

Department of Chemistry
Nesamony Memorial Christian College, Marthandam
M. Sc. Chemistry
Course Outcome

Semester – I					
M.Sc. Chemistry					
Part	Course Name	Course Code	Credit	Hours	Course Outcome
Part - A	Core Course – I: Organic Reaction Mechanism	VCHC11	4	5	Students will be able CO1 Recall the basic principles of organic chemistry. CO2 Understand the formation and detection of reaction intermediates of organic 18 reactions. CO3 Predict the reaction mechanism of organic reactions and stereochemistry of organic compounds. CO4 Apply the principles of kinetic and non-kinetic methods to determine the mechanism of reactions. CO5 Design and synthesize new organic compounds by correlating the stereochemistry of organic compounds
	Core Course -II : Structure and Bonding in Inorganic Compounds	VCHC12	4	5	Students will be able CO1 Predict the geometry of main group compounds and clusters. CO2 Explain about the packing of ions in crystals and apply the radius ratio rule to predict the coordination number of cautions. CO3 Understand the various types of ionic crystal systems and analyze their structural features. CO4 Explain the crystal growth methods. CO5 Understand the various types of defects in crystals.
	Core Course -III : Organic Chemistry Practical - I	VCHL11	3	5	Students will be able CO1 Explain the basic separation procedures of organic mixtures. CO2 Select the separation methods to separate the organic mixtures. CO3 Classify the functional groups using systematic procedure. CO4 Determine the physical properties of organic compounds. CO5 Analyze the separated organic components systematically and derivative them suitable
	Core Course -IV : Physical Chemistry	VCHL12	3	5	Students will be able CO1 Recall the principles associated with various physical chemistry experiments.

	Practical				<p>CO2 Explain the principles of conduct to metric titrations and estimate the strength of solutions.</p> <p>CO3 Observe and record systematically the readings in all the experiments.</p> <p>CO4 Calculate and process the experimentally measured values and compare with graphical data.</p> <p>CO5 Interpret the experimental data scientifically to improve students' efficiency for societal developments.</p>
	Elective –I: Nano materials and Nanotechnology	VCHE12	3	5	<p>Students will be able</p> <p>CO1 Explain methods of fabricating nanostructures.</p> <p>CO2 Relate the unique properties of nano materials to reduce dimensionality of the material.</p> <p>CO3 Describe tools for properties of nanostructures.</p> <p>CO4 Discuss applications of nano materials.</p> <p>CO5 Understand the health and safety related to nanomaterial.</p>
	Elective –II: Electro chemistry	VCHE13	3	5	<p>Students will be able</p> <p>CO1 Understand the behaviour of electrolytes in solution and compare the structures of electrical double layer of different models.</p> <p>CO2 Predict the kinetics of electrode reactions applying Butler-Volmer and Tafel equations</p> <p>CO3 Study the mechanism of multi- step electrode reactions.</p> <p>CO4 Discuss the theories of electrolytes, electrical double layer, electrodicts and activity coefficient of electrolytes</p> <p>CO5 Have knowledge on storage devices and electrochemical reaction mechanism.</p>
Semester – II M.Sc.Chemistry					
Part - A	Core Course –V: Organic reaction mechanism	VCHC21	4	5	<p>Students will be able</p> <p>CO1 Recall the basic principles of chemical reactions.</p> <p>CO2 Understand the mechanism of various types of organic reactions.</p> <p>CO3 Predict the suitable reagents for the conversion of selective organic compounds.</p> <p>CO4 Correlate the principles of substitution, elimination, and addition reactions.</p> <p>CO5 Design new routes to synthesis organic compounds.</p>
	Core Course -VI : Physical Chemisty	VCHC22	4	5	<p>Students will be able</p> <p>CO1 Explain the classical and statistical concepts of thermodynamics.</p> <p>CO2 Compare and correlate the thermodynamic concepts to study the kinetics of chemical reactions.</p> <p>CO3 Discuss the various thermodynamic and kinetic determination.</p> <p>CO4 Evaluate the thermodynamic methods for real gases ad mixtures.</p> <p>CO5 Compare the theories of reactions rates and fast reactions.</p>
	Core Course -VII:	VCHL21	3	4	Students will be able

	Organic Chemistry Practical				<p>CO1 Recall the basic principles of organic quantitative analysis.</p> <p>CO2 Explain the method of estimation of organic compounds.</p> <p>CO3 Develop the skills to estimate organic compounds.</p> <p>CO4 Develop the skills to handle corrosive and toxic chemicals in organic preparations.</p> <p>CO5 Categorize organic reactions and their mechanisms relevant to organic preparations.</p>
	Core Course –VIII: Inorganic Chemistry Practical	VCHL22	3	4	<p>Students will be able:</p> <p>CO1 Explain the principles and techniques and have skills of qualitative analysis of familiar and less familiar cautions in a mixture.</p> <p>CO2 Analyze a metal ion in the presence of another metal ion.</p> <p>CO3 Acquire the qualitative analytical skills by selecting suitable confirmatory tests and spot tests.</p> <p>CO4 Describe the principles, techniques and skills related to quantitative determination of ions in a mixture by complexometric titration.</p> <p>CO5 Estimate one metal ion in presence of another metal ion by complexometric m</p>
	Elective –III: Green Chemistry	VCHE22	3	4	<p>Students will be able:</p> <p>CO1 Recall the basic chemical techniques used in conventional industrial preparations and in green innovations.</p> <p>CO2 Understand the various techniques used in chemical industries and in laboratory.</p> <p>CO3 Compare the advantages of organic reactions assisted by renewable energy sources and non-renewable energy sources.</p> <p>CO4 Apply the principles of PTC, ionic liquid, microwave and ultrasonic assisted organic synthesis.</p> <p>CO5 Design and synthesize new organic compounds by green methods.</p>
	Elective –IV: Bio Inorganic Chemistry	VCHE23	3	4	<p>Students will be able:</p> <p>CO1 Analyze trace elements.</p> <p>CO2 Explain the biological redox systems.</p> <p>CO3 Gain skill in analyzing the toxicity in metals.</p> <p>CO4 Get experience in diagnosis.</p> <p>CO5 Get experience in diagnosis.</p>
	SEC – I: Industrial Chemistry	VCHSE21	2	4	<p>Students will be able:</p> <p>CO1 Understand the constituents, classification, properties and applications of paints.</p> <p>CO2 Exemplify the manufacture of cement and ceramics.</p> <p>CO3 Know the composition of cementing materials, process of setting and hardening of cement.</p> <p>CO4 Understand the types of petroleum products and their applications.</p> <p>CO5 Illustrate various methods for treatment of waste.</p>

