FATIMACOLLEGE (AUTONOMOUS), MADURAI–625018
COURSE OUTCOMES

NAME OF THE PROGRAMME: M.Sc CHEMISTRY PROGRAMME CODE: PSCH

COURSE CODE	COURSE TITLE	COURSE OUTCOMES
19PG1C1	Inorganic chemistry-I (basic concepts, covalent and ionic bonding, solid state and crystallography, and nuclear chemistry)	CO1: To analyse all chemical species involved in organic and Inorganic reactions and to identify those as acid and bases CO2: To classify the bonds as ionic and covalent and to compare the theories CO3: To categorize the solid systems, to calculate the lattice energy and draw conclusions on their stability CO4: To predict the structures and magnetic properties of Inorganic compounds CO5: To gain indepth knowledge of nuclear reactions, reactors and the applications of radio isotopes in all fields
19PG1C2	Organic chemistry-I (reaction mechanism and stereochemistry)	CO1: To interpret the concept of aromaticity and the main properties of aromatic compounds. CO2: To explore reactivity patterns of conjugated ,aromatic molecules and to evaluate the kinetics and thermodynamics controlled reactions. CO3: To define the fundamentals of chirality, prochirality, symmetry elements and applications of atropisomers. CO4: To comprehend of nucleophiles, electrophiles, electronegativity, and resonance CO5: To sketch the preparation and properties of heterocyclic compounds.
19PG1C3	Physical chemistry-I (Applied electro chemistry & statistical thermodynamics)	CO1: Calculate the molar conductance , degree of dissociation and electrical potential Possess thorough understanding of Debye-Huckel equation CO2: To gain knowledge of Electrocatalysis and Electrosynthesis CO3: Describe indetail about the three laws of thermodynamics CO4: Restate in their own words about the concept of distribution, thermodynamic probability and most probable distribution CO5: Correlate and explain the partial molar properties, chemical potential CO6: Categorize and compare various partition functions - translational, rotational, vibrational and electronic partition functions CO7: Distinguish various Fermi-Dirac and Bose-Einstein statistics and Maxwell-Boltzmann statistics based on the nature of theparticles.

19PG1C4	Inorganic qualitative analysis	CO1: To study the principle of distribution of common and rare metal ions in different groups. CO2: To know the inter- and intra group precipitation and separation of metal ions. CO3: To improve the skill in the qualitative analysis of rare metal ions in different groups. CO4: To identify the methodology to analyse a metal ion in the presence of another metalion.
19PG1C5	Organic qualitative analysis	CO1: To be skilled in the separation of binary organic mixtures CO2: To gain knowledge on the skills of doing micro level analysis CO3: To know the methods of qualitative analysis of organic compounds CO4: To learn about the preparation of suitable derivative of the organic functional groups CO5: To prepare organic compounds.
19C1EDC	Essentials of life	CO1: To acquire knowledge of common medicine. CO2: To express the concentration of solution in volumetric analysis. CO3: To differentiate column and TLC technique. CO4: To classify the different types of polymers and its characteristics. CO5: To analyze the different types of soil and differentiate natural fertilizer from artificial fertilizer.
19PG2C6	Inorganic chemistry –II (Advanced coordination chemistry)	CO1: Compare the stabilities of complexes using stability constants and to identify the types of isomers. CO2: To describe the theories of co-ordination compounds to understand the colours and magnetic properties and their position in the spectrochemical series. CO3: Investigate the structures of complexes using IR,NMR ,E SR and other spectral Techniques. CO4: To possess a thorough understanding of electronic spectra of complexes. CO5: To arrive at the mechanisms of substitution reactions in six and four coordinated complexes using kinetic studies.
19PG2C7	Organic chemistry –II (Elimination and addition reactions, organic spectroscopy and conformational analysis)	CO1:To comprehend the mechanism of elimination and substitution reactions and to apply the stereochemistry in E1, E2, ionic and pyrolytic eliminations. CO2:To interpret the concept of nucleophilic and free radical addition reactions and metal hydride reduction and to discriminate the reactivity of organometalic reagents. CO3: To explore reactivity patterns of substituted cyclohexanes and to employ conformational reactivity in cis and trans decalins and to apply conformations in SN1, SN2, ionic, pyrolytic eliminations and NGP reactions. CO4: To acquire a complete knowledge of the principles of UV, IR spectroscopy and to examine the various functional groups present in organic molecules using λmax and IR frequency values . CO5: To differentiate the molecular rearrangements and to solve the simple problems and to recall the various naming reactions and to interpret the products.

