

University of Basrah
College of Science
Department of Chemistry

**CURRICULUM FOR THE BACHELOR DEGREE DESCRIPTION OF THE COURSES OF
THE Department of Chemistry**

CH101 / Electronic Structure of Atom:

- *Derive the predicted ground-state electron configurations of atoms.
- *Identify and explain exceptions to predicted electron configurations for atoms and ions.
- *Relate electron configurations to element classifications in the periodic table.

CH102 /Chemical bonding:

The aim of this course is to give the student the ability to gain experience and understanding the basic concepts of chemical bonding, and how bonding occurs in chemical compounds, whether covalent or ionic bonding, which enables him to study the concept of chemical bonding with comprehensive clarity, and acquires the scientific skills necessary to develop his skill in understanding modern and old theories of chemical bonding.

CH131 / Analytical chemistry:

Identifying the methods of preparing compounds and estimating the concentration of an unknown substance through the titration process.

CH202 / Coordination chemistry:

Learning the student, the forms and characteristics of complexes according to scientific theories.

CH211 / Aliphatic organic compounds:

Introducing students to the chemistry of hydrocarbons, especially aliphatic organic materials, and their derivatives such as alcohols, aldehydes, ketones, carboxylic acids, amines, and others.

CH212 / Aromatic Organic Chemistry:

The chemistry of organic compounds is crucial due to the variety of these compounds and they are found in plants, animals and crude oil. These compounds are used in many applications, such as drugs, paints, adhesives.....etc, so study the synthesis, reactions of these compounds give the student the knowledge how these compounds are produced biosynthetically or in the lab and their reactions which could be converted to another crucial compounds..

CH221 / Thermodynamic:

Study of the relations between heat, work, temperature, and energy. The laws of thermodynamics describe how the energy in a system changes and whether the system can perform useful work on its surroundings.

CH222 / Electrochemistry:

Electrochemistry provides information on a number of phenomena such as the technology of metals and their corrosion, the cause of corrosion, direct study of electricity-generating cells, knowledge of how oxidation and reduction reactions occur.

CH315 / Heterocyclic aromatic compound:

Familiarize students with the names and structures of heterocyclic aromatic compounds, as well as the methods of their preparation and their reactions because of their great importance, as this type of compounds enters into many aspects of life, such as the pharmaceutical industries.

CH321 / Kinetic Chemistry:

The course aims to introducing to the student to the mechanism of reactions, calculating the rate of reactions and the extent of consumption of quantities of reactants with respect to time in terms of concentrations, volumes or pressures, especially for gaseous substances, determining the pathways of reactions, order of reactions, classification of reactions according to phases and molecularity, and how to calculate the energy accompanying the occurrence of the reaction, such as activation energy and thermodynamic functions that are related to rates of reactions. It is also possible to identify the catalysts and temperature and how these two factors affect the rate of the rate of reactions, in addition to studying various types of reactions..

CH324 / Molecular Spectroscopy:

Molecular spectroscopy syllabus syllabus Chem. 324

1) Introduction

Definition of spectroscopy and molecular spectroscopy - Electromagnetic radiation - Electromagnetic radiation applications - Energy quantization - Electromagnetic spectrum regions and basic components of the spectrum.

2) Microwave spectroscopy

Spin spectroscopy – Molecular spin – Spin spectra – Spin spectra of diatomic molecules – Solid rotor – Schrödinger equation for rigid rotors – Number of revolutions per second – Strength of spectral lines – Isotope compensation effect – Non-rigid rotor – Schrödinger equation for non-rigid rotors – Spin spectra of multiple molecules Atoms - Inversion of ammonia - Applications

3) Infrared spectroscopy

Definition of vibration spectroscopy - Harmonic oscillator - Vibration spectra of diatomic particles - Harmonic oscillator - Vibratory rotor - Born-Oppenheimer

approximation - Inertia of the Born-Oppenheimer approximation - Calculation of vibrational degrees of freedom - Factors affecting vibration - Uses and applications

4) Visible and ultraviolet spectroscopy

Principles of UV Vis Spectroscopy - Basic components of UV-Vis device - Factors affecting electronic absorption - Charge transfer absorption spectra - Colors of light - Visible spectrum - Colors of objects - Uses and applications.

5) NMR spectroscopy

Definition of nuclear magnetic resonance - Zeeman mutual effect - conditions of resonance - chemical shift - twist pairing - twist - interpretation of some nuclear magnetic resonance spectra - uses and applications.

