Courses Offered by the Department of Chemistry for the B.Sc. Degree

Course	Course Title	Syllabus	Pre-	Hours / Wee		'eek
No. & Code	course rule		requisite	L	P/T	С
C100	General Chemistry (1)	 (A):Atomic Spectra – Electron Orbital and Quantum Numbers – Quantum Energy Levels in Atoms – Basic Concepts of Bonding Electronegativities – Lewis Structure – The Octet Rule – Dipole moment – Resonance Hybridization in Molecules – Geometrics of Molecules – Orbital Configuration for Diatomic Molecules. (B):State of Matter – Introduction in Surface and Colloids Chemistry – Electrolytic Cell – Electrochemical Cells – Potential of Electrode (Practical: Selected practical experiments) 	-	2	3	3
C105	General Chemistry (2)	 (A): Chemical Equilibrium – Ionic Equilibrium – Basic of Qualitative Analysis – Solution Chemistry. (B):Introduction on Organic Chemistry-Bonding in Organic compounds – Hybridization in Carbon Compounds – Physical Properties of Org. Compounds – Nomenclature, Synthesis and Chemical Reactions of alkanes, alkenes and alkynes (Practical: Selected practical experiments) 	C100	2	3	3
C 210	Organic Chemistry(1)	Organic Reactions Mechanisms – Chemistry of Carbonyl Compounds Practical : (Selected practical experiments)	C105	3	3	4
C 211	Organic Chemistry for Non-Chemistry Students	Chemistry of Aliphatic Compounds – Chemistry of Selected Aromatic Compounds (Practical :Selected practical experiments)	C105	2	3	3
C 212	Organic Chemistry (2)	Aromatic Compounds – Heterocyclic Compounds (Practical : Selected practical experiments)	C210	3	3	4
C 214	Environmental and Green Organic Chemistry	Agrochemistry – Environmental Organic Chemistry – Green Chemistry	C212	3	-	3
C 220	Inorganic Chemistry(1)	Chemistry of the main groups (S, P- block elements): General properties of the main group elements of the first group to the seven group element- use of main group elements in industry. (in a glasses, conductors, and semiconductors – fertilizers	C100	2	-	2
C 230	Physical chemistry (1)	Chemical thermodynamics: Thermodynamics concepts- First law of thermodynamics- second law- Entropy changes of enthalpy and entropy with temperature-Gibb's free energy function and chemical potentials. Chemical kinetics: Concept and terminologies of chemical kinetics- Reaction rate laws- Effect of temperature on reaction rates- Theory of reaction rates	C100	3	-	3

Course	Course Title	Syllabus	Pre-	Hours / W		/eek
No. & Code			requisite	L	P/T	С
C 232	Physical Chemistry (2)	Phase rule: Concept and terminologies of phase rule, phase rule equation, One, Two, Three component systems and their applications. Colloids: Preparation, properties- The stability of hydrophilic and hydrophobic sols. gels- Emulsions and Foams. Electrochemistry(I): Ionic conductivity and applications- Electrochemical cells and electrode potentials- The Nernst equation- Primary and secondary cells- Fuel cells.	C230	3	-	3
C 234	Computational Chemistry	Schrödinger equation- approximated methods- different computational methods.	C332	3	-	3
C 240	Introductory Quantitative Analysis	Statistical treatment of Analytical Data, Activity and Systematic Treatment of Equilibrium, Acid-Base equilibrium, Types of titration in volumetric analysis, Gravimetric analysis, Fundamentals of potentiometry & Principles of UV, Vis-Spectrophotometry (Practical: Selected practical experiments)	C105	2	3	3
C 250	Physical and Inorganic Chemistry	General Properties of the Main Group Elements (S, P- block elements) (The First Group to Seventh Group) – First and Second Law of Thermodynamics (Entropy and Enthalpy and Their Change With Temperature – Chemical Potential). (Practical: Selected practical experiments)	C100	2	3	З
C 311	Stereochemistry and spectroscopy	Spectroscopy (I) (UV, IR) – Spectroscopy (II) (MS, NMR) – Stereochemistry – (Practical: Spectroscopy and Stereochemistry)	C212	3	3	4
C 312	Biochemistry and Natural products	Biochemistry (I): Chemistry of carbohydrates – Amino acids & Proteins Natural Products (I):– Lipids Terpenes - Steroids. (Practical: Biochemistry)	C311	3	3	4
C 313	Photohemistry and Reactive Intermediates	Photochemistry – Reactive Intermediates	C212	3	-	3
C 314	Advanced Organic Synthesis	Selectivity in Organic Synthesis – Protecting groups in Organic Synthesis – Enolate Reactions – Oxidation and reduction Reactions	C311	3	-	3
C 320	Inorganic chemistry lab(1)	Preparation of simple and double salts – preparation of metal complexes – characterization by spectrophotometric and conductometric methods.	C321 (In parallel)	-	3	1
C 321	Inorganic Chemistry(2)	Transition elements: An introduction to transition elements – general properties of the first transition series and their compounds. Coordination compounds: Coordination compounds and double salts – application of coordination compounds –nomenclature – preparation – isomerism – stability – oxidation states – nature of bonding- Huggin's suggestion – investigation of structures. Coordination polymer.	C220	3	-	3

