

Holy Cross College (Autonomous), Nagercoil
Kanyakumari District, Tamil Nadu.
Accredited with A⁺ by NAAC - IV cycle – CGPA 3.35

Affiliated to

Manonmaniam Sundaranar University, Tirunelveli



Semester I & II

POs, PSOs & COs

DEPARTMENT OF CHEMISTRY



2023-2026

(With effect from the academic year 2023-2024)

DEPARTMENT OF CHEMISTRY



PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

| PEOs | Upon completion of M. Sc. Chemistry Programme, the graduates will be able to: | Mapping with Mission |
|------|--|----------------------|
| PEO1 | apply scientific and computational technology to solve social and ecological issues and pursue research. | M1, M2 |
| PEO2 | continue to learn and advance their career in industry both in private and public sectors. | M4 & M5 |
| PEO3 | develop leadership, teamwork, and professional abilities to become a more cultured and civilized person and to tackle the challenges in serving the country. | M2, M5 & M6 |

PROGRAMME OUTCOMES (POs)

| POs | Upon completion of M.Sc. Chemistry Programme, the graduates will be able to: | Mapping with PEOs |
|-----|---|-------------------|
| PO1 | apply their knowledge, analyze complex problems, think independently, formulate and perform quality research. | PEO1 & PEO2 |
| PO2 | carry out internship programmes and research projects to develop scientific and innovative ideas through effective communication. | PEO1, PEO2 & PEO3 |
| PO3 | develop a multidisciplinary perspective and contribute to the knowledge capital of the globe. | PEO2 |
| PO4 | develop innovative initiatives to sustain eco-friendly environment | PEO1, PEO2 |
| PO5 | through active career, team work and using managerial skills guide people to the right destination in a smooth and efficient way. | PEO2 |
| PO6 | employ appropriate analysis tools and ICT in a range of learning scenarios, demonstrating the capacity to find, assess, and apply relevant information sources. | PEO1, PEO2 & PEO3 |
| PO7 | learn independently for lifelong executing professional, social and ethical responsibilities leading to sustainable development. | PEO3 |

Programme Specific Outcomes (PSOs)

| PSO | Upon completion of M.Sc Chemistry programme, the graduates will be able to: | Mapping with POs |
|------------|--|-------------------------|
| PSO-1 | impart in-depth knowledge about various aspects of chemistry within an environment committed to excellence | PO1 |
| PSO-2 | develop critical thinking, technical skills and innovative ideas in analysing and solving problems in the field of chemistry | PO2, PO3 |
| PSO-3 | explore and expedite the recent avenues in chemistry research across the globe with professional competency | PO4 |
| PSO-4 | inculcate positive approach towards environment and ecology from the chemistry perspective | PO4, PO7 |
| PSO-5 | promote entrepreneurial skills and become self-reliant | PO5, PO6 |

Mapping of PO'S and PSO'S (Science)

| POs | PSO1 | PSO 2 | PSO3 | PSO4 | PSO5 |
|----------------|-------------|--------------|-------------|-------------|-------------|
| PO 1 | 3 | 3 | 2 | 3 | 2 |
| PO 2 | 3 | 2 | 3 | 3 | 3 |
| PO 3 | 3 | 3 | 3 | 2 | 2 |
| PO 4 | 3 | 3 | 2 | 3 | 3 |
| PO 5 | 3 | 3 | 3 | 2 | 3 |
| PO 6 | 2 | 3 | 3 | 3 | 2 |
| PO 7 | 3 | 2 | 2 | 3 | 2 |
| Total | 20 | 19 | 18 | 19 | 17 |
| Average | 2.7 | 2.7 | 2.5 | 2.7 | 2.4 |

Strong -S (3), Medium – M (2), Low – L (1)

Course Outcomes

SEMESTER – I

CORE COURSE– I: ORGANIC REACTION MECHANISM – I

Course Code : CP231CC1

| On the successful completion of the course, student will be able to: | | |
|--|--|--------------------|
| 1. | remember & understand the basic concepts of reaction mechanisms, stereochemistry and conformation in organic compounds | K1 & K2 |
| 2. | apply the reaction mechanism, stereochemistry and conformation for the synthesis of organic compounds | K3 |
| 3. | analyze the types of reaction mechanisms involved in synthetic organic transformation. | K4 |
| 4. | evaluate the suitable reaction mechanisms for the synthesis of organic compounds | K5 |
| 5. | design and synthesize new organic compounds by correlating the stereochemistry of organic compounds. | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER – I

CORE COURSE– II: STRUCTURE AND BONDING IN INORGANIC COMPOUNDS

Course Code : CP231CC2

| On the successful completion of the course, student will be able to: | | |
|--|--|--------------------|
| 1. | recall & understand the structure and bonding in inorganic compounds | K1 & K2 |
| 2. | apply the concepts of chemical bonding to predict the structure of inorganic compounds | K3 |
| 3. | analyze the types of bonding, crystal defects and interpret the crystal lattices using diffraction techniques. | K4 |
| 4. | evaluate bond energy, lattice energy, properties of inorganic compounds | K5 |
| 5. | create new crystal structures by adopting various crystal growth methods | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER – I
CORE LAB COURSE– I: ORGANIC CHEMISTRY PRACTICAL

