chemical equations, Amounts of reaction and reactants and products, Reaction Yield, Limiting reagents.
- 4. Reaction in aqueous solutions:** General proprieties of aqueous solutions, Solution, solute, solvent, An electrolyte and nonelectrolyte, Precipitation reactions, Solubility, Properties of acids, Properties of bases, Arrhenius acid and base, Bronsted acid and base, Neutralization reaction. Oxidation-reduction reactions, Oxidation number, Types of oxidation-reduction reactions, Solution Stoichiometry, Concentration, dilution, indicators, Equivalence point, Gravimetric analysis, Acid base titrations, Redox titrations.
- 5. Gases:** Physical characteristics of gases, Units of pressure, Boyle's law, Charles' & Gay-Lussac's Law, Avogadro's law, and the gas laws. The ideal gas equation, Gas stoichiometry, Dalton's law of partial pressures, The kinetic molecular theory of gases, Molecular Speed Distribution, Gas diffusion, Gas effusion, Deviations from ideal behavior.
- 6. Quantum Theory and the Electronic Structure of Atoms:** Properties of waves, Line emission spectrum, Bohr's model of the atom, The dual nature of the electron, Schrodinger Wave Equation, Quantum numbers, Atomic Orbitals, Aufbau principle, Hund's rule, Electron Configuration.
- 7. The Periodic Table:** Development of the periodic table, ground state electron configurations of the elements, classification of the elements, electron configurations of cations and anions, isoelectronic, effective nuclear charge, atomic radii, ionization energy, electron affinity, diagonal relationships on the periodic table, properties of oxides across a period.

b, Practical:

Safety and Laboratory equipments and measurements and How to make a report, Density of liquids
Density of regular and irregular solids, Stoichiometry: Mass-mass relationship, The chemical composition by mass percentage, Preparation of primary standard and dilution rule & titration
Determination of the empirical formula, Strong acid-strong base titration, Vinegar Analysis, Mass %
Reactions in Aqueous Solutions, Precipitation reaction & Limiting reactant, Redox titration of Fe²⁺
Determination of the specific heat of metal, Review



D. Exams & Grading System

The semi-official dates of the exams for this course, with all the caveats, that the word “semi-official” entails, can be found here:

- **Midterm 1:** 6th or 7th week & **Midterm 2:** 11th or 12th week
- **Quizzes & Homework:** During the semester

Your course grade will be based on Final Exam, Midterms, Homework, Quizzes, Participation, Attendance and Project.

Midterm 1: 10 %	Midterm 2: 10 %	Final Exam: 40 %
Laboratory: 30 %	Quizzes; Homework & Attendance & Participation: 10 %	

Grading distribution:

A+: [95, 100], A: [90, 95), B+: [85, 90), B: [80, 85), C+: [75, 80), C: [70, 75), D+: [65, 70), D: [60, 65), F: [0, 60).

E. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Exams](https://www.examsgoo.gl/ykm7t3)
[goo.gl/ykm7t3](https://www.examsgoo.gl/ykm7t3)

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