

# DEPARTMENT OF CHEMISTRY

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## PROGRAM & COURSE OUTCOMES OF CHEMISTRY HONOURS (B.Sc. FYUGP) UNDER NEP-2020

### Program Outcomes

**PO-1:** Disciplinary knowledge and skill: A graduate student is expected to be capable of demonstrating comprehensive knowledge and understanding both theoretical and practical knowledge in all disciplines of Chemistry. Students can solve their subjective problems very methodically, independently and finally draw a logical conclusion. Further, the student will be capable of applying modern technologies, handling advanced instruments and Chemistry related softwares for chemical analysis, characterization of materials and in separation technology.

**PO-2:** Skilled communicator: The course curriculum incorporates basics and advanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation.

**PO-3:** Critical thinker and problem solver: The course curriculum also includes components that can be helpful to graduate students to develop critical thinking and to design, carry out, record and analyze the results of chemical reactions. Students will be able to think and apply evidence based comparative chemistry approach to explain chemical synthesis and analysis.

**PO-4:** Sense of inquiry: It is expected that the course curriculum will develop an inquisitive characteristics among the students through appropriate questions, planning and reporting experimental investigation.

**PO-5:** Team player: The course curriculum has been designed to provide opportunity to act as team player by contributing in laboratory, field based situation and industry.

**PO-6:** Skilled project manager: The course curriculum has been designed in such a manner as to enabling a graduate student to become a skilled project manager by acquiring knowledge about chemistry project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.

**PO-7:** Digitally literate: The course curriculum has been so designed to impart a good working knowledge in understanding and carrying out data analysis, use of library search tools, use of chemical simulation software and related computational work.

## Programme Specific Outcomes

**PSO-1:** Core competency: The chemistry graduates are expected to gain knowledge of the fundamental concepts of chemistry and applied chemistry through theory and practical. These fundamental concepts would be reflected in the latest understanding of the field to keep continues its progression.

**PSO-2:** Communication skills: Chemistry graduates are expected to possess minimum standards of communication skills to read and understand documents so that they can solve their problems very methodically, independently and with logical argument. Graduates are expected to build good communication skill so that they can easily share their idea/finding/concepts to others.

**PSO-3:** Critical thinking: Chemistry graduates are expected to achieve critical thinking ability to design, carry out, record and analyze the results of chemical reactions. They can have that much potential and confidence that they can overcome many difficulties with the help of their sharp scientific knowledge and logical approaches.

**PSO-4:** Psychological skills: Chemistry graduates are expected to possess basic psychological skills so that they can deal with individuals and students of various socio-cultural, economic and educational levels. Psychological skills are very important for proper mind setting during performing, observing and giving conclusion of a particular reaction. It is also important for selfcompassion, self-reflection, interpersonal relationships, and emotional management.

**PSO-5:** Problem-solving: Graduates are expected to be well trained with problem-solving philosophical approaches that are pertinent across the disciplines.

**PSO-6:** Analytical skill development and job opportunity: Chemistry graduates are expected to possess sufficient knowledge how to synthesize a chemical compound and perform necessary characterization and analysis in support of the formation of the product by using modern analytical tools and advanced technologies. Because of this course curriculum chemistry graduates have lot of opportunity to get job not only in academic and administrative field but also in industry.

**PSO-7:** Research motivation: Chemistry graduates are expected to be technically well trained with modern devices and Chemistry based software and has powerful knowledge in different disciplines of Chemistry so they can easily involve themselves in theory and laboratory-based research activities.

**PSO-8:** Teamwork: Graduates are expected to be team players, with productive co-operations involving members from diverse socio-cultural backgrounds.

**PSO-9:** Digital Literacy: Graduates are expected to be digitally literate for them to enroll and increase their core competency via e-learning resources such as MOOC and other digital tools for lifelong learning.

**PSO-10:** Social Awareness: As an inhabitant of this green world it is our duty to make our planet clean and suitable for living to all. In this context Chemistry graduates are expected to be more aware about finding green chemical reaction routes for sustainable development. They are expected to maintain good laboratory practices and safety.

