

ST PETER'S COLLEGE KOLENCHERY, ERNAKULAM
DEPARTMENT OF CHEMISTRY

- PROGRAMME - BSc Chemistry Model I
- COURSE CODE - CHICRT01 to CH4CRP02 & CH5B01 to CH6B06
- **B.Sc. Chemistry Model 1** -MAHATMA GANDHI UNIVERSITY KOTTAYAM
KERALA

Programme Outcome	
PO1	Critical Thinking
PO2	Environment and Sustainability
PO3	Self-directed and Life-long learning
PO4	Computational Thinking
PO5	Problem Solving

Programme Specific Outcome (PSO)

PSO 1	Understand the basic principles of organic, inorganic, analytical and nano chemistry
PSO 2	Solve problems on thermodynamics, chemical kinetics, electrochemistry, spectroscopy and quantum mechanics based on theoretical principles of physical chemistry
PSO 3	Design of experiments, synthesis, separation, quantitative and qualitative analysis of inorganic and organic compounds and mixtures.
PSO 4	Perform the physical chemistry experiments and interpret the results

PROGRAMME - STRUCTURE

SEMESTER ONE

Course No	Name of Course	Credit	Total Credits/Semester
EN1CC01	Common Course English I	4	18
EN1CC02	English/Common Course I	3	
HN/ML/SK1CCT01	Second Language	4	
CH1CRT01	General and Analytical Chemistry	2	
CH2CRP01	Volumetric Analysis	-	
MM1CNT01	Complementary Mathematics	3	
PH1CM02	Complementary Physics	2	
PH2CMP01	Complementary Physics Practical	-	

SEMESTER TWO

Course No	Name of Course	Credit	Total Credits/Semester
EN2CC03	Common Course English II	4	22
EN2CC04	English /Common Course II	3	
HN/ML/SK2CCT02	Second Language II	4	
CH2CRT01	Theoretical and Inorganic Chemistry	2	
CH2CRP01	Volumetric Analysis	2	
MM2 CMT02	Complementary Mathematics	3	
PH2CM02	Complementary Physics	2	
PH2CMP01	Complementary Physics Practical	2	

SEMESTER THREE

Course No	Name of Course	Credit	Total Credits/Semester
EN3CC05	Common Course English III	4	18
HN/ML/SK3CCT02	Second Language	4	
CH3CRT03	Organic Chemistry-I	3	
CH4CRP02	Qualitative Organic Analysis	-	
MM3CMT03	Complementary Mathematics	4	
PH3CM02	Complementary Physics	3	
PH4CMP02	Complementary Physics Practical	-	

SEMESTER FOUR

Course No	Name of Course	Credit	Total Credits/Semester
EN4CC06	Common Course English IV	4	22
HN/ML/SK4CCT02	Second Language	4	
CH4CRT04	Organic Chemistry-II	3	
CH4CRP02	Qualitative Organic Analysis	2	
MM4CMT04	Complementary Mathematics	4	
PH4CM02	Complementary Physics	3	
PH4CMP02	Complementary Physics Practical	2	

SEMESTER FIVE

Course No	Name of Course	Credit	Total Credits/Semester
CH5B01	Chemistry of d and f block elements	3	20
CH5B01	Qualitative Inorganic Analysis	1	
CH5B02	Basic Organic Chemistry II	3	
CH5B02	Preparation and basic lab skills	1	
CH5B03	States of Matter	2	
CH5B03	Physical Chemistry Practicals	2	
CH5B04	Quantum Mechanics and Spectroscopy	3	
CH5B05	Gravimetric Analysis	1	
	Open Course	4	

SEMESTER SIX

Course No	Name of Course	Credit	Total Credits/Semester
CH6B01	Applied Inorganic Chemistry	3	20
CH6B01	Qualitative Inorganic Analysis	1	
CH6B02	Chemistry of Natural Products and Biomolecules	3	
CH6B02	Preparation and basic lab skills	1	
CH6B03	Equilibrium and Kinetics	3	
CH6B03	Physical Chemistry Practicals	1	
CH6B04	Solution Chemistry	3	
CH6B05	Gravimetric Analysis	1	
CH6B06.1	Choice Based Course: Nanochemistry and Technology	3	
CH7B07	Project	1	

Name of Course: CH1CRT01 General and Analytical Chemistry

Credits given: 2

CO No.	CO Statement
CO1	Familiarize the students with the theory of titration, gravimetric analysis, filtration, crystallization, distillation and solvent extraction.
CO2	Understand the concept of errors and statistical analysis of data
CO3	Develop a research aptitude among students.
CO4	Discuss the various chromatographic techniques and their applications.
CO5	Explain common ion effect, ionic product, solubility product and its application in inorganic mixture analysis.
CO6	Understand the periodic properties of elements.
CO7	Discuss the methods of elimination of interfering radicals.
CO8	Discuss the evolution of chemistry.

