Programme Specific Outcomes (PSO) and Course Outcomes (CO) at Rajah Serfoji Government College, Thanjavur-613005, Tamilnadu

DEPARTMENT OF CHEMISTRY

B.Sc., - CHEMISTRY

PSO: Upon completion of the B.Sc. Degree programmes, students will be able to-

- Understand all the traditional branches of Physical, Inorganic, organic and Analytical chemistry.
- The experimental work will be continues throughout the session to develop the theoretical knowledge and practical as well.
- Graduates from this course will be better prepared to understand the new environment friendly systems and can understand the processes that the chemical industry is adopting.
- The course has been designed to have insight in almost all the aspects of chemistry and to build a solid foundation in the subject to choose a career in industry or academics or research
- The employment areas for the B. Sc. Chemistry graduates include pharmaceutical industries, chemical manufactures, cement and leather factories, plastic industries, agro industries etc
- There are various higher study options for candidates who have completed their PG in Chemistry.
- Understand good laboratory practices and safety.
- ✤ Make aware and handle the sophisticated instruments/equipments.

Course code/Paper/ Semester	Title	Course Outcomes
	General Chemistry – I	 Understand the structure of atoms and will
CC I		apply the periodic laws to predict chemical and
Sem I		Physical properties of the elements.
		 Comprehend the nature of compounds, and
		chemical equations and apply them in
		stochiometric calculations.
S2ACH1	Allied Chemistry – I	 To apply the principles of kinetics in
First Allied Course – I		calculating reaction rates, activation energies,
Sem I		and order of reactions.
		 know about the importance of phase rule and
		its applications and energetic.
		 understand the utility of organic reactions and

		 appreciate the structure-activity relationship of certain drugs. Determinate rate law of chemical change based on experimental data. Be talented to classify the reaction order for a chemical change. Understand the concept order of kinetics and when they apply Studies to classify catalysts
S2CH2 CC2 Sem II	General Chemistry – II	 Understand the nature and variety of forms of matter and list the physical properties Understand the structure of atoms ,predict chemical and physical properties of the elements
S2ACH2 Second Allied Course – II Sem II	Allied Chemistry – II	 Exhibit good work ethic and study skills as evidenced by their record of showing up to class on time and having all objectives and key terms identified within the chapter. Use the vocabulary of chemistry, both language and mathematical, to explain concepts Utilize safe and course-appropriate laboratory techniques. Produce writing that shows original thinking, depth of analysis, and comprehension of basic course content. Identify examples of how chemistry affects the quality of their lives.
S2ACHP Allied chemistry practicals Sem II	Allied Chemistry Practicals	 To understand the principle of volumetric analysis such as acidimetry, alkalimetry, permanganometry, and iodometry. Prepare to identify the organic compounds
S2CHP1 CC3 Sem II	Volumetric Analysis Practical – I	The principle of volumetric analysis such as acidimetry, alkalimetry, permanganimetry, dichr ometry, iodo and iodimetry, argentometry and complexometry.
S3CH3 CC4 Sem III	General Chemistry – III	 Understand and apply the principles of gas behavior, properties of aqueous solutions. Apply the principles of chemical equilibrium
S3SB1E Skill Based Elective I Sem III	Food And Nutrition	 Importance of Balanced Diet and its components. Identify and control adulterants in various foods and evaluate food quality Acquire the knowledge on the basic concepts of biological knowledge of food and human welfare.

