

**ST. JOSEPH'S COLLEGE, DEVAGIRI, CALICUT
(AUTONOMOUS)**



POST GRADUATE DEGREE PROGRAMME

**ST. JOSEPH'S CHOICE BASED CREDIT SEMESTER SYSTEM
(SJCBCSSUG)**

**MASTER OF SCIENCE
IN
CHEMISTRY**

Course Outcome
(2019Admn Onwards)

COURSE OUTCOMES

CORE COURSES

SEMESTER I

FCHE1C01: QUANTUM MECHANICS AND COMPUTATIONAL CHEMISTRY

COs	COURSE OUTCOMES
CO1	To categorize translational, rotational, vibrational motion of molecules quantum mechanically
CO2	To evaluate the importance of approximation methods to solve systems of many electrons
CO3	To summarize the different methods used in computational chemistry
CO4	To gain an insight into the structure of Gaussian file and how it is applied to find molecular parameters

SEMESTER I

FCHE1C02 - ELEMENTARY INORGANIC CHEMISTRY

COs	COURSE OUTCOMES
CO1	To differentiate between different acid-base concepts.
CO2	To discuss the chemistry of main group, transition and inner transition elements.
CO3	To predict the stability of nuclei.
CO4	To explain the importance of Nano materials.

SEMESTER I

FCHE1C03: STRUCTURE AND REACTIVITY OF ORGANIC COMPOUNDS

COs	COURSE OUTCOMES
CO1	To predict and demonstrate the aromaticity of organic compounds.
CO2	To analyse the effect of conformation on the rate of reactions.
CO3	To categorize different types of stereoisomerism in organic compounds.

CO4	To summarize the basic aspects of asymmetric synthesis.
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SEMESTER I

FCHE1C04 – THERMODYNAMICS, KINETICS AND CATALYSIS

COs	COURSE OUTCOMES
CO1	To compare and contrast the principles of reversible and irreversible thermodynamics.
CO2	To apply the basic concepts of chemical kinetics to study rates of different types of reactions.
CO3	To categorize the different theories of reaction rates.
CO4	To apply the basics of adsorption to determine surface parameters.
CO5	To analyse the different theories of catalysis.

SEMESTER II

FCHE2C05 - GROUP THEORY AND CHEMICAL BONDING

COs	COURSE OUTCOMES
CO1	To correlate the principles of Group theory and quantum mechanics.
CO2	To apply the principles of group theory for spectroscopic analysis.
CO3	To apply the principles of group theory to study chemical bonding in diatomic and polyatomic molecules.
CO4	To describe the chemical bonding in diatomic and polyatomic molecules.

SEMESTER II

FCHE2C06: CO-ORDINATION CHEMISTRY

COs	COURSE OUTCOMES
CO1	To summarize the stability of co-ordination compounds.
CO2	To categorize the different theories about Co-ordination compounds.
CO3	To explain the electronic spectra, magnetic properties characterization of Co-ordination compounds.
CO4	To discuss the different mechanisms for the reaction mechanism in metal complexes.

SEMESTER II

FCHE2C07: REACTION MECHANISM IN ORGANIC CHEMISTRY

COs	COURSE OUTCOMES
CO1	To compare and contrast the different mechanisms of substitution, addition, elimination reactions.
CO2	To discuss the different kinds of reaction intermediate, its formation, stability and reactions.
CO3	To summarize the different reactions of carbonyl and related compounds.
CO4	To apply different methods for explaining the outcome of a Pericyclic reaction.
CO5	To explain the photochemistry of organic compounds.

SEMESTER II

FCHE2C08: MOLECULAR SPECTROSCOPY

COs	COURSE OUTCOMES
CO1	To discuss the various branches of spectroscopy like rotational spectroscopy, vibrational spectroscopy, Raman and electronic spectroscopy.
CO2	To describe and interpret the magnetic nature of certain nuclei.
CO3	To apply the concepts of vibrational, electronic, NMR and mass spectroscopy in organic molecules.