Semester – III **M.Sc. Chemistry**

Part - A	Core Course -9 : Organic synthesis and Photochemistry	WCHM31	5	6	Students will be able CO1 Recall the basic principles of organic chemistry and to understand the various reactions of organic compounds with reaction mechanisms. CO2 Understand the versatility of various special reagents and to correlate their reactivity with various reaction conditions CO3 Implement the synthetic strategies in the preparation of various organic compounds. CO4 Predict the suitability of reaction conditions in the preparation of tailor-made organic compounds. CO5 Design and synthesize novel organic compounds with the methodologies learnt during the course
	Core Course -10: Coordination Chemistry-I	WCHM32	5	6	CO1 Understand and comprehend various theories of coordination compounds. CO2 Understand the electronic spectroscopic and magnetic properties of coordination complexes. CO3 Explain the stability of complexes and various experimental methods to determine the stability of complexes. CO4 Comprehend the kinetics and mechanism of substitution reactions in octahedral and square planar complexes. CO5 Understand the versatility of electron transfer reactions and photochemistry of coordination complexes.
	Core Course -11: Inorganic Chemistry Practical-II	WCHL31	4	5	Students will be able CO1 Recall the principle of titrimetric analysis. CO2 Acquire knowledge about the synthesis of coordination of complexes. CO3 Correlate the quantitative technique and the purity of the complex. CO4 Understand the separation techniques of bimetals in a solution. CO5 Develop the gravimetric skill.
	Core Course -12: Analytical Chemistry Practical	WCHL32	4	5	Students will be able CO1 Recall the principles associated with various inorganic organic and physical chemistry experiments CO2 Scientifically plan and perform all the experiments CO3 Observe and record systematically the readings in all the experiments CO4 Calculate and process the experimentally measured values and compare with graphical data. CO5 Interpret the experimental data scientifically to improve students efficiency for societal developments.
	Elective –V:	WCHE31	4	5	Students will be able

	Biomolecules and Heterocyclic compounds				CO1 Understand the basic concepts of biomolecules and natural products. CO2 Integrate and assess the different methods of preparation of structurally different biomolecules and natural products. CO3 Illustrate the applications of biomolecules and their functions in the metabolism of living organisms. CO4 Analyse and rationalise the structure and synthesis of heterocyclic compounds. CO5 Develop the structure of biologically important heterocyclic compounds , proteins and nucleic acids, steroids and hormones by different methods.
Part - B	SEC -II: Forensic Chemistry	WCHSE31	2	3	Students will be able CO1 Recall the basic principles of forensic chemistry. CO2 Understand the versatility of finger printing and forensic serology. CO3 Implement the concept of forensic analysis. CO4 Predict the suitability of forensic toxicology. CO5 Design the data bases for cyber crime technology.
	Internship		2		
Semester – IV M.Sc. Chemistry					
Part - A	Core Course -13 : Coordination Chemistry-II	WCHM41	5	6	Students will be able CO1 Understand and apply 18 and 16 electron rule for organometallic compounds CO2 Understand the structure and bonding in olefin, allyl, cyclopentadienyl and carbonyl containing organometallic compounds CO3 Understand the reactions of organometallic compounds. CO4 Familiarize the catalytic cycles CO5 Identify / predict the structure of coordination complexes using spectroscopic tools such as IR, NMR, ESR, Mossbauer and optical rotatory dispersion studies to interpret the structure of molecules by various spectral techniques
	Core Course -14: Physical Chemistry-II	WCHM42	5	6	Students will be able CO1 Discuss the characteristics of wave functions and symmetry functions. CO2 Classify the symmetry operation and wave equations. CO3 Apply the concept of quantum mechanics and group theory to predict the electronic structure. CO4 Specify the appropriate irreducible representations for theoretical applications. CO5 Develop skills in evaluating the energies of molecular spectra.
	Project with Viva	WCHP41	6	8	

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	Elective –VI: Chemistry of Natural Products	WCHE41	4	5	Students will be able CO1 Understand the biological importance of chemistry of natural products. CO2 Perform the isolation and characterization of synthesized natural products. CO3 Elucidate the structure of alkaloids, terpenoids , carotenoids, flavonoids and anthocyanins. CO4 Study the structure of phytochemical constituents by chemical and physical methods. CO5 Interpret the experimental data scientifically to improve biological activity of active components.
Part - B	SEC - III: Scientific Research Methodology	WCHSE41	2	5	CO1 Select research problems. CO2 Do literature survey. CO3 Write relevantly and coherently the research report. CO4 Apply the concepts of plagiarism and to get patents.. CO5 Develop the skills of using instrumental technologies.
Part - C	Extension Activity		1		