ST PETER'S COLLEGE KOLENCHERY, ERNAKULAM
DEPARTMENT OF CHEMISTRY

- PROGRAMME - BSc Chemistry Model I
- COURSE CODE - CHICRT01 to CH6CRT12
- **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 and to perform the physical chemistry experiments and interpret the results
PSO 4	Create an awareness on various environmental aspects and human rights

PROGRAMME - STRUCTURE

SEMSTER ONE

Course No	Name of Course	Credit	Total Credits/Semester
EN1CC01	Common Course English I	4	
EN1CC02	English/Common Course I	3	18
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	
EN2CC04	English /Common Course II	3	22
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	

SEMSTER THREE

Course No	Name of Course	Credit	Total Credits/Semester
EN3CC05	Common Course English III	4	
HN/ML/SK3CCT02	Second Language	4	18
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	

SEMSTER FIVE

Course No	Name of Course	Credit	Total Credits/Semester
CH5CRT05	Environment Ecology and Human Rights	4	20
CH6CRP03	Qualitative Inorganic Analysis	2	
CH5CRT06	Organic Chemistry III	3	
CH6CRP04	Preparation and basic laboratory techniques	1	
CH5CRT07	Physical Chemistry -I	2	
CH6CRP05	Physical Chemistry Practical	1	
CH5CRT08	Physical Chemistry -II	3	
CH5OPT	Open Course: Chemistry in everday life	3	
CH6PRP01	Project	1	

SEMESTER SIX

Course No	Name of Course	Credit	Total Credits/Semester
CH6CRT09	Applied Inorganic Chemistry	3	23
CH6CRP03	Qualitative Inorganic Analysis	1	
CH6CRT10	Chemistry of Natural Products and Biomolecules	3	
CH6CRP04	Preparation and basic lab skills	1	
CH6CRT11	Equilibrium and Kinetics	3	
CH6CRP05	Physical Chemistry Practicals	1	
CH6CRT12	Solution Chemistry	3	
CH6CRP06	Gravimetric Analysis	2	
CH6CBT	Choice Based Course:Nanochemistry and Technology	3	
CH6PRP01	Project, Industial visit and comprehensive viva-voce	1	
CH6OJPO1	OJT	2	

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: **CH2CRT02 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
C05	To understand the basic concepts of pericyclic reactions
C06	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: CH5CRT05 – Environment Ecology and Human Rights

Credits given: 4

CO No.	CO Statement
CO1	Define the natural resources
CO2	Describe the importance of environmental studies for sustainable development
CO3	Understand the types of pollution and social issues
CO4	Explain the environmental problems due to population growth
CO5	Understand the basic concepts of green chemistry
CO6	Describe the concept of ecological chemistry, transformation processes , Persistent Organic Pollutants and MSDS.
CO7	Understand the history of Human Rights and the Human Rights co-ordination within UN system
CO8	Understand the fundamental Human Rights in Indian Costitution

Name of Course: CH5CRT06 Organic Chemistry III

Credits given: 3

CO No.	CO Statement
CO1	Understand the chemistry of nitro compounds, amines and diazonium salts
CO2	Compare the mechanism of reactions of nitro compounds and amines
CO3	Understand the preparation, properties, structure and applications of heterocyclics.
CO4	Describe the preparation and reactions of active methylene compounds
CO5	Classify organic polymers based on synthesis and application
CO6	Discuss the synthesis and application of dyes
CO7	Classify drugs according to structure and mode of action
CO8	Understand the preparation, properties, structure and applications of carbohydrates

Name of Course: CH5CRT07 PHYSICAL CHEMISTRY -I

Credits given: 2

CO No.	CO Statement
CO1	Illustrate the deviation of real gas from ideal behaviour
CO2	Explain the Maxwell- Boltzmann distribution of velocities and collision properties of gases
CO3	Understand the intermolecular forces and physical properties of liquids.
CO4	Explain the crystal structure, laws of crystallography and the X-ray diffraction by crystals.
CO5	To understand the defects in crystals.
CO6	Understand the concept of liquid crystals
CO7	Describe the types of adsorption isotherms.
CO8	Explain the types, purification and properties of colloids