Name of Course: CH2CRP01 Volumetric Analysis

Credits given: 2

CO No.	CO Statement
CO1	Understand the basic principle of qualitative analysis.
CO2	Understand the preparation of standard solution.
CO3	Apply equations to calculate concentrations.
CO4	Estimate acids, bases, oxidizing and reducing agents using titrations.
CO5	Understand the role of indicator and the physical changes at the end point.
CO6	Estimate metal ions using EDTA.

Name of Course: CH2CRT01 Theoretical and Inorganic Chemistry

Credits given: 2

CO No.	CO Statement
CO1	Understand the theories of atomic structure
CO2	Write the electronic configuration of atoms based on Pauli's, Hund's and Aufbau Principle
CO3	Differentiate among ionic, covalent hydrogen and metallic bonds
CO4	Draw the Molecular Orbital Diagram of homo nuclear and heteronuclear diatomic molecules
CO5	Predict the trends in periodicity of s and p block elements
CO6	Understand the properties and separation of d and f block elements

Name of Course: CH3CRT03 Organic Chemistry I

Credits given: 3

CO No.	CO Statement
CO1	Applying the fundamentals of Organic Chemistry in reaction mechanism
CO2	Analyse conformational and configurational structures of organic compounds.
CO3	To understand the preparation, properties and uses of alkanes, alkenes, alkyl halides and organometallic compounds.
CO4	To understand the basic concepts of Aromaticity
CO5	To understand the basic concepts of pericyclic reactions
CO6	To understand the fundamental concepts of organic mechanisms..

Name of Course: CH4CRP02 Qualitative Organic Analysis

Credits given: 2

CO No.	CO Statement
CO1	Identify the elements using test for Nitrogen, Halogen & Sulphur
CO2	Compare the reactions of common functional groups
CO3	Analyze qualitatively functional groups
CO4	Understand the reactions of functional groups
CO5	Distinguish the different functional groups for characterization of functional groups
CO6	Recognize derivatives and prepare using appropriate methods

Name of Course: CH4CRT04 - Basic Organic Chemistry -II

Credits given: 3

CO No.	CO Statement
CO1	Understand the preparation and reactions of alcohols and phenols
CO2	Understand the preparations and reactions of derivatives of phenols
CO3	Understand the preparation and properties and reactions of aldehydes and ketones
CO4	Analyze the reaction mechanism involving aldehydes and ketones
CO5	Apply the effect of substituent on acidity of carboxylic acids
CO6	Understand the preparation reactions and uses of carboxylic acid derivatives
CO7	Remember the preparation properties and reactions of different carboxylic acids
CO8	Understand the preparation reactions and uses of sulphonic acid and its derivatives

Name of Course: CH5BO1 - Chemistry of d and f block elements

Credits given: 3

CO No.	CO Statement
CO1	Remember the physical and chemical properties of d and f block elements
CO2	Understand the general characteristics of d and f block elements
CO3	Remember the Werner's theory of coordination compounds
CO4	Remember the isomerism in the metal complexes
CO5	Remember the bonding in coordination compounds
CO6	Understand the applications of coordination compounds
CO7	Understand the classification, properties and applications of organometallic compounds
CO8	Understand the role of metals in biological systems

Name of Course: Organic Chemistry II**Credits given: 3**

CO No.	CO Statement
CO1	Understand the chemistry of nitro compounds, amines and other nitrogen containing functional groups
CO2	Compare the mechanism of reactions of nitro compounds and amines
CO3	Classify dyes, soaps and detergents according to chemical constitution.
CO4	Define the various types of photochemical reactions.
CO5	Classify organic polymers based on synthesis and application
CO6	Predict the stability of cycloalkanes
CO7	Classify drugs according to structure and mode of action
CO8	Identify Organic compounds using uv, IR and NMR spectroscopic techniques.

Name of Course: States of Matter

Credits given: 2

CO No.	CO Statement
CO1	To understand the concept of inter molecular forces in gases and liquid
CO2	To understand the dynamics of the molecules in the gases and liquids
CO3	To understand the various methods of liquefaction of gases.
CO4	To differentiate the structural properties of solids.
CO5	To understand the defects in crystals.
CO6	To analyse the various features of different types of adsorption isotherms.

