School of Chemical Sciences
Devi Ahilya Vishwavidyalaya, Indore

Creative Learning

School of Chemical Sciences is one of the premier centres of higher education in central India. As an acclaimed and leading science centre for academic excellence, school's mission is to provide world class education and training for high flying careers in chemical sciences. As science and technology move faster and faster, globally it becomes more and more important for Indian institutions to make their presence on the international arena. To prepare academicians and trained chemist scientists for highly professional and top positions in drug and pharmaceutical industries, environmental and scientific organizations, school is running following programmes:

- **M.Sc. (Chemistry)**
- **Ph.D.**

Graduate Attributes (GA)

All students will have the chance to develop the following academic competencies, personal qualities, and transferable skills as part of their experience at School of Chemical Sciences, Devi Ahilya University, Indore:

GA- 1: Deep Discipline knowledge

Graduates will have a deep understanding and expertise of their subject area, as well as the ability to apply their knowledge in practice, including in multidisciplinary contexts.

GA- 2: Creative - Critical thinking and Problem Solving

Graduates will become effective problems-solvers, able to apply critical, creative and evidence-based thinking to conceive innovative responses to future challenges.

GA- 3: Ethically and Socially Aware

Graduates will act in an honest, ethical and consistent manner based on a strong sense of self and personal values. They will consider the impact of their actions on society and the environment.

GA- 4: Collaboration and Team Work

Graduates will be able to collaborate effectively with others, regardless of culture, perspective, or background, and finish joint tasks.

GA- 5: Effective Communication Skills

Graduates will be able to successfully communicate ideas and information to a variety of audiences, as well as contribute in a constructive manner.

GA- 6: Leadership Readiness

Graduates will be having the potential to take leadership roles in their chosen careers and communities

GA- 7: Digital Capabilities

Graduates will be having the capabilities needed to live, learn and work in a digital society.

GA- 8: Self-Awareness and Intelligence

Graduates will be self-aware and resilient when confronted with challenges and able to adapt positively to and accept change through a continued willingness to learn and develop

PROGRAM OUTCOMES (POs)

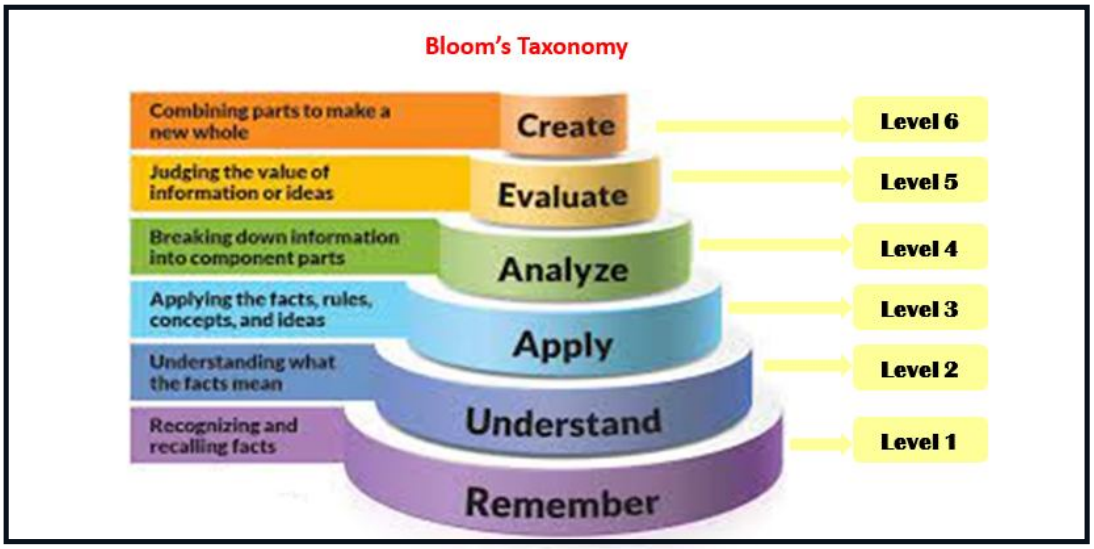
Upon completion of M.Sc., the program outcomes (POs) would be as follows:

Program Outcomes (POs)

After completing the M.Sc. Chemistry program, student will come up with following program outcomes:

PO 1	**Individual and team work**	Can work independently in the interdisciplinary and multidisciplinary fields of chemical sciences.
PO 2	**Environmental Consciousnessand sustainability**	Will understand the environmental issues and importance of sustainable development goals. In addition, they will develop awareness about the protection of environment, pollution control and importance of renewable energy resources for the society.
PO 3	**Students as ActiveKnowledge Seekers**	Critical thinking and scientific rigor can be used by students to grasp key topics in all chemistry disciplines.
PO 4	**Research Aptitude**	Students will build a scientific temper and will be able to learn the necessary skills to succeed in research or industrial field. In addition, they will acquire the skills in handling scientific instruments, planning and performing in laboratory experiments.
PO 5	**EnhancedCommunication Skills**	Students can express their ideas and findings with confidence and personality development.
PO 6	**ICT Enabled Learning and skill development**	ICT enhances the instructional process through the arrangement of interactive instructive materials that increase learner inspiration and encourage easy attainment of fundamental aptitudes. Utilization of different multimedia tools provides more challenging and attractive learning atmosphere for learners
PO 7	**Cross-Breeding of Ideas**	Demonstrate and apply the fundamental knowledge of the basic principles in various fields of Chemistry.
PO 8	**Proactive Learning**	Students will be able to think creatively (divergently and convergent) to propose novel ideas in explaining facts or providing new solution to the problems in chemistry.
PO 9	**CompetitiveExaminations andEmployability**	Adequate training for the preparation of National and State level tests such as NET/GATE/ other competitive examination and provide an insight into the various opportunities for employment.
PO 10	**Ethical Awareness**	A graduate student requires understanding and developing ethical awareness/reasoning, which the course curriculum adequately provide.

Program Specific Outcomes (PSOs)/ Learning Outcomes (LOs) and Course Outcomes (COs)



Courses for M.Sc. Chemistry:

First year	Second year
SEMESTER I	**SEMESTER III**
MCH-101 Inorganic Chemistry I MCH-102 Organic Chemistry I MCH-103 Physical Chemistry MCH-104 Symmetry, Group Theory and Spectroscopy	MCH-301 Molecular Spectroscopy MCH-302 Organic Photochemistry MCH-303 Bioinorganic Chemistry MCH-304 Chemistry of Polymers and Spectroscopy MCH-305 Organic Synthesis MCH-306 Solid State Chemistry and Nanoscience
SEMESTER II	**SEMESTER IV**
MCH-201 Inorganic Chemistry II MCH-202 Organic Chemistry II MCH-203 Physical Chemistry II MCH-204 Medicinal Chemistry	MCH-401 Advances in Analytical Chemistry MCH-402 Environmental Chemistry MCH-403 Bio-organic and Natural Chemistry MCH-404 Organometallic Chemistry MCH-405 Heterocyclic Chemistry

Program Specific Outcomes (PSOs)

After completing the M.Sc. Chemistry program, student will come up with following program specific outcomes:

PSO 1	**Knowledge of different domains of chemistry and Competence Development**	A student is expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and experimental chemistry knowledge in various fields of interest like Analytical Chemistry, Physical Chemistry, Inorganic Chemistry, Organic Chemistry, Material Chemistry, environmental, nanoscience, medicinal etc. Further, the students will have the competence to qualify NET/ GATE/ Other competitive examinations.
PSO 2	**Design,Development,Characterize andModern tools usage**	Students can acquire the capability to synthesize, separate and characterize organic/ inorganic compounds and learn to apply appropriate techniques for the qualitative and quantitative assessment of chemicals in laboratories and in industries. In addition, students can relate the theoretical and experimental knowledge for analyzing the molecules considering the data obtained from modern sophisticated instruments (e.g., FTIR, NMR, UV-Visible, Mossbauer, ESR, Mass, TGA/DTA, Particle Size Analyzer etc.).
PSO 3	**Green andSustainable Approach**	Students can apply green chemistry approaches in planning and execution of experiments. They will be concerned about environmental protection and sustainable development.
PSO 4	**R&D/Industry/Academia Readiness**	They will gain a thorough knowledge of the subject to be able to work in projects at different R&D institutions. They can get job in scientific as well as analytical laboratories *ca.*, pharma, chemical, and other industries. Also, they will have the opportunity to work in any academic/national institution across the country.
PSO 5	**Problem solving and Analytical Skills**	Students will be well versed in developing skills for solving computational and

		mathematical problems along with develop the ability to use appropriate techniques for qualitative and quantitative analysis of chemicals in laboratories and in industries.

Course Outcomes (COs)

After completing the M.Sc. Chemistry program, student will come up with following program specific outcomes:

MCH-101 Inorganic Chemistry I

CO No.	COs	Bloom's Taxonomy
CO1	Discuss the concept of chirality, axial, planar, helical chirality, optical activity of compounds, identification of stereoisomers, absolute and relative nomenclature and explain the criteria for chirality	Level 1
CO2	Understand concepts of aromatic/non-aromatic/antiaromatic behaviour of various compounds viz., annulenes, azulenes, etc	Level 2& Level 3
CO3	Application of stereochemistry in various organic reaction mechanism such as S_N1, S_N2, SN_i, E1, E2, E_1CB	Level 4 & Level 5
CO4	Gain basic knowledge of structure, stability, geometry, properties and reactions of free radicals	Level 6

MCH-102 Organic Chemistry I

CO No.	COs	Bloom's Taxonomy
CO1	Gain basic knowledgetypes of overlapping of orbitals and their applicability in chemical bonding	Level 1
CO2	Understand Dragos' compounds, Walsh diagram and classifications of forces other than chemical forces	Level 2
CO3	Discuss the metal ligand bonding, its applications and limitations using VBT, CFT and MOT	Level 3
CO4	Determine magnetic properties, electronic spectra of transition metal complexes and metal-ligand equilibrium in solution	Level 5
CO5	Learn energy profile, reactivity of metal complexes and reaction mechanism of transition metal complexes	Level 5 & Level 6

MCH-103 Physical Chemistry I

CO No.	COs	Bloom's Taxonomy
CO1	Understand the limitations of classical theory and origin of quantum chemistry with the help of its basic postulates, Schrodinger equation and its solutions for one electron system	Level 1
CO2	Significance of wave function, its normalization and various applications in dealing with rigid rotor and harmonic oscillator	Level 2
CO3	To solve the Schrodinger equation using various approximation methods like Variation method and Perturbation method	Level 3
CO4	Gain the knowledge of classical and statistical thermodynamics by understanding the concept of partial molar quantities, fugacity, ideal/non-ideal solutions, vibrational, rotational, electronic partition functions.	Level 4
CO5	Study Gibbs-Duhem equation, Debye Huckel theory, ionic strength, Sackure-Tetrode equation.	Level 5 & Level 6

MCH-104 Symmetry, Group Theory and Spectroscopy

CO No.	COs	Bloom's Taxonomy
CO1	Visualize molecule in 3D, understand the concept of symmetry elements and symmetry operations and assign point groups to molecules	Level 1
CO2	Gain knowledge of matrix representation, character tables, reducible and irreducible representations	Level 2 & Level 3
CO3	Correlate applications of symmetry to spectroscopy and find IR active modes of vibration using SALCs	Level 4
CO4	Study important concepts of ESR spectroscopy and its interpretation	Level 5
CO5	Outline the salient features, principles, applications and interpretation of Mossbauer spectroscopy for Fe and Sn nuclie	Level 5 & Level 6
CO6	Discuss the principle, instrumentation, selection rule, interpretation of IR spectroscopy and its applicability in characterizing the functional groups	Level 5 & Level 6