S3ACH1 First Allied Course – I Sem III	Allied Chemistry – II	 Exhibit good work ethic and study skills as evidenced by their record of showing up to class on time and having all objectives and key terms identified within the chapter. Use the vocabulary of chemistry, both language and mathematical, to explain concepts Utilize safe and course-appropriate laboratory techniques. Produce writing that shows original thinking, depth of analysis, and comprehension of basic course content. Identify examples of how chemistry affects the quality of their lives.
S4CH4 CC5 Sem IV	General Chemistry – IV	 Write the name and formula for any ionic or binary covalent compound, as well as using these to complete a balance chemical equation. Use stoichiometric data to make calculations with balanced equations. Apply the principles of thermo chemistry to solve problems involving heat transfer.
S4CHP2 CC6 Sem IV	Inorganic Qualitative Analysis Practical - II	Understand Qualitative analysis of inorganic salt mixtures.
S4SB2D Skill Based Elective II Sem IV	Dyeing Techniques And Water Treatment	 Understand the techniques for developing different products. Exploring and applying the old and new ideas of designing in different sector.
S4ACH2 Second Allied Course – II Sem IV	Allied Chemistry – II	 Exhibit good work ethic and study skills as evidenced by their record of showing up to class on time and having all objectives and key terms identified within the chapter. Use the vocabulary of chemistry, both language and mathematical, to explain concepts Utilize safe and course-appropriate laborator techniques. Produce writing that shows original thinking, depth of analysis, and comprehension of basic course content.
S4ACHP Allied chemistry practicals Sem IV	Allied Chemistry Practicals	 To understand the principle of volumetric analysis such as acidimetry, alkalimetry, permanganometry, and iodometry. Prepare to identify the organic compounds.
S5CH5 CC7 Sem V	Inorganic Chemistry – I	 To classify the types of mechanism involved in coordination compounds reactions. To explain the bond formation of coordination compounds according to Valence bond theory, Crystal Field Theory and Molecular Orbital Theory. inorganic complexes in their real life. For example, estimating the hardness of water in

		their own villages
S5CH6 CC8 Sem V	Organic Chemistry – I	 Identify ,classify and draw strctures of organic molecules. Apply the basic rules of organic nomenclature to interrelate between structures and names of organic compounds.
S5CHP3 CC9 Sem V	Organic Chemistry Practical – III	 Understand the basic principles of qualitative analysis of organic compounds. To Prepare organic compounds in a single stage.
S5CHEL1A MEC1-Elective Course Sem V	Physical Chemistry - I	 State and apply the laws of thermodynamics Perform calculations with ideal and real gases. Predict chemical equilibrium and spontaneity of reactions by using thermodynamic principles. Construct phase diagrams.
S5CHEL2A MEC2-Elective Course Sem V	Analytical Chemistry	 Construct phase diagrams. Understand the principles of analytical chemistry. Use statistical method for evaluating and interpreting data. Understand the principles of chromatographic methods
S5CHELO1 NMEC1- Non Major Elective Sem V	Soil Science	 Understand the role of soil forming factors and processes in soil formation. Imparts knowledge on essential nutrients, soil fertility, nutrient transformations in soil. Manures, fertilizers and soil fertility management through various approaches. Useful in making decisions on nutrient dose, choice of fertilizers and method of application etc. practiced in crop production. Understand various Nutrient management concepts and Nutrient use efficiencies of major and micronutrients and enhancement techniques. gain knowledge on chemical composition and nutritional quality of various field and horticultural crops.
S5SB3D Skill Based Elective -III Sem V	Agricultural Chemistry	 To gain knowledge about types, Uses and preparation of synthetic Fertilizer. understanding the behaviour of soils in crop production and management. Classify soil type, soil texture and soil structure required for an agricultural field Analyze soil, water and nutrients related to crop growth .
S6CH7 CC11 Sem VI	Inorganic Chemistry – II	 To know the applications of nuclear chemistry nuclear structure, stability, decay, nuclear reactions.

S6CH8 CC12 Sem VI	Organic Chemistry – II	 Understand the interaction between radiation and matter: retardation, absorption and scattering. Learnt a chemical and biological effects of radiation: radiation chemistry. understand Interstitial compounds. Apply the principles of radical reactions to write a mechanism for these reaction Write equations for reactions involving
		 alcohols, ethers, and aromatic compounds. Apply the principles of organic chemistry to determine the advantages and disadvantages of biochemical molecules in the human body.
	Gravimetric Analysis	 Prepare organic compounds of gravimetric
	Practical - IV	analysis
Sem VI		 To determine the melting point and boiling point of simple organic compounds.
S6CHP5	Physical Chemistry	 Understand the principles of partition
	Practical – V	coefficient, equilibrium constant, rate constant,
Sem VI		molecular weight and electrochemistry.
S6CHEL3A MEC3 - Elective course Sem VI	Physical Chemistry – II	 Relate macroscopic thermodynamic properties to microscopic states by using the principles of statistical thermodynamics. Relate reaction kinetics to potential reaction mechanisms. Calculate the temperature dependence of rate constant and relate it to activation energy.
S6CHELO2 NMEC1- Non major elective Sem VI	Industrial Chemistry	 Basic application of chemistry In industries like water, cement , sugar, rubber, plastics etc To know the quality requirement of water, analysis and treatment methods. Understand the role of chemicals in development of various value added products viz.fuels, lubricants and agrochemicals Understand the basic theory behind the behaviour of surfactants Understand how to select a particular surfactant for a particular application • Analyse the role of surfactant in various value added applications