Course Code : CP231CP1

| On the successful completion of the course, student will be able to: | | |
|---|---|-----------|
| 1 | understand the methods for the separation and estimation of organic compounds | K2 |
| 2 | apply the theoretical concepts to identify and synthesize organic compounds | K3 |
| 3 | analyze the elements and functional groups using microscale analysis | K4 |
| 4 | evaluate the quality and quantity of organic compounds | K5 |
| 5 | create organic compounds using various rearrangement reactions | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

ELECTIVE COURSE II: a) NANO MATERIALS AND NANO TECHNOLOGY

Course Code : CP231EC1

| On the successful completion of the course, student will be able to: | | |
|---|---|--------------------|
| 1. | understand the basic concept of nano chemistry and its applications | K1 & K2 |
| 2. | apply the principle of nanotechnology for the synthesis and characterization of nanomaterials in various fields | K3 |
| 3. | analyze the physical and chemical properties of nanoparticles | K4 |
| 4. | evaluate the properties of nanoparticles using various analytical techniques | K5 |
| 5. | create and characterize novel nanomaterials | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER – I

ELECTIVE COURSE-I : b) PHARMACEUTICAL CHEMISTRY

Course Code : CP231EC2

| On the successful completion of the course, student will be able to: | | |
|---|--|-----------|
| 1. | understand the concepts of pharmaceutical chemistry | K2 |
| 2. | apply the principles of drug action and computers in drug formulation. | K3 |
| 3. | analyze the drug dosage forms in drug delivery system. | K4 |
| 4. | evaluate the structure activity relationship in drug formulation. | K5 |
| 5. | synthesize new drugs after understanding the concepts of SAR. | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

ELECTIVE COURSE I: C) ANALYTICAL CHEMISTRY

Course Code : CP231EC3

| On the successful completion of the course, student will be able to: | | |
|---|---|--------------------|
| 1. | understand the principle and instrumentation of various analytical techniques | K1 & K2 |
| 2. | apply the principle of analytical techniques to predict the purity, stability and concentrations of compounds | K2 & K4 |
| 3. | analyse chemical compound using various analytical techniques | K1 & K2 |
| 4. | evaluate the quality and quantity of chemical compounds | K2 & K3 |
| 5. | understand the principle and instrumentation of various analytical techniques | K2 & K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

ELECTIVE COURSE II : A) ELECTROCHEMISTRY

Course Code : CP231EC4

| On the successful completion of the course, student will be able to: | | |
|---|--|-----------|
| 1. | understand the behaviour of electrolytes in solution. | K2 |
| 2. | apply Butler-Volmer and Tafel equations to predict the kinetics of electrode reactions | K3 |
| 3. | analyze the different electrochemical processes | K4 |
| 4. | evaluate the theories of electrolytes, electrical double layer, electrostatics and activity coefficient of electrolytes. | K5 |
| 5. | design new storage devices using the mechanism of electrochemical reaction | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

ELECTIVE COURSE II: B) MOLECULAR SPECTROSCOPY

Course Code : CP231EC5

| On the successful completion of the course, student will be able to: | | |
|--|--|-----------|
| 1. | understand the advanced concepts of spectroscopy. | K2 |
| 2. | apply the different spectral techniques to elucidate the structure of compounds. | K3 |
| 3. | analyze the structure of compounds using spectroscopic techniques. | K4 |
| 4. | evaluate different electronic spectra of simple molecules using electronic spectroscopy. | K5 |
| 5. | develop the knowledge on principle, instrumentation and structural elucidation of simple molecules using Mass Spectrometry, EPR and Mossbauer Spectroscopy techniques. | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

ELECTIVE COURSE II: c) INDUSTRIAL PRODUCTS

Course Code : CP231EC6

| On the successful completion of the course, student will be able to: | | |
|--|--|--------------------|
| 1. | understand the manufacturing processes of cement and glass. | K1 & K2 |
| 2. | apply different methods for manufacturing industrial products | K3 |
| 3. | analyze the types of dyes, pigments and paints. | K4 |
| 4. | evaluate the composition versus quality of industrial products | K5 |
| 5. | Synthesize new industrial products | K6 |

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

SPECIFIC VALUE ADDED COURSE

HERBAL PRODUCT DEVELOPMENT AND FORMULATION

Course Code : CP231V01

| On the successful completion of the course, student will be able to: | | |
|---|--|--------------------|
| 1 | understand the role of natural products in herbal medicines. | K1 & K2 |
| 2 | apply the extraction techniques in herbal drug formulation. | K3 |
| 3 | analyse crude drugs and herbal formulation to determine their quality. | K4 |
| 4 | evaluate crude drugs and herbal formulations as per the WHO and cGMP guidelines and stability testing of herbal drugs. | K5 |
| 5 | synthesize herbal products. | K6 |

SEMESTER – I

LIFE SKILL TRAINING – I ETHICS

Course Code : PG23LST1

| Course Outcomes | On completion of this course the student will be able to | |
|------------------------|--|-----------|
| CO1 | understand deeper insight of the meaning of their existence. | K1 |
| CO2 | recognize the philosophy of life and individual qualities | K2 |
| CO3 | acquire the skills required for a successful personal and professional life. | K3 |
| CO4 | develop as socially responsible citizens. | K4 |
| CO5 | create a peaceful, communal community and embrace unity. | K3 |