Name of Course: CH5B04 Quantum Mechanics and Spectroscopy

Credits given: 3

CO No.	CO Statement
CO1	Differentiate between classical and quantum mechanics
CO2	Understand the postulates of quantum mechanics and the quantum mechanical model of the hydrogen atom
CO3	Differentiate valence bond and molecular orbital theory
CO4	Apply the principles of microwave, infra-red, Raman, electronic and magnetic resonance spectroscopy.
CO5	Understand the fundamentals of mass spectrometry
CO6	Understand the fundamentals of photochemistry

Name of Course: CH5B01 Qualitative Inorganic Analysis

Credits given: 2

CO No.	CO Statement
CO1	Identify the anions and cations present in a mixture
CO2	Prepare sodium carbonate extract
CO3	Eliminate interfering radicals
CO4	Carry out intergroup separation of cations
CO5	Understand the theory behind qualitative analysis.

Name of Course: CH5B02 Preparation and Basic Laboratory Skills

Credits given: 2

CO No.	CO Statement
CO1	Prepare organic compounds using appropriate procedures
CO2	Carry out the simple distillation of organic liquid mixture
CO3	Purify organic compounds using crystallization
CO4	Separate two immiscible organic liquids quantitatively using solvent extraction
CO5	Determine the R_f value of organic compounds by TLC

Name of Course: CH5B03 Physical Chemistry Practicals

Credits given: 3

CO No.	CO Statement
CO1	Determination of physical constants - Heat of solution, Heat of neutralization, Equivalent conductance of an electrolyte, Determination of partition coefficient, Transition temperature of salt hydrates.
CO2	Estimate concentrations using electronic instruments
CO3	Differentiate between manual calculations and computational methods in simple experiments
CO4	Calculate rate constant of the hydrolysis reaction
CO5	Monitor the changes in physical constants with experimental conditions

Name of Course: CH6B01 Applied Inorganic Chemistry

Credits given: 3

CO No.	CO Statement
CO1	Understand and apply the principles of qualitative inorganic analysis
CO2	Identify the extraction and purification techniques of metals
CO3	Identify the applications of radioactive isotopes
CO4	Understand the synthesis, properties and uses of nanomaterial, industrially important materials and inorganic polymers
CO5	List the non-aqueous solvents and their properties
CO6	Describe the bonding and properties of p block elements
CO7	Understand the concepts and applications of thermo analytical methods
CO8	Differentiate chromatographic methods of separation

Name of Course: CH6B02 Chemistry of Natural Products and Biomolecules

Credits given: 3

CO No.	CO Statement
CO1	Elucidate the structure of terpenoids and alkaloids
CO2	Describe the classification and functions of lipids, vitamins, steroids and enzymes
CO3	Understand the preparation, properties, structure and applications of carbohydrates and heterocyclics.
CO4	Classify proteins based on the physical and chemical properties
CO5	Differentiate between DNA and RNA
CO6	Understand the concept of supramolecular chemistry

Name of Course: CH6B03 Equilibrium and Kinetics

Credits given: 3

CO No.	CO Statement
CO1	Understand the laws of thermodynamics
CO2	Derive Gibb's Helmholtz equation, Clausius Clapeyron equation , Gibbs Duhem Equation and van't Hoff reaction isotherm
CO3	Determine the spontaneity of reaction
CO4	Calculate the efficiency of heat engines
CO5	Draw the phase diagrams of one and two component systems
CO6	Understand the theories of chemical kinetics
CO7	Derive the rate equations for zero, first and second order reactions
CO8	Understand homogenous, heterogenous and enzyme catalysis

Name of Course: CH6B04 Solution Chemistry

Credits given: 3

CO No.	CO Statement
CO1	Understand the Raoult's law
CO2	Calculate the pH, degree of dissociation and solubility product of solutions
CO3	Identify the colligative properties
CO4	Understand the concept of buffer solutions
CO5	Explain the variation of conductivity with concentration
CO6	Determine the transport number
CO7	Differentiate between electrochemical cells and electrolytic cells
CO8	Understand the concept of corrosion and the ways of preventing it

Name of Course: CH6B06.1 Nanochemistry and Technology

Credits given: 3

CO No.	CO Statement
CO1	Understand the history, terminology and scales of nano systems
CO2	Understand the synthesis, purification and characterization of fullerenes, carbon nanotubes and quantum tubes
CO3	Identify the principles and instrumentation of SEM, TEM,AFM,STEM,ETEM and XPES
CO4	Understand the electrical and optical properties of nanomaterials
CO5	Understand the concept of immunogold labelling
CO6	Understand the concept and application of nanosensors

Name of Course: CH6B05 Gravimetric Analysis

Credits given: 1

CO No.	CO Statement
CO1	Develop the skill of quantitative precipitation, filtration, incineration and weighing
CO2	Identify the optimum conditions for precipitation.
CO3	Understand the theory of gravimetric analysis