19PG2C8	Physical chemistry –II (Chemical kinetics and quantum mechanics)	CO1: To acquire knowledge about the basic concepts of chemical kinetics CO2: To identify and analyze the effect of physical parameters μ, □, D on rate of reaction CO3: To derive rate constant for reactions using Lindemann, Hinshelwood, RRK, RRKM Theories. CO4: To develop a knowledge and understanding of the concept Normalisation and orthogonalization and to solve Schrodinger wave equation for particle in a one dimensional box, three dimensional box and Rigid rotator. CO5: To apply variation and perturbation method to He atom6.To calculate Delocalisation energy and π-bond order of conjugated molecules like cyclobutadiene, cyclopropenyl system and 1,3 butadiene.
19PG2C9	Inorganic Practicals –II (Inorganic quantitative analysis)	CO1: To enable the students to acquire the quantitative skills in volumetric analysis and gravimetric analysis CO2: To improve the skill in quantitative estimation of metal ions by various titric methods CO3: To identify the methodology to estimate a metal ion in the presence of another metal ion. CO4: To be skilled in synthesis of inorganic complexes.
19PG2C10	Organic Practicals –II (Organic quantitative analysis)	CO1: To develop the ability for synthesizing organic compounds by single stage. CO2: To develop the ability for synthesizing organic compounds by double stage. CO3: To study the reaction mechanism.
19C2EDC	EDC(Essentials of life)	CO1: To acquire knowledge of common medicine. CO2: To express the concentration of solution in volumetric analysis. CO3: To differentiate column and TLC technique. CO4: To classify the different types of polymers and its characteristics. CO5: To analyze the different types of soil and differentiate natural fertilizer from artificial fertilizer.
19PG3C11	Organic chemisty-III (Spectroscopy and pericyclic reactions)	CO1: To acquire a complete knowledge of the basic principles of 1H-NMR, 13C-NMR and Mass spectroscopy CO2: To be acquainted with complete knowledge of photochemistry of ketone & cyclo addition reactions and to develop an understanding of the significance of the number, and splitting of signals in NMR CO3: To be competent to assign structures to simple molecules on the basis of nuclear magnetic resonance spectra CO4: To distinguish the similarities and differences of Pericyclic reactions and Cyclo addition and sigmatropic reactions CO5: To apply the Spectral concepts to solve the problems, to elucidate the structures of simple organic compounds using the data from all the spectral techniques

19PG3C12	Physical chemistry-III (Group theory, surface chemistry and macromolecules)	CO1: To learn about symmetry elements and symmetry operations, the point groups and character table CO2: To Describe the selection rule for infrared-active and Raman active transitions, electronic transitions CO3: To analyse the hybridization of given compounds and to apply HMO theory to Ethylene and some conjugated systems CO4: To Classify of surface active agents, Polymers, and to derive Gibbs adsorption and BET isotherms CO5: To explain the kinetics of vinyl, cationic and anionic polymerizations and to determine the mass of polymers.
19PG3C13	Green chemistry	CO1: To know about the alternative feedstock To study about the process and advantages of alternative materials CO2: To get familiarise about the green house technology CO3: To understand the advantage and disadvantages of protecting the cultivation. CO4: To study about the biocatalytic reactions and fermentation CO5: To learn about the industrial case studies
19PG3CE1	Material chemistry	CO1: Distinguish between bulk material and nanomaterials CO2: Choose the suitable synthetic methods to prepare particular nanomaterials CO3: Interpret the structure of nanomaterials using various characterisation techniques CO4: Categorize and identify the different types Carbon nano structures CO5: Summarise the uses of nanomaterials in various fields
19PG3CE2	Bio-organic chemistry	CO1: To tabulate the functions and uses of enzymes CO2: To design of drugs using molecular modelling
19PG3C14	Physical Practical's-I (Electrical experiments-I)	CO1: Verify Oswald's dilution law and calculate the degree of dissociation of acetic acid using the following Conductance values. CO2: Determine the rate constant for the alkaline hydrolysis of ethyl acetate by conductivity method CO3: Estimate the amount of unknown CH_3COOH and HCl present in the mixture of 0.01N HCl and CH_3COOH by titrating against std. NaOH either by using pH values or Conductance values CO4: Determine the rate constant for the oxidation of ethyl alcohol by $K_2Cr_2O_7$ spectrophotometrically CO5: Estimate the amount of given Ferrous sulphate by titrating against Potassium dichromate potentiometrically.