Programme Specific Outcomes (PSO) and Course Outcomes (CO) at Rajah Serfoji Government College, Thanjavur-613005, Tamilnadu

Department of Chemistry

M.Sc., - CHEMISTRY

PSO: Upon completion of the M.Sc. Degree programmes, students will be able to

- The students will improve their competencies on par with their counterparts in premier institutions across the nation.
- ✤ The students will become technically sound to handle the advance analytical instruments.
- The students will intensify their desire to contribute to the nation in the capacity of chemist or as innovator by taking up research career afterwards.
- The students will become well versed in the mechanisms of all types of high level and complicated chemical reactions.
- Know the structure and bonding in molecules/ ions and predict the Structure of molecule/ions.
- Understand good laboratory practices and safety.
- ✤ Learn the classical status of thermodynamics.
- Gathers attention about the physical aspects of atomic structure, various energy transformation, molecular assembly in nanolevel and significance of electrochemistry.

Course Code/ Paper/ Semester	Title	Course Outcomes
S1PCH1 CC I Sem I	Inorganic Chemistry – I	 Predict geometrics of simple molecules Use of group theory to recognize and assign symmetry characteristics to molecules. Understand the metal complexes in biological system. To know the structure and bonding in
S1PCH2 CC 2	Organic Chemistry – I	 molecules and ions At the completion of this course the student will be able to
Sem I		 Acquire the skills for correct stereochemical assignment and interpretation in rather simple organic molecules Identify ,classify and draw structures of organic molecules Apply the basic rules of organic nomenclature to

		interrelate between structures of organic molecules To identify the stereochemical notation
S1PCHP1 CC 3 Sem I	Inorganic Chemistry Practical – I	 To understand the procedure of semi micro qualitative analysis and colorimetric analysis. How to predict the outcome and mechanism of some simple organic reactions, using a basic understanding of the relative reactivity of functional groups. How to use the scientific method to create, test, and evaluate a hypothesis. How to characterize products by physical and spectroscopic methods.
S1PCHP2 CC 4 Sem I	Organic Chemistry Practical – I	 To familiarize the solubility nature of organic substances of different functional Group. To learn the pilot separation of bimixtures . To familiarize the systematic producers organic substances analysis To learn two stage preparation involving molecular rearrangement oxidation . To know the preparation involving nitration and bromination To learn the conformatory test for various functional groups. To learn the preparations of derivative all functional groups.
S1PCHEL1A EC 1 Sem I	Analytical Chemistry	 Understand the principles of analytical chemistry. Understand the procedures and applications of the analytical techniques. Use statistical method for evaluating and interpreting data. To obtain a detailed knowledge about Atomic absorption spectroscopy for studying theconcentration of various elements To get a basic idea about polarography, its theory and applications To use the polarographic technique for studying the chemical equilibria.
S2PCH3 CC 5 Sem II	Inorganic Chemistry – II	 Apply the concepts of Inorganic Chemistry to solve a range of different chemical problems. Basic concept of bio inorganic chemistry To predict the relative stability of oxidation states and corrosion tendency under various conditions. To study the role of inorganic substances in biological acivities. Use of Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds
S2PCH4 CC 6 Sem II	Organic Chemistry – II	 Recall reagents and predict products for a defined set of organic reactions. To understand the naming reaction and molecular