SEMESTER I & II

FCHE2L01: INORGANIC CHEMISTRY PRACTICALS– I

COs	COURSE OUTCOMES
CO1	To apply the principles of solubility product and common-ion effect to separate and identify cations in the given mixture.
CO2	To appreciate the different types of volumetric methods for the quantitative analysis of metal ions.
CO3	To apply the basic principles of Colorimetry for the quantitative analysis of metal ions.

SEMESTER I & II
FCHE2L02: ORGANIC CHEMISTRY PRACTICALS – I

COs	COURSE OUTCOMES
CO1	To appreciate the different methods for the purification and separation of organic compounds.
CO2	To formulate and perform the different methods for the separation of organic binary mixtures.
CO3	To perform two stage and three stage organic preparations

SEMESTER I & II
FCHE2L03: PHYSICAL CHEMISTRY PRACTICALS – I

COs	COURSE OUTCOMES
CO1	To determine heat of the solution using thermodynamic methods.
CO2	To gain an insight into the phase diagram of eutectic, binary systems.
CO3	To apply the principles of viscosity to determine the molecular weight of polymers.
CO4	To perform refractometric analysis, different types of potentiometric and conductometric titrations.

SEMESTER III
**FCHE3C09: ELECTROCHEMISTRY, SOLID STATE CHEMISTRY
AND STATISTICAL THERMODYNAMICS**

COs	COURSE OUTCOMES
CO1	To compare the basic aspects of equilibrium electrochemistry and dynamic electrochemistry.
CO2	To explain the electronic and optical properties of solids.
CO3	To apply the principles of statistical thermodynamics to evaluate the properties of systems.

SEMESTER III
FCHE3C10 - ORGANOMETALLIC AND
BIOINORGANIC CHEMISTRY

COs	COURSE OUTCOMES
CO1	To classify and describe the different types of organometallic compounds.
CO2	To discuss the different type of reactions by organometallic compounds.
CO3	To explain the different aspects of metal clusters.
CO4	To describe the role of various metal ions in living systems.

SEMESTER III
FCHE3C11: PHOTOCHEMISTRY AND PERICYCLIC REACTIONS

COs	COURSE OUTCOMES
CO1	Apply the concepts of pericyclic reactions in predicting the mechanism of new systems
CO2	Apply the concepts of photochemistry to various chemical and physical processes.
CO3	Generate an understanding of the synthesis of natural products.
CO4	Compare the structure and functions of biomolecules

SEMESTER III
FCHE3E01:ELECTIVE: SYNTHETIC ORGANIC CHEMISTRY

COs	COURSE OUTCOMES
CO1	Apply main group and transition metallic reagents to the synthesis of complex organic compounds
CO2	Able to justify the selection of one reagent over another in terms of efficacy in relation to a particular synthetic problem
CO3	Predict the mechanisms of standard chemical reactions, with a focus on functional group conversions
CO4	Design synthesis of organic molecules using retro-synthetic analysis

SEMESTER III

FCHE3E02: ELECTIVE: COMPUTATIONAL CHEMISTRY

COs	COURSE OUTCOMES
CO1	Compare the different methods used in computational chemistry
CO2	Insight into the structure of Gaussian file and how it is applied to find molecular parameters

SEMESTER III

FCHE3E03: ELECTIVE: INDUSTRIAL CATALYSIS

COs	COURSE OUTCOMES
CO1	To summarize different types of adsorption, its kinetics and theories.
CO2	To describe the preparation, deactivation of catalyst surfaces.
CO3	To analyse the role of phase transfer catalyst and Bio-catalyst in catalysis.
CO4	To apply the principles of catalysis for conducting different organic reactions in macro scale.

SEMESTER IV

FCHE4C12: INSTRUMENTAL METHODS OF ANALYSIS

COs	COURSE OUTCOMES
CO1	To summarize different methods for the treatment of statistical data.
CO2	To compare the volumetric and gravimetric methods of quantitative analysis.
CO3	To describe the different types of electro-analytical techniques, optical, thermal and radiochemical methods used in chemical analysis.
CO4	To classify and analyse different chromatographic methods in qualitative and quantitative analysis.