19PG4C15	Inorganic chemistry –III (Organometallic chemistry-I &II, Basic concepts for bio-inorganic chemistry-I&II and inorganic chains, rings and cages)	CO1: Illustrate the structure and mode of bonding in organometallic complexes CO2: Apply the different electron counting procedures to predict the shape and stability of organometallic complexes. CO3: Illustrate the mechanism of dioxygen binding in various oxygen carrier proteins CO4: Classify and identify the different types of metalloenzymes and metallo proteins based on their biological functions. CO5: Interpret the structure of borazines, boranes and carboranes
19PG4C16	Organic chemistry –IV (Retrosynthesis, reactions and reagents, natural Products)	CO1: To differentiate the carbon –carbon bond forming reactions and to interpret the products and to explore reactivity patterns of various coupling reactions CO2: To elucidate the structural units of quinine, morphine, □-pinene and □-codinene CO3: To correlate the skeletal units of nucleotides and nucleosides- RNA and DNA CO4: To categorize the reducing and oxidizing agents and its applications. CO5: To Sketch the effective and logical synthetic route for the synthesis of new molecules
19PG4C17	Physical chemistry –IV (Spectroscopy, kinetic theory of gases, photochemistry and radiation chemistry)	CO1: To Outline the selection rules for rotational and vibrational spectra and rationalize the role of the molecular dipole moment in the selection rules. CO2: To apply knowledge to detailedunderstanding of electronic states of atoms, molecules, Franck-Condon Principle. CO3: To predict the number of ESR signals of organic radical anions, Complexes and NQR transitions. CO4: To understand molecular velocities in one, two and three dimensions CO5: To distinguish between Fluorescence and Phosphorescence, Primary and secondary processes, radiative and non-radiative transitions, to compare Ground and excited state acidity, dipole moments and redox potentials
19PG4CE3/	Analytical Chemistry	CO1: To acquire the complete knowledge of C language CO2: To develop logics which will help them to create programs, applications of chemistry problems in C. CO3: To explicate the theoretical principles of selected instrumental methods within electro analytical and spectrometric/spectrophotometric methods, and main components in such analytical instruments. CO4: To explain the confidence level and confidence limit, the sources of random errors and effects of random errors on analytical results. CO5: To illuminate the theoretical principles of various separation techniques in chromatography, and typical applications of chromatographic techniques.
19PG4CE4	Chemical Engineering	CO1: To write C- Program using various features of C- language CO2: To categorize the various conditioning methods in water treatment CO3: To apply the principles involved in spectrophotometric analysis. CO4: To compare the mechanism between dry corrosion and wet corrosion CO5: To synthesize some industrially important polymers.

19PG4C18	Physical practicals-II (Non-electrical experiments)	CO1: To study the adsoption of oxalic acid on charcoal CO2: To verify the Freundlich adsorption isotherm for the adsorption of acetic acid on activated charcoal CO3: To determine the rate constant for acid catalysed hydrolysis methyl acetate at different temperatures. CO4: To calculate the activation energy of acid catalysed hydrolysis methyl acetate at different temperatures. CO5: To study the effect of ionic strength on rate constant
19PG4CPR	Project	CO1: To carry out scientific experiments CO2: To accurately record and analyze the results of such experiments