

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



UNDER GRADUATE DEGREE PROGRAMME

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

**BACHELOR OF SCIENCE (B.Sc.)
IN
CHEMISTRY
(CORE, OPEN & COMPLEMENTARY COURSES)**

Course Outcome
(2019Admn Onwards)

COURSE OUTCOMES – CORE COURSES

SEMESTER I

GCHE1B01T – THEORETICAL AND INORGANIC CHEMISTRY- I

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 32 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To study the methodology of scientific research.
CO2	To understand the principles behind volumetry
CO3	To compare the characteristics of different elements
CO4	To study molecular structure and bonding.
CO5	To study and compare the properties of the compounds of some s and p block elements.
CO6	To understand nuclear reactions and radioactivity.

SEMESTER II

GCHE2B02T – THEORETICAL AND INORGANIC CHEMISTRY- II

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 32 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To realize the importance and the impact of quantum revolution in science.
CO2	To understand and apply the concept that the wave functions of hydrogen atom are nothing but atomic orbitals.
CO3	To realize that chemical bonding is the mixing of wave functions of the two combining atoms.
CO4	To understand the concept of hybridization as linear combination of orbitals of the same atom.
CO5	To inculcate an atomic/molecular level philosophy in the mind.

SEMESTER III

GCHE3B03T – PHYSICAL CHEMISTRY-I

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the properties of gases, Collision theory and how it links to thermodynamic systems
CO2	To understand the fundamental concepts of thermodynamics, apply thermochemical principles to chemical reaction and the significance of entropy and free energy
CO3	To analyse the concepts of chemical potential, probability and partition function
CO4	To comprehend the concepts of law of mass action and chemical equilibria
CO5	To apply symmetry operations to categorize different molecules

SEMESTER IV

GCHE4B04T – ORGANIC CHEMISTRY– I

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To apply the concept of stereochemistry to different compounds
CO2	To understand the basic concepts of reaction mechanism
CO3	To understand the mechanism of a chemical reaction
CO4	To analyse the stability and reactivity of different aromatic systems

SEMESTER IV

GCHE4B05P – INORGANIC CHEMISTRY PRACTICAL – I

Contact Hours per Week: 2

Number of Credits: 4

Number of Contact Hours: 128 Hrs

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	To enable the students to develop skills in quantitative analysis and preparing inorganic complexes.
CO2	To understand the principles behind quantitative analysis

CO3	To apply appropriate techniques of volumetric quantitative analysis in estimations
CO4	To analyze the strength of different solutions

SEMESTER V
GCHE5B06T – INORGANIC CHEMISTRY – III

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the principles behind qualitative and Gravimetric analysis
CO2	To understand basic processes of metallurgy and to analyse the merit of different alloys
CO3	To understand the applications of different inorganic polymers
CO4	To analyse different polluting agents
CO5	To apply the principles of solid waste management

SEMESTER V
GCHE5B06T – ORGANIC CHEMISTRY – II

Contact Hours per Week: 4

Number of Credits: 3

Number of Contact Hours: 64 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To evaluate the various conditions for substitution reactions of organohalides
CO2	To understand the characteristic properties and reactions of alcohols, phenols, ethers and epoxides
CO3	To apply organometallic compounds in preparation of different functional groups
CO4	To apply different reagents for the inter conversion of aldehydes, carboxylic acids and acid derivatives
CO5	To apply active methylene compounds in organic preparations
CO6	To study the reactivity and reactions of organo nitrogen compounds

SEMESTER V
GCHE5B08T – PHYSICAL CHEMISTRY–II

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To apply the concept of kinetics, catalysis and photochemistry to various chemical and physical processes
CO2	To characterize different molecules using spectral methods
CO3	To understand various phase transitions and its applications

SEMESTER VI
GCHE6B09T – INORGANIC CHEMISTRY – IV

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the principles behind different instrumental methods
CO2	To distinguish between lanthanides and actinides
CO3	To appreciate the importance of CFT
CO4	To understand the importance of metals in living systems
CO5	To distinguish geometries of coordination compounds