MCH-201 Inorganic Chemistry II

CO No.	COs	Bloom's Taxonomy
CO1	Study of organic reactions like acid/base catalysed reactions, organotransition metals assisted reactions	Level 1
CO2	Electrophilic and nucleophilic aromatic substitution reaction and their mechanism	Level 2 & Level 3
CO3	Discuss the stereochemistry and mechanisms of name reactions such as Birch reduction, Sharpless epoxidation, Meerwein-Ponndorf-Verley reduction, Wittig reaction for formation of carbon-carbon and carbon-hetero multiple bonds.	Level 4 & Level 5
CO4	Gain a brief knowledge of pericyclic reactions by understanding various theories and their applications	Level 6

MCH-202 Organic Chemistry II

CO No.	COs	Bloom's Taxonomy
CO1	Study the chemistry of organometallic compounds by understanding 18 electron rule, its limitations, Wade's rule, electron counting, metal hydrides, different types of ligands	Level 1
CO2	Understand the mechanisms, applications of organometallic complexes and discuss the Fischer and Schrock carbene	Level 2
CO3	Learn the various features of metal carbonyl viz., structure, bonding, vibrational spectra, important reactions	Level 3
CO4	Applications of organometallic complexes in homogeneous catalysis consist name reactions such as Suzuki Miyara coupling, Hiyama coupling, Buchwald-Hartwig amination etc	Level 4
CO5	Discuss about preparation, classification, topology of boranes, carboranes, metalloboranes and metallocarboranes	Level 5 & Level 6

MCH-203 Physical Chemistry II

CO No.	COs	Bloom's Taxonomy
CO1	Determine the chemical dynamics through various theories like Arrhenius theory and learn the kinetics of inorganic mechanisms	Level 1
CO2	Understand the phenomena of adsorption and absorption to get insight of surface chemistry, catalysis, Gibbs adsorption isotherm and critical micellar concentration	Level 2
CO3	Study the kinetics of complex, parallel and free radical polymerization reactions	Level 3
CO4	Learn principles and instrumentations of analytical techniques viz., cyclic voltammetry, amperometric titrations for qualitative and quantitative applp	Level 4
CO5	Study Gibbs-Duhem equation, Debye Huckel theory, ionic strength, Sackure-Tetrode equation	Level 5
CO6	Outline the concept of corrosion, its classification, principle and prevention	Level 6

MCH-204 Medicinal Chemistry (Elective-Discipline centric)

CO No.	COs	Bloom's Taxonomy
CO1	Detailed study of medicinal chemistry with knowledge of related important terms, classification of drugs	Level 1
CO2	Discuss the theories of drug action and structure activity relationship	Level 2 & Level 3
CO3	Understand the molecular modeling and drug designing by studying concept of lead compound, prodrugs, soft drugs and Lipinski Rule of Five	Level 2,Level 3 & Level 4
CO4	Study classification, mode of action, structure activity relationship of sedatives, hypnotics, analgesics, antipyretics and some of the synthesis of compounds come under these categories	Level1, Level 2, Level 3, Level 4, Level 5 & Level 6
CO5	Study classification, modes of action, structure activity relationship of Sulpha drugs and discuss the synthesis of some examples	Level1, Level 2, Level 3, Level 4, Level 5 & Level 6
CO6	Discuss antimalerial drugs and their development	Level1, Level 2, Level 3, Level 4, Level 5 & Level 6