6) Electron Spin Resonance Spectroscopy

Electron Spin resonance definition – theory – origin of ESR signal – Zeeman effect – g factor – hyperfine coupling – glass solutions – relative intensity and number of beams – Permian electron resonance spectra of free radicals – Permian electron resonance spectra of transition elements – uses and applications.

7) Maspuor spectroscopy

Maspuor effect - isotope displacement - nuclear quadrupole coupling - magnetic supramolecular interaction - applications.

CH342 / Metabolic Biochemistry:

Identify the metabolic reactions of vital compounds and what are the metabolites.

How are metabolic reactions regulated?

CH343 / Clinical biochemistry:

Objectives: Introduce the student to clinical biotechnologies and how to deal with the analysis models that are carried out in medical laboratories.

CH351 / Principle of industrial chemistry:

Industrial Chemistry is an undergraduate Chemistry course. Industrial Chemistry is the process of development, optimization, and monitoring of fundamental chemical processes used in industry for transforming raw materials and precursors into useful commercial products for society. Industrial Chemistry program provides a broad education within chemistry.

CH352 / Polymer Chemistry:

This course provides an opportunity to learn general aspects of synthetic polymer chemistry as well as to study step-growth polymerization (Condensation), and chain polymerization (Addition), and polymer reaction. This course covers not only the basic aspects but also advanced topical researches and applications of polymers in materials science.

CH353 / Chemistry of Oil:

The course aims to provide the student with information about crude oil and its derivatives, methods for evaluating the quality characteristics of oil and its derivatives, and what are the most prominent chemical and physical processes that take place in refineries to produce the oil derivatives required in the market, then knowing all types of petroleum products and their additives.

CH354 / Industrial applications:

Course objectives: This course aims to introduce some important industries that are directly related to our daily life, including: sulfur industries and phosphate fertilizers, paper and its derivatives industries, detergents and soap industries, the manufacturing of rubber and its products, the manufacturing and extraction of vegetable oils from their sources, cement industry, ceramics and glass industry, the manufacturing of dyes and pigments and finally, pesticides industry.

CH401 / Transition metals chemistry:

Study transition metals series and methods of extraction, characterizations and application.

CH402 / Inorganic Nanomaterials:

Introduce the student to the concepts of inorganic nanomaterials because of their scientific importance, especially as we live in the age of nanotechnology.

CH403 / Chemistry of non- aqueous solution:

The course aims at multiple concepts. Where the curriculum deals with topics, including those related to anhydrous solvents, their role in chemical reactions, and the characteristics of each solvent and its type. The curriculum also includes an explanation of the acids and bases in anhydrous solvents and how to measure their strength. The curriculum also touches on an important topic in chemistry and related to the stability of the reacting compounds and the products expected theoretically after the reactions were conducted. The so-called hard and soft acids and bases, in detail for all inorganic reactions

CH416 / Identification of organic compounds:

Identification of organic compounds by spectroscopic techniques, by IR ,HNMR, UV-Visble.

CH426 / Radiological and Nuclear:

The student's knowledge of what nuclear chemistry is, its difference from general chemistry, the difference between unstable and stable radioactive elements, the types of radiation that are emitted from them, and how to protect living organisms from radiation and its applications in the medical and industrial fields and in the field of manufacturing nuclear weapons

CH427/ Selective Topics in Physical Chemistry:

The course covers the topic of Liquid Crystals .We aim to understand the main basic concepts of liquid crystals, the fundamentals and chemical aspects of different types of liquid crystals(thermotropic and lyotropic) , and especially leading to an identification of the most important liquid crystal phases . On the other hand we slightly focus on physics concepts and optical properties of LC materials in order to understand the structure and function of liquid crystal displays and devices.Finally , we focus on key aspects related to the use of LCs in pharmacological and medical..

CH431 / Instrumental analysis chemistry:

This course included principal spectroscopic method such as UV-Vis , IR , AAS and fluorescence methods in details , this course also included practice part for studying the determination of deferent analyses by instrumental methods.

CH444 / Selected topics in biochemistry:

Teaching this course aims to present some important topics in the field of biochemistry, which explain the relationship of chemistry to the functions of body and to clarify the chemical variables that occur inside the body.

CH455 / Polymer Processing:

The aim of this Course included the definition of polymer processing (convert the final polymers to final products through the processing under molding compression or extrusion or) , and then study of some mechanical properties of polymers like tensile strength , impact strength and thermal study .

CH456 / Industrial Chemical Additives:

The Additives added to the food and lubricants and polymer and it's type with the mechanism.

CH461 / Industrial Pollutant Chemistry:

Spreading awareness and reducing industrial pollution that destroys the environment in order to achieve sustainable growth.