S2PCHP3 CC 7 Sem II	Inorganic Chemistry Practical – II	 rearrangement To have and importance of natural products, Terpenes Alkaloids and Vitamins. To recognize either molecule is aromatic,non- aromatic or antiaromatic. To describe mechanism of different aliphatic nucleophillic substitution reactions. To estimate the individual amount of mixture by gravimetric and volumetric To prepare single stage preparation of inorganic compounds
S2PCHP24 CC 8 Sem II	Organic Chemistry Practical – II	 Assemble glassware and perform the following techniques as a part of synthetic procedure distillation, reflux, separation, isolation, and crystallization. Assemble glassware and perform syntheses requiring special conditions, including reactions under the reduced pressure, reactions in the air-and/or water protected systems, microwave induced reactions, etc.
S2PCHEL2A EC 2 Sem II	Physical Chemistry – I	 Basic idea about quantum chemistry. The mathematics associated with quantum statistics including certain aspects of linear algebra. The quantum chemistry and how to apply this knowledge to atomic and molecular structure. Know the Eigen function, Eigen value, operator and postulates of quantum mechanics. Learn two and three dimensional box, mechanics of particle. The derivation of rate equations from mechanistic data. The use of simple models for predictive understanding of physical phenomena
S3PCH5 CC 9 Sem III	Inorganic Chemistry - III	 To understand the basic concepts of spectroscopy To understand the applications of bio inorganic chemistry To acquire the basic knowledgein examining structure and measure properties os solid state materials using analytical tools. Describe the selection rule for infrared-active transitions. Determine the vibrations for a triatomic molecule and identify whether they are infrared-active. Determine whether the molecular vibrations of a triatomic molecule are Raman active.

S3PCH6 CC 10 Sem III	Organic Chemistry - III	 Predict the physical properties of organic chemicals based on their structures. Analyze the influence of structure and physical properties of organic molecules on their biological properties. Understand the factors affecting UV- absorption spectra, Interpret IRspectra on basic values of IR-frequencies. Discuss the problem of UV, IR and NMR. To understand the Classification- structural elucidation and synthesis of cholesterol. To know the synthesis and structural elucidation of heterocyclic compounds
S3PCH7 CC 11 Sem III	Physical Chemistry – II	 To study the concept of group theory and its applications. Solve Schrodinger wave equation for Rigid rotor and Linear harmonic oscillator and calculate their respective energies. Understand the concept of partition function, its physical significance and calculation of molar and atomic partition function. Recall the basics of thermodynamics, photochemistry and electrochemistry Differentiate the classical and quantum approaches. Describe Kinetics of reaction in solution and in catalytic reactions. understand the principles of Molecular Spectroscopy
S3PCHP5 CC 12 Sem III	Physical Chemistry Non Electrical Practical	 Basic principle of kinetics , partition, CST, TT and Phase diagram. An appreciation for modern problems and scientific controversies in physical chemistry. How to design and perform experiments to determine the rate, order, and activation energy of chemical reactions by varying concentrations and/or temperature. To determination of the molar mass of an unknown non electrolyte and an unknown electrolyte from a freezing point depression experiment
S3PCHEL3A EC 3 Sem III	Industrial Chemistry	 Basic application of chemistry In industries like water, cement , sugar, rubber, plastics etc To know the quality requirement of water, analysis and treatment methods. Understand the role of chemicals in development of various value added products viz.fuels, lubricants and agrochemicals Understand the basic theory behind the behaviour of surfactants Understand how to select a particular surfactant for a particular application

		 Analyse the role of surfactant in various value added applications like detergency, adhesives, surface coatings, petroleum, pharmaceuticals etc. Understand the importance of crude petroleum as a resource for energy and chemicals
S4PCH8 CC 13 Sem IV	Physical Chemistry – III	 Ability to interpret spectroscopic data for compound identification To study the fundamental principles and concepts of Quantum chemistry To impart knowledge on molecular spectroscopy To learn about Transport and Activity of ions and Electrolyte equilibrium in a solutions. To gain the depth knowledge in Elect kinetic phenomena.
S4PCHP6 CC 14 Sem IV	Physical Chemistry Electrical Practical	 To understand the principle of pH meter. Methods to measure equilibrium concentrations and equilibrium constants for acid-base, solubility, and complexation reactions given initial concentrations of reactant. To the preparation of buffer solutions at a required pH, given a choice of solutions ofacid/conjugate base pairs. To know the principle and mechanism of Conductormetric and potentiometric titrations
S4PCSPW CC 15 Sem IV	Project Work	 To understand the principles of research To understand the concepts of laboratory instruments and techniques
S4PCHEL4A EC 4 Sem IV	Applied Chemistry	 Demonstrate skills in sampling , processing, preservation of environmental samples, quality assurance and quality control procedures in performance of analytical instruments use of analytical instruments in environmental pollution analysis and in the field of selected industries critically analyse and interpret scientific data
S4PCHEL5A EC 5 Sem IV	Nano And Computational Chemistry	