MCH-301 Molecular Spectroscopy

CO No.	COs	Bloom's Taxonomy
CO1	Discuss the fundamentals of UV-Vis spectroscopy, effect of various factors on UV bands and its applicability to organic compounds	Level 1, Level 2, Level 3 & Level 4
CO2	Understand the fundamentals and instrumentation of NMR spectroscopy, factors influencing chemical shift, NMR shift reagents and classification of spin system (AXB, AMX, ABC, etc)	Level 1, Level 2 & Level 3 & Level 4
CO3	Discuss the principles, instrumentation, chemical shift of Carbon-13 NMR spectroscopy and its interpretation	Level 1, Level 2 & Level 3 & Level 4
CO4	Gain the basic knowledge of 2D NMR spectroscopy, ^{19}F and ^{31}P NMR spectroscopy	Level 1, Level 2 & Level 3 & Level 4
CO5	Learn the principle, instrumentation, ion production methods, mass spectral fragmentation of organic compounds and interpretation of spectra in mass spectrometry	Level 1, Level 2 & Level 3 & Level 4
CO6	Determine the structure of compounds by solving the combined problems based on UV, IR, NMR and Mass spectral techniques	Level 4, Level 5 & Level 6

MCH-302 Organic Photochemistry

CO No.	COs	Bloom's Taxonomy
CO1	Study the basic principles of photochemistry, quantum yield and actinometry	Level 1
CO2	Determination of reaction mechanism via rate constant, life time and discuss the types of photochemical reactions-photo dissociation, gas-phase photolysis	Level 2 & Level 3
CO3	Explain the photochemistry of alkene and aromatic compounds	Level 4
CO4	Discuss the photochemistry of carbonyl compounds which involves Norish type I, Norish type II, Paterno-Buchi reaction and Photo-Fries reactions	Level 5 & Level 6

MCH-303 Bioinorganic Chemistry (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Learn the structure and function of metal of proteins in electron transport processes and biological nitrogen fixation, its mechanism and nitrogenase	Level 1
CO2	Gain the knowledge of several metalloporphyrins viz., hemoglobin, myoglobin and enzymes such as peroxidase, catalase, cytochrome P-450	Level 2 & Level 3
CO3	Study of various metalloenzymes viz., superoxide dismutase, vitamin B12, carbonic anhydrase and copper proteins	Level 4
CO4	Discuss the role of metal ions in biological system	Level 5 & Level 6

MCH-304 Chemistry of Polymers (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Understand the chemistry of macromolecules, polymerization and classification of polymers on different basis	Level 1
CO2	Know different types of molecular weights and determining the weights using various methods	Level 2
CO3	Analysis, testing tensile strength, thermal analysis, X-ray diffraction study, microscopy of polymers	Level 3
CO4	Study degradation, processing and rheology of polymers	Level 4 & Level 5
CO5	Discuss structure, properties and application of polymers	Level 6

MCH-305 Organic Synthesis (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Study solid state reactions that involves principles, various methods like coprecipitation, vapor phase, electrochemical methods, Czochralski method, Bridgman and Stokbarger methods	Level 1
CO2	Discuss crystal defects and non-stoichiometric defects	Level 2 & Level 3
CO3	Detailed study of X-ray diffraction for crystal structure determination	Level 4, Level 5 & Level 6
CO4	Outline the concept of superconductivity, Meissner effect and BCS theory of superconductivity	Level 1, Level 2, Level 3
CO5	Preparation, classification, Properties and applications of nanotechnology	Level 1, Level 2, Level 3, Level 4, Level 5 & Level 6

MCH-306 Solid State Chemistry and Nanoscience (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Understand chemistry of protection and deprotection of groups	Level 1, Level 2 & Level 3
CO2	Study selective name reactions and their application in organic synthesis	Level 1, Level2 Level 3 & Level 4
CO3	Study oxidizing agents in organic synthesis	Level 1, Level 2 & Level 3
CO4	Understand mechanism and stereochemistry of reduction with some specific reagents	Level 1, Level 2 & Level 3
CO5	Study concept of retrosynthesis in designing synthetic routes for different classes of organic compounds	Level 1, Level2 Level 3 & Level 4