Contents of the Courses-Credit Hour System Bylaw – Faculty of Science – Assiut University – 2009

Course	Course Title	Syllabus	Pre-	Hours / Wee		
No. & Code			requisite	L	P/T	С
C324	Inorganic Chemistry(3)	Inner transition elements: Relation between lanthanides and actinides - f-block elements and d-block elements – chemistry of some important elements – method of separation – properties of the compounds – oxidation state – Spectral and magnetic properties Coordination chemistry: Crystal field theory complexes of weak and strong field ligands – ligand field and molecular orbital theories – stability constant of complexes – Johen Toiller effects.	C321	3	-	3
C 331	Physical Chemistry Lab. (1)	Experiments based on: Chemical kinetics, Phase rule, and electrochemistry.	C230 *	-	3	1
C 332	Physical Chemistry (3)	Quantum chemistry: Pre-Schrödinger equation- Schrödinger equation and its application to translational, vibrational, and rotational motion of a particle. Theory of gases: The kinetic molecular gas model- numerical values of molecular velocities and their distribution in three dimensions – Average quantities from the distribution law – equipartition principle - the molecular gas collisions and the mean free path, Tronsport properties. Molecular spectroscopy: Types and patterns of free energies of gas molecules- experimental and theoretical treatment for studies on rotational vibrational, Raman and electronic spectra- spectral analysis using NMR and ESR.	C232	3	-	3
C 333	Nuclear and Radiation Chemistry	Radioactivity- nature of radioactive rays and its types – the kinetics of radioactive decay and growth- structure of nuclei- the nuclear potential- nuclear reactions and nuclear reactors-nuclear fission.	C232	3	-	3
C 334	Corrosion Chemistry	Principles of corrosion- electrochemical reactions (polarization and passivity)- Forms of corrosion- Anodic and cathodic protection.	C332	3	-	3
C 342	Analytical Chemistry (1)	Atomic Spectroscopy, Ultraviolet/Visible spectrophotometry and Infrared Spectrometry, Polarography & Amperometry, Conductometry & Coulometry and Modern Voltametric Techniques, Introduction to Analytical Separation and the Need for Quality Assurance . (Practical: Selected practical experiments).	C240	2	3	3
C343	Environmental chemistry analyses	Environmental Sampling – Analysis Using Modern Instrumental Techniques – Chemistry of Natural Water – Water Pollution – Waste Water Treatment – Environmental Toxicology – Analysis of Selected Contaminants (Heavey Metals and Organometalic compounds).	C105	3	-	3
C400	Research Project \ Article	An essay or research article in one of the different fields of chemistry	Accomplishing of 100 C.H	2	-	2

Contents of the Courses-Credit Hour System Bylaw – Faculty of Science – Assiut University – 2009