SEMESTER IV

FCHE4E04: ELECTIVE: PETROCHEMICALS AND COSMETICS

COs	COURSE OUTCOMES
CO1	Study the various processes involved in the refining of petroleum
CO2	Apply the concept of petroleum refining in designing novel technologies with better efficiency
CO3	Compare the cosmetics and prepare a list of ingredients in the commercially available samples

SEMESTER III

FCHE4E05: ELECTIVE: SUPRAMOLECULAR, MEDICINAL & GREEN CHEMISTRY

COs	COURSE OUTCOMES
CO1	Study emerging branches in chemistry like supramolecular chemistry, medicinal chemistry, heterocyclic chemistry and its applications
CO2	Apply the principles of green chemistry to devise alternate pathway for the conventional organic reactions
CO3	To compare the recent advancement in reagents and synthetic methods
CO4	To get an overview about research process and to gain the ability to apply various research methods and techniques

SEMESTER III

FCHE4E06: ELECTIVE: NATURAL PRODUCTS & POLYMER CHEMISTRY

COs	COURSE OUTCOMES
CO1	To apply the principles of organic synthesis for the structural elucidation of terpenoids, steroids, alkaloids, anthocyanins.
CO2	To summarize the basic aspects about dyes, pigments and Supramolecules.
CO3	To appreciate different types of polymerisation techniques.
CO4	To discuss the stereochemistry and various characterization techniques for polymers.
CO5	To describe the basic aspects of speciality polymers.

SEMESTER III
FCHE4E07: ELECTIVE: MATERIAL SCIENCE

COs	COURSE OUTCOMES
CO1	To categorize different methods for the preparation of Nano materials.
CO2	To illustrate different techniques used for the characterisation of Nano Materials.
CO3	Describe the preparation, deactivation of catalyst surfaces.
CO4	Analyse the role of phase transfer catalyst and Bio-catalyst in catalysis.
CO5	Apply the principles of catalysis for conducting different organic reactions in macro scale

SEMESTER III
FCHE4E08: ORGANOMETALLIC CHEMISTRY

COs	COURSE OUTCOMES
CO1	To classify and describe the different types of organometallic compounds.
CO2	To discuss the different type of reactions by organometallic compounds.
CO3	To explain the different aspects of metal clusters.

SEMESTER III & IV
FCHE4L04: INORGANIC CHEMISTRY PRACTICALS - II

COs	COURSE OUTCOMES
CO1	To apply the gravimetric and colorimetric methods to separate and quantitatively analyse the inorganic ions present in it.
CO2	To perform ion-exchange methods for the separation and estimation of binary mixtures.
CO3	To generate inorganic complexes.

SEMESTER III & IV

FCHE4L05: ORGANIC CHEMISTRY PRACTICALS– II

COs	COURSE OUTCOMES
CO1	To apply the different methods of organic analysis for the quantitative analysis of amino acids, vitamins and antibiotics.
CO2	To perform extraction and purification of natural products.
CO3	To apply the chromatographic technique for the analysis of natural products.

SEMESTER III & IV

FCHE4L06: PHYSICAL CHEMISTRY PRACTICALS– II

COs	COURSE OUTCOMES
CO1	To apply the concepts of chemical kinetics and Polarimetry to determine the rates of chemical reactions.
CO2	To apply the concepts of adsorption to verify isotherms.
CO3	To design phase diagram for different type of systems.
CO4	To apply the principles of spectrophotometry for the quantitative analysis of metals.
CO5	To apply the different methods of computational chemistry to calculate the molecular properties.

SEMESTER IV

FCHE4P01: RESEARCH PROJECT

COs	COURSE OUTCOMES
CO1	To recall the scientific methods of research project.
CO2	To apply the scientific methods in life situations.
CO3	To analyse scientific problems systematically.