MCH-401 Advances in Analytical Chemistry

CO No.	COs	Bloom's Taxonomy
CO1	Study the basics of statistical tests and error analysis	Level 1 & Level 2
CO2	Discuss the principle, instrumentation, interpretation and applications of flame ionization spectrometry, atomic absorption spectrometry and atomic emission spectrometry	Level 2, Level 3 & Level 4
CO3	Learn the principles, instrumentation and applications of thermal methods of analysis like TG, DTA and DSC	Level 4, Level 5 & Level 6
CO4	Basic fundamentals with theoretical parameters, instrumentation, types of detector and applications of GC, HPLC and hyphenated techniques	Level 4, Level 5 & Level 6

MCH-402 Environmental Chemistry

CO No.	COs	Bloom's Taxonomy
CO1	Discuss composition of atmosphere and hydrosphere, different types of temperature, biochemical cycle, aquatic pollution, inorganic pesticides and detergents	Level 1
CO2	Learn analytical methods of measuring BOD, DO, COD, purification methods and water treatment	Level 2 & Level 3
CO3	Study composition of soils, waste treatment, green house effect, acid rain, air pollution controls and their chemistry	Level 4
CO4	Analytical methods for measuring air pollutants, continuous monitoring instruments, urban air pollution, damaging effects of carbon monoxide and their control strategies	Level 4
CO5	Discuss the causes and prevention of industrial pollution and environmental disasters	Level 5 & Level 6
CO6	Gain the knowledge of environmental toxicology that involves toxic heavy metals and toxic organic compound	Level 5 & Level 6

MCH-403 Bio-organic and Natural Products Chemistry (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Discuss the basic concepts, synthesis and reactions of main group organometallics	Level 1
CO2	Gain the knowledge transition metal-carbon bond for different ligands such as alkyl, aryl, carbene, vinlidene, cyclopropenyl, carbyne	Level 2 & Level 3
CO3	Explain the synthesis and chemistry of cyclopentadienyl and arene metal analogues	Level 4, Level 5 & Level 6
CO4	Discuss the applications of various name reactions to organic synthesis and homogenous catalysis	Level 4, Level 5 & Level 6

MCH-404 Organometallic Chemistry (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Gain knowledge of structure, stereochemistry of terpenoids and synthesis/ biosynthesis of some specific terpenoids	Level 1, Level 2, Level 3, Level 5 & Level 6
CO2	Structure, stereochemistryof alkaloids and synthesis/biosynthesis of some common alkaloids	Level 1, Level 2, Level 3, Level 5 & Level 6
CO3	Discuss the occurrence, nomenclature, basic skeleton, isolation of steroids and prostaglands and synthesis of cholesterol, PGE2, PGF2a	Level 1, Level 2, Level 3, Level 5 & Level 6
CO4	Study of specific hormones like androsterone, testosterone, ostrone, progesterone and aldosterone	Level 1, Level 2, Level 3, Level 5 & Level 66
CO5	Thorough study on nomenclature, classification, catalysis and inhibitory actions of enzymes alongwith mechanism of enzyme action and co-enzyme chemistry	Level 1, Level 2, Level 3, Level 4, Level 5 & Level 6

MCH-405 Heterocyclic Chemistry (Elective)

CO No.	COs	Bloom's Taxonomy
CO1	Study the nomenclature (Hantzsch-Widman system) for heterocycles	Level 1
CO2	Chemical behaviour, classification criteria of aromatic heterocycles and their interpretation via ^{1}H NMR	Level 2 & Level 3
CO3	Discuss the basic concepts of stability and formation of non-aromatic, small and benzo-fused ring heterocycles	Level 4
CO4	Learn the general classification of some important meso-ionic heterocycles of type-A and type-B and their applications	Level 5 & Level 6
CO5	Study the synthesis and reactions of six and seven memebered heterocycles with one or two heteroatoms	Level 5 & Level 6