Programme Specific Outcomes (PSO) and Course Outcomes (CO) at Rajah Serfoji Government College, Thanjavur-613005, Tamilnadu

M.Phil., CHEMISTRY

PSO: Pursue Ph.D programme with norms of scholarly research that chip into the augmentation of students personal and professional development

- Acquire in-depth knowledge of the process of developing new materials as well as gain expertised of well defined area of research in physics.
- Develop innovative methodologies to tackle issues identified and contributing to the development of technological knowledge and intellectual property
- Evolve as excellent professionals in the public sector units BARC/ISRO/DRDO/CSIR laboratories and contribute towards the scientific growth of the country
- Analyze the impact of new emerging areas of physics in the global, economic, environmental and societal context.
- ✤ Adopt Blooms Taxonomy in educational objectives
- ✤ Optimize counseling and guidance skills both for themselves and society
- ✤ Develop and enhance leadership and teaching skills.

Course code/Paper/ Semester	Title	Course Outcomes
S1MCH1 CC1	Research Methodology	 Be able to formulate research questions and develop a sufficiently coherent research design
Sem I		 Be able to assess the appropriateness of different kinds of research designs and methodology,
		 To develop independent thinking for critically analyzing research report
S1MCH2 CC2 Sem I	Physical Methods in Chemistry	 Students will be able to understand the most commonly used techniques in structure determination. Students will be able to apply the knowledge they have learned to identify unknown molecules with a given set of characteristic spectra. Students will use spectroscopic data to make meaningful observations about the chemical properties of compounds.
S1MPTL3	Teaching and Learning	 To understand the terms communication
CC3	Skills	Technology and Computer mediated teaching and
Sem I		develop multimedia / e- content in their respective

S1MCH4A CC4 Sem I	1. Principles and advances in medicinal chemistry	 subject. To understand the communication process through the web To acquire the knowledge of Instructional Technology and its Applications To understand the nomenclature and mechanism of drugs. Idea of drug discovery and Drug Design and Pharmacokinetics Principle of Combinatorial Synthesis To understand the Application of Drugs for Treatment
S1MCH4B CC4 Sem I	2. Synthetic chemistry	To identify, construct and synthesize the medicinally important new targets and their by screen their antimicrobial activities.
S1MCH4C CC4 Sem I	3. Reaction kinetics and advances in Nano Chemistry	 Understand about the LFER,Taft equation and Yukawa Tsuno equation. Will have an idea about oxidation reaction and reaction mechanism. Will be aware of green synthesis and nano materials. Will be comprehend the structural characterization chemical and surface characterization Will gain research knowledge about the photocatalytic degradation of dyes by nanomaterials
S1MCH4D CC4 Sem I	4. Organic Reaction Mechanism	 Use curly arrow reaction mechanisms and knowledge of the relative stability of intermediates to predict and / or account for the products of reactions. Recognize the functional group transformation Design experiments to probe asymmetric induction mechanisms Recognize principle of stereochemistry Combine reactions to achieve simple synthesis of target molecules.
S1MCH4E CC4 Sem I	5. Chemistry of polymers and Deep Eutectic solvents	 To have an about different types of polymer synthesis and its characterization Will be able comprehend the applications of DES in Nano technology
S1MCH4F CC4 Sem I	6. Organic synthesis towards Heterocycles	 Students can understand the basic concepts like, nomenclature, aromaticity and basic character of various heterocyclic compounds. Students can able to use various spectroscopic techniques for the structural identification heterocycles. After study this paper, students can apply and

		develop novel methods in the synthesis of different heterocycles
S1MCH4G CC4 Sem I	7. Crystal Growth and Nonlinear Optics	 To understand the theoretical concepts involved in crystal growth and basic processes and features of nonlinear optical materials and to learn the basic characterizing techniques of materials Recognize the functional group transformation After study this paper, students can apply and develop novel methods in the synthesis of different nonlinear optical materials
S1MCH4H CC4 Sem I	8.Introduction on Phytochemistry and Nutrition Analysis	 After study learned knowledge of variety of mushrooms. Acquired knowledge about sterilization and culture method s. Get the knowledge about nutrition Gained knowledge about harvest Management methods
S2MCHD CC5 SEM2	Dissertation and viva Voce	 To understand the principles of research To understand the concepts of laboratory instruments and techniques

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