Name of Course: CH5CRT08 Physical chemistry -II

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	Describe the principles of microwave, infra-red, Raman, electronic and nuclear magnetic resonance spectroscopy.
CO5	Understand the fundamentals of mass spectrometry
CO6	Understand the fundamentals of electron spin resonance spectroscopy

Name of Course: CH5OPT01 Chemistry In Everyday Life

Credits: 3 hours

CO No.	CO Statement
CO1	Demonstrate the types of food additives and food adulterants
CO2	Define the cleansing action of soaps and detergents
CO3	Understand the general formulation of cosmetics
CO4	Describe the classification, use and environmental impacts of plastics, paper and dyes
CO5	Classify the drugs based on their action
CO6	Illustrate the impact of chemistry in agriculture
CO7	Understand the classification and application of nanomaterials

Name of Course: CH6CRP03 Qualitative Inorganic Analysis

Credits given: 3

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: CH6CRP04 Organic Preparations and Laboratory Techniques

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	Illustrate the separation of organic compounds using column chromatography
CO5	Determine the R_f value of organic compounds by TLC

Name of Course: CH6CRP05 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 and viscosity.
CO2	Evaluate the molecular weight of a solute by Rast's Method
CO3	Determine the concentration of a substance by conductometry and potentiometry
CO4	Calculate rate constant of the hydrolysis reaction
CO5	Illustrate the effect of electrolyte in the CST of phenol-water system .
CO6	Determine the rate constant of kinetic experiments using spread sheet program

Name of Course: CH6CRT09 -Inorganic Chemistry

Credits given: 3

CO No.	CO Statement
CO1	Explain the nomenclature and isomerism in coordination compouds
CO2	Define the theories of bonding in coordination complexes
CO3	Describe the spectral and magnetic properties and substitution reactions of coordination complexes
CO4	Explain the classification, preparation, properties and bonding in organometallic compounds
CO5	Illustate the role of inorganic elements in our biological system
CO6	Describe the preparation, properties and structure of boron compounds
CO7	Undersatnd the classification, preparation and structure of interhalogen compounds
CO8	Compare the properties of pseudo halogens with halogens

Name of Course: CH6CRT10 Organic Chemistry - IV

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	Explain the synthesis, properties and reactions of amino acids.
CO4	Classify proteins based on the physical and chemical properties
CO5	Define the various types of photochemical reactions.
CO6	Understand the concept of supramolecular chemistry
CO7	Identify Organic compounds using uv, IR and NMR spectroscopic techniques.
CO8	Understand the basic aspects of enzymes and nucleic acids

Name of Course: CH6CRT11- PHYSICAL CHEMISTRY- III

Credits given: 3

CO No.	CO Statement
CO1	Understand the laws of thermodynamics
CO2	Derive Gibb's Helmholtz 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 and homogenous, heterogenous and enzyme catalysis
CO7	Derive the rate equations for zero, first and second order reactions
CO8	Calculate the pH, degree of dissociation and solubility product of ionic solutions

Name of Course: CH6CRT12 – PHYSICAL CHEMISTRY IV
Credits given: 3

CO No.	CO Statement
CO1	Understand the Raoult's law
CO2	Identify the colligative properties
CO3	Explain the variation of conductivity with concentration
CO4	Determine the transport number
CO5	Differentiate between electrochemical cells and electrolytic cells
CO6	Understand the concept of corrosion and the ways of preventing it
CO7	Define the various types of photochemical reactions.
CO8	Determine the point groups of simple molecules

Name of Course: CH6CBT02 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: CH6CRP06 Gravimetric Analysis
Credits given: 2

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