Mapping matrix of Course outcomes (Cos) with Program Specific Outcomes (PSOs)

MCH-101 Inorganic Chemistry (I)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	1
CO2	3	2	1	1	2
CO3	3	3	1	3	3
CO4	3	2	3	3	3

MCH-102Organic Chemistry (I)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	-	2
CO2	3	1	1	1	2
CO3	3	2	2	1	3
CO4	3	3	3	-	2

MCH-103 Physical Chemistry (I)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	-	3
CO2	3	-	1	2	3
CO3	3	1	1	-	3
CO4	3	-	1	2	2
CO5	3	-	-	-	3
CO5					

MCH-104 Symmetry, Group Theory and Spectroscopy	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	2
CO2	3	1	-	-	2
CO3	3	2	-	1	3
CO4	3	3	-	1	3
CO5	3	3	-	3	3
CO6	3	3	1	3	3

MCH-201 Inorganic Chemistry II	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	1	3
CO2	3	2	-	1	3
CO3	3	3	-	-	3
CO4	3	2	3	3	3
CO5	3	2	1	1	2

MCH-202 Organic Chemistry II	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	-	2
CO2	3	-	-	1	2
CO3	3	3	3	3	3
CO4	3	3	3	3	2

MCH-203 Physical Chemistry II	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	-	3
CO2	3	-	2	1	2
CO3	3	2	-	-	3
CO4	3	-	-	3	3
CO5	3	2	-	1	2
CO6	3	3	-	3	3

MCH-204 Medicinal Chemistry (Elective-Discipline centric)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	1	2	-
CO2	3	2	2	2	2
CO3	3	3	-	2	2
CO4	3	2	2	3	-
CO5	3	2	2	2	-
CO6	3	3	1	3	2

MCH-301 Molecular Spectroscopy	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	3	3
CO2	3	3	-	3	3
CO3	3	3	-	3	3
CO4	3	3	-	3	3
CO5	3	3	-	3	3
CO6	3	3	-	3	3

MCH-302 Organic Photochemistry	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	2
CO2	3	2	2	3	2
CO3	3	2	2	2	2
CO4	3	3	3	2	2

MCH-303 Bioinorganic Chemistry (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	1	2	2
CO2	3	-	-	1	1
CO3	3	-	-	1	1
CO4	3	-	-	3	1

MCH-304 Chemistry of Polymers (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	-
CO2	3	3	-	3	2
CO3	3	3	1	3	3
CO4	3	3	3	3	1
CO5	3	1	1	3	3

MCH-305 Organic Synthesis (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	1	2	2
CO2	3	2	2	3	1
CO3	3	2	2	2	1
CO4	3	2	-	1	1
CO5	3	2	3	3	2

MCH-306 Solid State Chemistry and Nanoscience (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	3	2
CO2	3	-	-	2	2
CO3	3	3	-	3	2
CO4	3	3	-	3	2
CO5	3	3	3	3	2

MCH-401 Advances in Analytical Chemistry	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	3	3
CO2	3	3	-	3	3
CO3	3	3	-	3	3
CO4	3	3	-	3	3

MCH-402 Environmental Chemistry	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2
CO2	3	3	3	3	3
CO3	3	2	3	3	2
CO4	3	3	3	3	3
CO5	3	2	3	3	1
CO6	3	3	3	3	2

MCH-403 Bio-organic and Natural Products Chemistry (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	3	1
CO2	3	1	-	3	2
CO3	3	1	-	3	1
CO4	3	1	-	3	2
CO5	3	2	-	3	1

MCH-404 Organometallic Chemistry (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	2	1
CO2	3	-	-	2	1
CO3	3	-	-	2	1
CO4	3	1	2	2	1

MCH-405 Heterocyclic Chemistry (Elective)	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	3
CO2	3	2	-	3	3
CO3	3	-	-	3	1
CO4	3	1	-	3	2
CO5	3	-	-	3	2

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