Course	Course Title	Syllabus	Pre-	Hours / V		eek
No. &			requisite	L	P/T	С
Coue					_ / _	
C 411	Petroleum Chemistry	Chromatography – Petroleum Chemistry and Petrochemicals	C212	3	3	4
	and Chromatography	(Practical.: Chromatography & Petroleum)				
C 412	Applied Organic	Dyes and Textiles – Material Science and Polymers	C212	2	3	3
	Chemistry	(Practical: Dyes and Textile, Polymers)				
C 413	Chemistry of	Biochemistry (II): Lipids – Nucleic acids – Enzymes.	C212	2	3	3
	Biomolecules	Medicinal Chemistry				
		(Practical: Microanalysis, Detection and estimation of Carbohydrates, Amino acids, Proteins,				
		Lipids, Nucleic acids Ect.)				
C 414	Selected Topics in	Topics Suggested by the Department	Department	3	-	3
	Organic Chemistry	Drganic Chemistry	consent			
C 415	Advanced Practical	Advanced exercise synthesis. Estimation of functional aroun	C 313	-	3	1
	Organic Chemistry	Advanced organic synthesis – Estimation of functional group.				
C 422	Inorganic Chemistry (4)	Organometallic compounds of transition element – carbonyl and their type of bonding – aryl and	C321	3	-	3
		cyclopentadienyl azo cyanide and nitrasol complexes.				
		Solution chemistry of coordination compounds: Stability of complex ions in aqueous solution -				
		step wise formation of complexes – thermodynamic parameters – chelate effect, on stability of				
		complexes.				
C 423	Special topics in	The title and topics are to be determined by the chemistry Department	Department	3	-	3
	inorganic chemistry		consent			
C 431	Physical chemistry	Experiments based on: surface chemistry, catalysis and electrochemistry (II)	C232,C331	-	3	1
	Lab(2)					
C 432	Surface chemistry and	Solid state: Semiconductors, doping of semiconductors, non-stoichiometric compounds, point	C232	3	-	3
	electrochemistry	defects.				
		Surface& Catalysis: Gas adsorption- Langmuir and BET theories- pore analysis by adsorption.				
		Introduction and basic concepts of catalysis and catalysts.				
		Electrochemistry (II): Structure of ionic electrical double layer- irreversible processes- types of				
		the potential difference – cathodic and anodic protection against corrosion.				

Course	Course Title	Syllabus	Pre- requisite	Hours / Wee		ek
No. & Code				L	P/T	C
C 434	Applied Catalysis	preparation and characterization- Homogeneous and heterogeneous catalysis- Role of catalytic reactions in the chemical industry- Synthesis of methyl alcohol- Synthesis of different chemicals from ethyl alcohol- Esterfication reaction (Practical: Selected practical experiments)	C332	2	3	З
C 437	Selected topics in physical chemistry	Topics to be suggested by chemistry Department	Department consent	3	-	3
C 441	Analytical Chemistry (2)	 (II A): Quality Control Quality, Assurance in Chemical Analysis and GLP Requirements, Introduction to Chemometrics, Analysis of Gaseous Pollutants, Water Analysis, HPLC, Automated methods of analysis, X-ray, GMS and ICP. Analytical Chemistry (II B): General Principles of Analytical Biochemistry, Biosensors, Biochemical uses of Isotopes, Immunological Methods, Enzyme Assay Methods, Separation of Amino Acid Mixtures, Separation of Proteins, Separation of Lipid Mixture, Methods of Nucleic Acid Analysis (Practical: Selected practical experiments) 	C342	2	3	З
C444	Selected topic in analytical chemistry	Topics to be suggested by chemistry Department	Department consent	3	-	3
C 445	Instrumental Methods of Analysis	Introduction To Atomic Spectrometry (Absorption, Florescence and Emission Spectrometry. Ultraviolet/Visible Spectrophotometry and Infrared Spectrometry, Polarography & Amperometry, Conductometry & Coulometer and Modern Voltammetric Techniques, Analytical Separation.) (Practical: Selected practical experiments)	C240	2	3	3
C 451	Chemistry of Petroleum and Petrochemicals	Crude Oils – Evaluation of Crude Oils - Refining of Petroleum – Petrochemicals Derived from Petroleum Fractions (Practical: Selected practical experiments)	C105	2	3	3
C 453	Industrial Chemistry	Silicate Technology (Ceramics – Glass – Fertilizers – Cement) Energy and Raw materials – Paper industry – Pigments, Paints, Varnishes and Printing Inks.	C220	3	-	3
C 460	Analytical Chemistry For Biology Students	Acid –Base Titration, Precipitation Titrations, Complexometric Titrations, Redox Titration, Gravimetric Analysis, Potentiometric Titrations, Ultraviolet/Visible Spectrophotometry, Atomic Spectrometry, Conductometry and Modern Voltammetric techniques, Analytical Separations, HPLC, Electrophoresis (Practical: Selected practical experiments)	C105	2	3	3

Course No. &	Course Title	Syllabus	Pre- requisite	Hours / Week		/
Code				L	P/T	С
C 465	Analytical Chemistry For Geology Students	Acid –Base Titration, Precipitation Titrations, Complexometric Titrations, Redox Titration, Gravimetric Analysis, Potentiometric Titrations, Ultraviolet/Visible Spectrophotometry, Atomic Spectrometry, Conductometry and Modern Voltammetric techniques, Analytical Separations, Chemical Sensors, XRF, XRD, GC/MS, ICP (Practical: Selected practical experiments)	C 105	2	3	3

* May be in parallel