SEMESTER VI
GCHE6B10T – ORGANIC CHEMISTRY – III

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To elucidate structure of simple organic compounds using spectral techniques
CO2	To understand the basic structure and tests for carbohydrates

CO3	To understand the basic components and importance of DNA
CO4	To understand the basic structure and applications of alkaloids and terpenes
CO5	To distinguish different pericyclic reactions

SEMESTER VI
GCHE6B11T – PHYSICAL CHEMISTRY–III

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To apply the basic concepts of electrochemistry, Conductivity measurements and its applications
CO2	To realize the importance of colligative properties
CO3	To relate the properties of material/solids to the geometrical properties and chemical compositions

SEMESTER VI
GCHE6B12T – ADVANCED AND APPLIED CHEMISTRY

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the importance of nanomaterial's
CO2	To appreciate the importance of green approach in chemistry
CO3	To review various methods used in computational Chemistry and their importance in molecular design
CO4	To realize the extent of chemistry in happiness index and life expectancy
CO5	To list various sources information for scientific writing and to practice scientific writing.

ELECTIVE
SEMESTER VI
GCHE6E01T – INDUSTRIAL CHEMISTRY

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the importance of petrochemicals.
CO2	To appreciate the importance and to familiarise the opportunities of pharmaceutical, leather and sugar industries.
CO3	To analyse the role of catalysts in industrial processes.

SEMESTER VI
GCHE6E02T –POLYMER CHEMISTRY

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand various classification of polymers and types of polymerization methods.
CO2	To understand the important characteristics of polymers such as average molecular weight, glass transition temperature, viscoelasticity and degradation
CO3	To appreciate the importance of processing techniques
CO4	To familiarize different commercial polymers and to understand the significance of recycling

SEMESTER VI
**GCHE6E03T –MEDICINAL AND ENVIRONMENTAL
CHEMISTRY**

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the importance of drugs in human health.

CO2	To understand the facts about common diseases and treatment.
CO3	To identify the presence of toxic substances in atmosphere.
CO4	To apply chemistry in treatment of water and sewage.

SEMESTER VI
GCHE6B13P – PHYSICAL CHEMISTRY PRACTICAL

Contact Hours per Week: 5

Number of Credits: 4

Number of Contact Hours: 80 Hrs

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	To enable the students to develop analytical skills in determining the physical properties (Physical constants)
CO2	To develop skill in setting up a experimental methods to determine the physical properties
CO3	To understand the principles of Refractometry, Potentiometry and Conductometry

SEMESTER VI
GCHE6B14P – ORGANIC CHEMISTRY PRACTICAL

Contact Hours per Week: 5

Number of Credits: 4

Number of Contact Hours: 80 Hrs

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	To enable the students to develop analytical skills in organic qualitative analysis.
CO2	To develop talent in organic preparations to ensure maximum yield.
CO3	To apply the concept of melting or boiling points to check the purity of compounds.
CO4	To analyse and characterise simple organic functional groups.
CO5	To analyse individual amino acids from a mixture using chromatography.

SEMESTER VI
GCHE6B15P – INORGANIC CHEMISTRY
PRACTCAL-II

Contact Hours per Week: 5

Number of Credits: 4

Number of Contact Hours: 80 Hrs

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	To enable the students to develop analytical skills in inorganic quantitative analysis.
CO2	To understand the principles behind gravimetry and to apply it in quantitative analysis.
CO3	To understand the principles behind colorimetry and to apply it in quantitative analysis.

SEMESTER VI
GCHE6B16P – INORGANIC CHEMISTRY
PRACTCAL-III

Contact Hours per Week: 5

Number of Credits: 4

Number of Contact Hours: 80 Hrs

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	To enable the students to develop skills in inorganic qualitative analysis.
CO2	To understand the principles behind inorganic mixture analysis and to apply it in qualitative analysis.
CO3	To analyse systematically mixtures containing two cations and two anions.

