UNDERGRADUATE COURSES DESCRIPTIONS
for the Degree of Bachelor of Science in Chemistry

2110101: General Chemistry I 3 Cr. Basic concepts, stoichiometry, gases, thermochemistry, atomic structure, periodic table, liquids and solids, solutions.

2110104: General Chemistry Lab I 1 Cr. Independent laboratory work under the supervision of a faculty member.
Prerequisite: General Chemistry I: 2110101.

2110105: General Chemistry II 3 Cr. Chemical kinetics, chemical equilibrium, acids and bases, electrochemistry and cells, solubility products, nuclear chemistry.
Prerequisite: General Chemistry I: 2110101.

2110106: General Chemistry Lab II 1 Cr. Independent laboratory work in qualitative analytical chemistry.
Prerequisite: General Chemistry II: **2110105**

2110103: General Chemistry E (for Engineering Students) 3 Cr. Stoichiometry, gases thermochemistry, atomic structure, solutions of acids and bases, electrochemistry, chemical kinetics.

2112125: Organic Chemistry I 3 Cr. Structure and bonding, alkanes, alkenes, reactions and mechanism, alkylhalides, stereochemistry, alkynes.
Prerequisite: General Chemistry II: 2110105

2112230: Organic Chemistry Lab I 1 Cr. Independent laboratory work in synthesis, separation and identification of organic compounds.
Prerequisite: Organic Chemistry I: 2112125; General Chemistry Lab I: 2110104

2112231: Organic Chemistry II 3 Cr. Electrophilic aromatic substitutions, aldehydes, ketones, alcohols, ethers, carboxylic acids and derivatives.
Prerequisite: Organic Chemistry I: 2112125

2112232: Organic Chemistry Lab II 1 Cr. Electrophilic aromatic substitution, extraction, preparing soaps, synthesis of dyes-esterifications.
Prerequisite: Organic Chemistry II: 2112231; Organic Chemistry Lab I: 2112230

2112233 Organic Chemistry III 3 Cr. Carbanion II, □□, □□□-unsaturatad carbonyl carbons, polynuclear aromatic compounds, carbohydrates, polypeptides, Heterocyclic Chemistry.
Prerequisite: Organic Chemistry II: 2112231.

2112235: Spectroscopy in Organic Chemistry 2 Cr. Mass spectrometry, H-NMR, ^{13}C-NMR, IR and UV-Vis Spectroscopy.
Prerequisite: Organic Chemistry II: 2112231.

2112337: Separation and Identification Organic Compounds 1 Cr. Purity and physical properties of organic compounds, classification via solubility - characterization of functional groups.
Prerequisite: Organic Chemistry II: 2112231.

2112338: Separation and Identification Organic Compounds Lab 2 Cr. separation and identification of mixtures of two or more known and unknown and making derivatives.
Prerequisite: Separation and Identification Organic Compounds: 2112337

2112441: Synthesis of Organic Compounds 3 Cr.
Prerequisite: Organic Chemistry III: 2112233

2112443: Physical Organic Chemistry 3 Cr. Models of chemical bonding, H-Mo theory, aromaticity, pericyclic reactions, acids-base, study of organic reaction mechanism.
Prerequisite: Physical Chemistry I: 2114251.

2118281: Analytical Chemistry I (for Chemistry students) 3 Cr. Theoretical concepts of analytical chemistry, statistics, gravimetric and volumetric methods, titration curves, oxidation, reduction titrations complexometry.

Prerequisite: General Chemistry II: 2110105

2118282: Analytical Chemistry Lab I 1 Cr. Experiments in gravimetric and volumetric techniques - acid-base titrations.

Prerequisite: General Chemistry Lab II: 2110106

2118283: Analytical Chemistry II 2 Cr. oxidation-reduction systems, electrochemistry, selected electrodes, conductometry, voltametry.

Prerequisite: Analytical Chemistry I (for Chemists): 2118281

2118384: Analytical Chemistry Lab II 2 Cr. Experiments in electrochemistry.

Prerequisites: Analytical Chemistry II: 2118283; Analytical Chemistry Lab I: 2118282**.**

2118385: Instrumental Analysis 3 Cr. Introduction, signal to noise enhancement, atomic spectroscopy. Molecular spectroscopy, chromatography, mass spectrometry.

Prerequisite: Analytical Chemistry II: 2118283.

2118386 : Instrumental Analysis Lab 2 Cr. Atomic spectroscopic techniques, molecular spectroscopic techniques. IR, UV, Vis, NMR, HPLC, GC, Tlc Techniques.

Prerequisites: Instrumental Analysis: 2118385; Analytical Chemistry Lab II: 2118384.

2118387: Analysis Chemistry III 2 Cr. X-ray spectroscopy, mass spectrometry, gas chromatography, liquid chromatography, HPLC, electrophoresis.

Prerequisite: Instrumental Analysis Lab: 2118386.

2118388: Environmental Chemistry 3 Cr. Introduction to atmospheric chemistry, stratospheric ozone depletion, health aspects of ozone depletion, tropospheric chemistry, especially smog and aerosols, pollution and purification of water, water treatment methods, toxic organics other than pesticides, dioxin health hazards, soil pollution, global warming, climate change.

Prerequisite: General Chemistry (II): 2110105

2118389: Industrial Electrochemistry 3 Cr. Principles of electrochemical processes, chlor-alkali industry, electrochemical extraction of metals, electrochemical refinement, electrochemical synthesis, electroless plating, electrolytic electroplating, metal processing, electrochemical fabrication of metals, electrochemical cutting, etching, and patterning of metals, corrosion processes and control methods, batteries and fuel cells.

