

Course Outcomes of M.Sc. Chemistry

M.Sc. Chemistry is a 4-semester course conducted by Dr. Ambedkar College, Deekshabhoomi, Nagpur as per the syllabus provided by Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur. Each semester students have to take four theory papers, two Practicums based on four theory papers, and a Seminar. The fourth semester has a six-month Research Project Work. Third and Fourth Semester ha Two Elective papers. Coursework is according to theory papers, practicums, and seminars conducted throughout the program.

M. Sc. CHEMISTRY

Semester I

Paper – I (Code: 1T1) Inorganic Chemistry

Course outcome Students will be able to

- CO1 Remember and Understand the Fundamental Concepts of Stereochemistry and Bonding in Main Group Compound along with Metal – Ligand Bonding
- CO2 Understand the Metal – Ligand Equilibria in Solution and Reaction Mechanism of Transition metal complexes
- CO3 Understand the concepts of Cluster- I such as Boron hydrides
- CO4 Understand and envision the Metal-Metal bonds

Paper II (Code: 1T2) Organic Chemistry

Course outcome Students will be able to

- CO1. Remember and understand the fundamental concepts of Nature and Bonding in Organic Molecule and Reactive Intermediates
- CO2. Remember and understand the fundamental concepts of Stereochemistry
- CO3. Remember and understand the concepts Reaction mechanism, Structure and Reactivity, Aliphatic nucleophilic substitution
- CO4. Remember and understand the regulation of Aromatic Nucleophilic Substitution, Aromatic electrophilic substitution and Effect of Structure on reactivity

Paper III (Code: 1T3) Physical Chemistry

Course outcome Students will be able to

- CO1. Remember and understand the classical thermodynamics
- CO2. Remember and understand the Gibbs function and phase equilibria
- CO3. Remember and understand the Surface Phenomena And Macromolecules
- CO4. Remember and understand the chemical kinetics

Paper IV (Code: 1T4) Analytical Chemistry

Course outcome Students will be able to

- CO1. Remember and comprehend techniques Introduction and statistical analysis
- CO2. Remember and comprehend techniques and instrumentation involved in Separation techniques
- CO3. Remember and comprehend techniques and instrumentation involved in Classical methods of analysis

CO4. Remember and comprehend techniques and instrumentation involved in Electrochemical methods of analysis-I

Practical-I (Code: 1P1) Inorganic Chemistry

Course outcome Students will be able to

CO1. Perform major experiments in Preparation of Inorganic Complexes and their characterization by Elemental analysis and physico-chemical methods

CO2. Separation and determination of Quantitative Analysis and Qualitative analysis of radicals

Practical-II (Code: 1P3) Physical Chemistry

Course outcome Students will be able to

CO1. Perform major basic in Physical Chemistry

CO2. Perform basic techniques in understanding Physical Chemistry techniques.

M. Sc. CHEMISTRY
Semester II

Paper V (Code: 2T1) Inorganic Chemistry

Course outcome Students will be able to

- CO1. Magnetic Properties and Electronic spectra of Transition Metal complexes their application in Chemistry.
- CO2. Remember and understand basic concepts of Reaction mechanism of Transition Metal Complexes-II
- CO3. Understand the basic phenomenon Metal pi-Complexes - I Metal carbonyls
- CO4. Comprehend the concept of Metal pi-Complexes – II Metal Nitrosyls

Paper VI (Code: 2T2) Organic Chemistry

Course outcome Students will be able to

- CO1. Remember and understand the addition to carbon-carbon and carbon-hetero multiple bond
- CO2. Understand the concepts of mechanism of molecular rearrangement and Elimination reactions
- CO3. Understand the concept of Free radical reactions
- CO4. Develop understanding of Green chemistry

Paper VII (Code: 2T3) Physical Chemistry

Course outcome Students will be able to

- CO1. Remember and understand fundamental concepts of formulation of quantum mechanics
- CO2. Understand the thermodynamics
- CO3. Understand the concept of Solid State Chemistry
- CO4. Develop understanding of statistical thermodynamics and nuclear chemistry

Paper VIII (Code: 2T4) Analytical Chemistry

Course outcome Students will be able to

- CO1. Infer tools and techniques used in Sampling and quantification
- CO2. Understand the concept of Modern separation techniques
- CO3. Learn Optical methods of analysis-I and Flame photometry
- CO4. Remember and understand Electrochemical methods of analysis-II

Practical-III (Code: 2P2) Organic Chemistry

Course outcome Students will be able to

- CO1. gain knowledge of qualitative analysis
- CO2. comprehend the concept of organic preparations

Practical-IV (Code: 2P4) Analytical Chemistry

Course outcome Students will be able to

- CO1. Acquire basic Classical methods and separation techniques: Calibration, validation and computers
- CO2. Understand experiments in volumetry

