# CHEMISTRY

## Course Outcome

### Semester I

**Major Course: MJC-1(T) - Inorganic Chemistry: Atomic Structure, Chemical Bonding and Fundamentals of Organic Chemistry**

**Course Outcomes:**

- Understand the model of an atom and related principles.
- Understand bonding principles, shapes, and structures of covalent molecules.
- Begin research in organic chemistry, including detection, separation, and purification of organic compounds.

**Practical: MJC-1(P) - Inorganic and Organic Chemistry Practical**

**Course Outcomes:**

- Prepare solutions and perform titrations.
- Understand steps in organic chemistry like detection and purification.

### Semester II

**Major Course: MJC-2(T) - Physical Chemistry: States of Matter and Ionic Equilibrium**

**Course Outcomes:**

- Understand gas, liquid, and solid states and related mathematical expressions.
- Analyze crystal structures.
- Grasp ionization concepts and equilibria involving weak acids, bases, and buffers.

**Practical: MJC-2(P) - Physical Chemistry Practical**

**Course Outcomes:**

- Determine viscosity and surface tension.
- Calculate molecular weights.
- Prepare buffer solutions and conduct pH-metric titrations.

### Semester III

**Major Course: MJC-3(T) - Organic Chemistry: Cyclic Hydrocarbons and Their Halogen Derivatives**

**Course Outcomes:**

- Understand aromaticity and reactivity of hydrocarbons.
- Design organic syntheses using halogen derivatives.

**Major Course: MJC-4(T) - Physical Chemistry: Chemical Thermodynamics and Applications**

**Course Outcomes:**

- Learn thermodynamic principles and enthalpy changes.
- Understand entropy, free energy, and the laws of thermodynamics.

**Practical: MJC-4(P)**

**Course Outcomes:**

- Determine enthalpy changes and heat capacities.
- Measure solubility and heats of hydration.

## Semester IV

**Major Course: MJC-5(T) - Inorganic Chemistry: s-, p-, d-, and f-block Elements**

**Course Outcomes:**

- Understand periodic properties and bonding.
- Study transition metal chemistry, including oxidation states and coordination behavior.

**Practical: MJC-5(P)**

**Course Outcomes:**

- Identify basic and acid radicals in salt mixtures.

**Major Course: MJC-6(T) - Organic Chemistry: Compounds with Oxygen-Containing Functional Groups**

**Course Outcomes:**

- Understand reactions of alcohols, phenols, aldehydes, ketones, and acids.
- Draw mechanisms and apply green chemistry principles.

**Practical: MJC-6(P)**

**Course Outcomes:**

- Perform organic synthesis and functional group tests.

**Major Course: MJC-7(T) - Physical Chemistry: Phase Equilibria, Conductance and Electrochemical Cells**

**Course Outcomes:**

- Understand phase diagrams and conductance.
- Analyze electrochemical cells and perform potentiometric titrations.

## Semester V

**Major Course: MJC-8(T) - Coordination Chemistry**

**Course Outcomes:**

- Analyze coordination compounds using VBT and CFT.
- Understand magnetic properties and electronic spectra of complexes.

**Practical: MJC-8(P)**

**Course Outcomes:**

- Prepare coordination compounds.
- Perform complexometric and colorimetric analysis.

**Major Course: MJC-9(T) - Organic Chemistry: Polynuclear Hydrocarbons, Nitrogen Compounds, Heterocycles, Alkaloids, Terpenoids**

**Course Outcomes:**

- Study aromatic systems, nitrogen compounds, and natural products.

## Semester VI

**Major Course: MJC-10(T) - Colligative Properties, Kinetics, Photochemistry**

**Course Outcomes:**

- Understand colligative properties, rate laws, and photochemical reactions.

**Practical: MJC-10(P)**

**Course Outcomes:**

- Determine molecular masses and reaction rates.

**Major Course: MJC-11(T) - Organic Chemistry: Biomolecules**

**Course Outcomes:**

- Understand amino acids, proteins, nucleic acids, enzymes, and lipids.

**Practical: MJC-11(P)**

**Course Outcomes:**

- Conduct biochemical tests and synthesize simple pharmaceuticals.

## Semester VII

**MJC-13 (T): Inorganic Chemistry - Organometallic Chemistry, Symmetry and Group Theory**

**Course Outcomes:**

- CO1: Understand nomenclature and classification of organometallic compounds.
- CO2: Analyze properties and structures of metal carbonyls.
- CO3: Learn preparation methods of organometallics.
- CO4: Grasp symmetry concepts and group theory fundamentals.

**MJC-15 (T): Organic Chemistry - Spectroscopy**

**Course Outcomes:**

- CO1: Understand types of electronic transitions in organic molecules.
- CO2: Learn principles of ultraviolet spectroscopy.
- CO3: Understand molecular vibrations and IR spectroscopy principles.
- CO4: Grasp nuclear spin and NMR spectroscopy fundamentals.
- CO5: Learn the principles of ESR spectroscopy.

## Semester VIII

**MJC-16 (T): Analytical Methods in Chemistry**

**Course Outcomes:**

- CO1: Understand accuracy and precision in chemical analysis.
- CO2: Independently develop analytical methods for various samples.
- CO3: Test contaminated water samples.
- CO4: Understand instruments like Flame Photometer and UV-Vis Spectrophotometer.
- CO5: Learn chromatographic separation techniques.
- CO6: Apply knowledge of geometrical isomers and keto-enol tautomers.
- CO7: Determine soil composition.
- CO8: Estimate macronutrients using flame photometry