SEMESTER VI
GCHE6B17D – PROJECT WORK

Contact Hours per Week: 2 (Semester V)

Number of Credits: 2

Number of Contact Hours: 32 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the scientific methods of research project.

CO2	To apply the scientific method in life situations.
CO3	To analyse scientific problems systematically.

COURSE OUTCOMES – COMPLIMENTARY COURSES

SEMESTER I

GCHE1C01T – GENERAL CHEMISTRY

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 32 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand and to apply the theories of quantitative and qualitative analysis.
CO2	To understand the theories of chemical bonding.
CO3	To appreciate the uses of radioactive isotopes.
CO4	To understand the importance of metals in biological systems.

SEMESTER II

GCHE2C02T – PHYSICAL CHEMISTRY

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 32 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the importance of free energy in defining spontaneity
CO2	To realize the theories behind different states of matter and their implication
CO3	To understand the basic principles of electrochemistry

SEMESTER III
GCHE3C03T – ORGANIC CHEMISTRY

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the basic concepts involved in reaction intermediates.
CO2	To realise the importance of optical activity and chirality.
CO3	To appreciate the importance of functional groups and aromatic stability.
CO4	To understand the basic structure and importance of carbohydrates, nucleic acids, alkaloids and terpenes.

SEMESTER IV
**GCHE4C04T – PHYSICAL AND APPLIED
CHEMISTRY**

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	To understand the basic concepts behind colloidal state and nanochemistry.
CO2	To understand the importance of green chemistry and pollution prevention.
CO3	To appreciate the importance of different separation methods and spectral techniques.
CO4	To understand the extent of chemistry in daily life.

SEMESTER IV
GCHE4C05P – COMPLEMENTARY CHEMISTRY
PRACTICAL

Contact Hours per Week: 2

Number of Credits: 4

Number of Contact Hours: 128 Hrs

Course Evaluation: 100 (Internal 20 & External 80)

COs	COURSE OUTCOMES
CO1	To understand the basic concepts of inter group separation.
CO2	To enable the students to develop analytical and preparation skills.

COURSE OUTCOMES – OPEN COURSES

SEMESTER V
GCHE5D01T – ENVIRONMENTAL CHEMISTRY

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Recall the technical/scientific terms involved in pollution.
CO2	Understand the causes and effects of air pollution.
CO3	Understand the sources, types and effects of water pollution.
CO4	Describe water quality parameters.
CO5	Know soil, noise, thermal and radioactive pollutions and their effects.
CO6	Study various pollution control measures.
CO7	Understand the basics of green chemistry.

SEMESTER V
GCHE5D02T – CHEMISTRY IN DAILY LIFE

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basics of polymer chemistry.
CO2	Explain the functions of biomolecules, vitamins, enzymes, hormones and nucleic acid.
CO3	Describe food additives and food habits.
CO4	Explain the uses of pesticides and fertilizers and their impacts on the environment.
CO5	Understand advantages and disadvantages of cleansing agents and cosmetics.
CO6	Recognize the common classes of drugs in pharmaceutical industry and their application.
CO7	Understand the basic concepts and processes in petroleum industry.

SEMESTER V
GCHE5D03T – FOOD SCIENCE AND MEDICINAL CHEMISTRY

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 48 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand food adulteration and preservation methods.
CO2	Understand food additives.
CO3	Compare modern food with natural food.
CO4	Describe the harmful effects of alcohol and modern food habits.
CO5	Exhibit a broad and coherent body of knowledge on the biomolecules, vitamins, enzymes, hormones and nucleic acids.
CO6	Recognize the uses of Indian medicinal plants and plant extracts.
CO7	Recall the chemical, generic and trade names of drugs and their uses.
CO8	Describe the treatment methods used in medical field.
CO9	Illustrate first aids and the safety steps to be taken for common illnesses.