Prerequisite: Analytical Chemistry (II)**:** 2118283

2114251: Physical Chemistry I 3 Cr. Properties of gases, kinetic theory of gases, thermodynamics laws, chemical equilibrium.

Prerequisite: Math. I: 1914103; General Chemistry II: 2110105.

2114252: Physical Chemistry Lab I 1 Cr. Experiments in gases, equilibrium, kinetics, refractive index, vapor pressure, adsorption.

Prerequisite: Physical Chemistry I: 2114251.

2114253: Physical Chemistry II 3 Cr. Phase transitions, electrolytes, chemical kinetics.

Prerequisite: Physical Chemistry I: 2114251.

2114254 Physical Chemistry Lab II 1 Cr. Experiments in equilibrium and temperature, kinetics of ionic reactions, phase diagrams of ternary systems, conductometry, solubility, partial molar volume, transference number.

Prerequisites: Physical Chemistry Lab I : 2114252; Physical Chemistry II: 2114253.

2114357: Principles of Quantum Chemistry 3 Cr. Classical mechanics of one particle systems, quantum mechanics, atomic structure.

Prerequisite: Basic Physics II: 2010127.

2114359 Molecular Spectroscopy 3 Cr. Rotational and vibrational spectroscopy (IR, Raman), group theory applied to spectroscopy, electronic spectroscopy, NMR spectroscopy.
Prerequisite: Principles of Quantum Chemistry: 2114357.

2116271: Inorganic Chemistry I 3 Cr. Structure of atom, bonding model in inorganic chemistry, covalent bonding, solid state, chemical forces, acid-base chemistry, inorganic redox reactions, physical methods in inorganic chemistry, symmetry.
Prerequisite: General Chemistry II: 2110105.

2116272: Inorganic Chemistry Lab. I 1 Cr. Preparation and reactions of some inorganic compounds.
Prerequisite: Inorganic Chemistry I: 2116271.

2116273: Inorganic Chemistry II 3 Cr. Metal complexes, structure, bonding, electronic structure, spectra, d-block complexes, catalysis and bioinorganic chemistry.
Prerequisite: Inorganic Chemistry I: 2116273.

2116274: Inorganic Chemistry Lab. II 1 Cr. Synthesis, characterization and properties of coordination compounds.
Prerequisite: Inorganic Chemistry Lab I: 2116272.

2110417: Organometallic Chemistry 3 Cr. The chemistry of Main group and transition metal organometallic compounds, structure, spectral properties, and their applications.
Prerequisite: Inorganic Chemistry II: 2116273.
2112227: Organic Chemistry for Engineering students 4 Cr. Selected topics from 21218 and 21219.
Prerequisite: General Chemistry for Engineering students: 2110103.

2112229: Organic Chemistry for Agriculture Students 3 Cr. Molecular structure, the chemistry of hydro-carbons alkylhalids, aromatics, alcohols, aldehydes, ketones, ethers, epoxides, carboxylic acids, stereochemistry, spectroscopy.
Prerequisite: General Chemistry for Engineering students: 2110103.

2118293: Analytical Chemistry for Chemical Engineering students 3 Cr. Statistics, Acid - Base precipitation, volumetric titration, complexometry, Electrochemistry, Oxidation - Reduction titration, Instrumentation.
Prerequisite: General Chemistry for Engineering students: 2110103.

2118026: Analytical Chemistry for Engineering students 2 Cr. Acid - base precipitation, volumetric titration, electrochemistry, oxidation - reduction titration, instrumentation, arc - spark - atomic emission spectroscopy, atomic absorption spectroscopy.
Prerequisite: General Chemistry for Engineering students: 2110103.

2118295: Analytical Chemistry for Textile Students 3 Cr. Acid-base, precipitation techniques, electrochemistry, spectroscopy.
Prerequisite: General Chemistry for Engineering students: 2110103.

2118298 Analytical Chemistry Lab. For Engineer Students 1 Cr. Experiments in precipitation, complexometry, electrochemistry, volumetric and gravimetric.
Prerequisite: 2118026 or 2118295

2114261: Physical Chemistry for Chemical Engineering Students 3 Cr. Chemical kinetics, gas kinetics, quantum chemistry, statistical thermodynamics.
Prerequisites: General Chemistry for Engineering students: 2110103, Thermodynamic: 1410211.

2114263: Physical Chemistry for Textile Students 1 Cr. Thermodynamics laws, solutions - kinetics, quantum chemistry, macromolecule physical chemistry.
Prerequisite: General Chemistry for Engineering students: 2110103.

Physical Chemistry Lab. for Students 1 Cr. Experiments in chemical kinetics, adsorption, equilibrium constants, phase diagrams. Conductometry, MW determination of macromolecules.
Prerequisite: 2114261 or 2114263.

2110307: English for Chemists 2 Cr. Understanding chemistry texts and papers.
Prerequisite: English for Specific Purposes: 2510112.

2110411: Chemical Literature 1 Cr. Introduction to scientific publications in the library.
Prerequisite: English for Chemists: 2110307.

2112339: Principles of Polymer Chemistry 4 Cr. Polymer terminology, physical and mechanical relationship with structure, morphology, polymerization reactions, polycondensation-polyaddition copolymerization, diels-alder polymerization.

Prerequisite: Organic Chemistry II: 2112231.

2110423: Undergraduate Research Project 3 Cr. Research project under the supervision of a faculty member.
Prerequisite: 80 units of coursework.

2110425: Industrial Training 2 Cr. Eight weeks of training in industries.
Prerequisite: 100 units of coursework.