M. Sc. CHEMISTRY
Semester III
ORGANIC CHEMISTRY SPECIALIZATION

Paper IX (Code: 3T1) Special I-Organic Chemistry

Course outcome Students will be able to

- CO1 Understand the concepts of Photochemistry
- CO2 Understand pericyclic reactions
- CO3 Describe the oxidation and reduction reactions
- CO4 Explain and illustrate Chemistry of P, S, Si, and Boron compounds

Paper X (Code: 3T2) Special II-Organic Chemistry

Course outcome Students will be able to

- CO1 Remember and understand the basic concept of Terpenoids and Porphyrins
- CO2 Understand Alkaloids and Prostaglandins.
- CO3 Comprehend concepts of Steroids and Plant Pigments
- CO4 Understand concepts of Carbohydrate and Amino acids, protein and peptides

Paper XI Elective (Code: 3T3) Medicinal Chemistry

Course outcome Students will be able to

- CO1 Remember and Understand the Drug Design
- CO2 Understand the design Pharmacokinetics and pharmacodynamics, Diuretics, Analgesics and Antipyretics
- CO3 Understand the Cardiovascular Drugs, Antineoplastic Agent
- CO4 Understand the Psychoactive drugs

Paper XII (Code: 3T4) Core Subject Centric - I: Spectroscopy– I

Course outcome Students will be able to

- CO1 Remember and understand the basic Symmetry properties of molecules and group theory
- CO2 Understand the Mass spectrometry and Mössbauer spectroscopy
- CO3 Understand the Microwave spectroscopy and ESR spectroscopy
- CO4 Understand the applications of Infrared spectroscopy and Raman Spectroscopy

Practical-V (Code: 3P1) Organic Chemistry Special

Course outcome Students will be able to

- CO1 Skillfully perform basic experiments in quantitative analysis and isolation of organic compounds from natural source
- CO2 Skillfully perform qualitative analysis

Practical VI–Elective (Code: 3P3) Medicinal Chemistry Practical

Course outcome Students will be able to

- CO1 Skillfully perform basic experiments in estimations and preparation of drugs
- CO2 Handle sophisticated laboratory equipment and reagents

M. Sc. CHEMISTRY
Semester IV
ORGANIC CHEMISTRY SPECIALIZATION

Paper XIII(Code: 4T1) Special I-Organic Chemistry

Course outcome Students will be able to

- CO1 Remember and understand the fundamental concepts of carbanions in organic chemistry and organometallic reagents -I
- CO2 Understand the organometallic reagents-II and transition metals in organic synthesis
- CO3 Understand the concepts of advanced stereochemistry and protection and deprotection of functional groups
- CO4 Understand and envision the designing the synthesis based on retrosynthetic analysis

Paper XIV (Code: 4T2) Special II-Organic Chemistry

Course outcome Students will be able to

- CO1 Understand the underlined concepts of enzyme chemistry
- CO2 Understand the underlined concepts of heterocycles
- CO3 Understand the underlined concepts of nucleic acids, lipids and vitamins
- CO4 Understand the underlined concepts of dyes, pharmaceutical chemistry and polymer chemistry

Paper XV (Code: 4T3) Elective- Medicinal Chemistry

Course outcome Students will be able to

- CO1 Remember and understand the basic concept of statistical method and antidiabetic agents
- CO2 Understand the anti-viral agents, anti-malarial agents and local anti-infective drug
- CO3 Understand the basic principles of histamines and antihistaminic agents and antibiotics
- CO4 Evaluate the production of anthelmintics and antiamebic drugs and anti-inflammatory drugs

Paper XVI(Code: 4T4) Core Subject Centric –II Spectroscopy – II

Course outcome Students will be able to

- CO1 Remember and Understand the basic concept of ultraviolet, visible spectroscopy and Photoelectron spectroscopy
- CO2 Understand the Nuclear magnetic Resonance Spectroscopy
- CO3 Understand the Application of NMR spectroscopy
- CO4 Evaluate the Diffraction techniques

Practical-VII (Code: 4P1) Organic Chemistry Special Practical

Course outcome Students will be able to

- CO1 Skillfully perform the experiments involving the advanced concept Quantitative Analysis based on classical and instrumental technique and perform the organic multi-step preparations

Practical VIII (Code: 4PROJ1) Project

Every student is required to carry out a project work in semester IV. The project can be of following types. A) Experimental Project Work; OR B) Review writing based Project Work.

Course outcome: Students will be able to

CO1 Develop the critical thinking ability and communication skills.

CO2 Understand and apply the scientific method.

CO3 Develop the aptitude to work on a scientific problem and look for alternative solution.

CO4 Write their finding in a form of a thesis and defend it by presenting it in front of their teachers and examiners.

CO5 Experience and embrace the habit of ethical practice in performing experiments and communicating them

Seminar (Code: 1S1, 2S1, 3S1 and 4S1)

CO1 Class seminar are conducted every semester to develop communication skills of students. Students will be able to comprehend the current research and should be able to put forward major ideas in front of their colleagues and teachers. Students will be evaluated on the basis of their presentation and questions and answer session.