## Course Learning Outcomes

Semester	CourseCode	Course Outcomes
SEM-I	UMJCHT101 & UMICHT102	<p><b>CO-1:</b> To know about the extra nuclear structure of atom.</p> <p><b>CO-2:</b> To understand the basic concept of kinetic theory of gases and know how to solve numerical problems related to that topic.</p> <p><b>CO-3:</b> To learn the transport processes of liquids and gases.</p> <p><b>CO-4:</b> To learn the basics concepts of organic chemistry especially on chemical bonding and physical properties.</p> <p><b>CO-5:</b> To study the periodic properties of elements through periodic table</p> <p><b>CO-6:</b> To understand about the formation and stability of reaction intermediates and their electrophilic and nucleophilic behavior.</p>
	UMDCHT103	<p><b>CO-1:</b> To learn about food additives and safe handling of drugs.</p> <p><b>CO-2:</b> To apply the basic principles chemistry in daily life.</p> <p><b>CO-3:</b> Students are expected to acquire the knowledge of understanding preparation and properties of drugs.</p> <p><b>CO-4:</b> Students learn about the various drugs analysis and preparations of Allegra, Zyrtec, Alprazolam, trazodone, lorazepam, Ambien &amp; Diazepam.</p> <p><b>CO-5:</b> After learning this unit, students analyze the basic factors behind the production of milk and milk products, analysis of food materials &amp; flavoring agents.</p> <p><b>CO-6:</b> Students are able to predict factors and know about Clinical analysis of blood, estimation of blood cholesterol, Glucose, Enzymes, RBC &amp; WBCs.</p>
	USECHT104	<p><b>CO-1:</b> To learn to prepare standard solutions.</p> <p><b>CO-1:</b> To gain knowledge about normality, molarity and equivalent weight of compounds.</p> <p><b>CO-1:</b> To prepare Battery water.</p> <p><b>CO-1:</b> Use Paper Chromatography as a separation Technique for separation of mixtures.</p>
	UMJCHT201 & UMICHT202	<p><b>CO-1:</b> Measurement of density, surface tension and viscosity of different liquids.</p> <p><b>CO-2:</b> Synthesize and identify functional groups in different organic compounds.</p> <p><b>CO-3:</b> To learn the basic concepts of Stereochemistry.</p> <p><b>CO-4:</b> To understand reaction kinetics, reaction thermodynamics and tautomerism of organic compounds.</p> <p><b>CO-5:</b> To learn about the basic concepts and types of chemical bonding, laws, rules and equations for formation of chemical bonds, solubility, hybridization and dipole moment of molecules.</p>

<b>SEM-II</b>		<b>CO-6:</b> To study the modern approaches of chemical bonding (Molecular Orbital Theory, Metallic Bonding concept, Role of weak intermolecular forces).
	<b>UMDCHT203</b>	<b>CO-1:</b> To understand the hazardous waste and its impact on environment. <b>CO-2:</b> To learn the treatment and disposal of hazardous waste.
	<b>USECHT204</b>	<b>CO-1:</b> The students should learn fundamentals of various cleaning agents. <b>CO-2:</b> The students should learn technology of soap. <b>CO-3:</b> The students should define soap, hard and soft soap, liquid soap. <b>CO-4:</b> The students should learn fundamentals of detergents and surfactants. <b>CO-5:</b> The students should explain preparations and various types of detergents and surfactants.
<b>SEM-III</b>	<b>UMJCHT301 &amp; UMICHT303</b>	<b>CO-1:</b> Helps to understand about the applications of Thermodynamics in Colligative properties and Phase Equilibrium. <b>CO-2:</b> To learn in detail about the synthesis, properties, chemical reactions and reaction mechanisms of alkenes and alkynes. <b>CO-3:</b> To understand about different types of electrophilic and nucleophilic aromatic substitution reactions, reaction intermediates and their mechanisms. <b>CO-4:</b> To study the chemistry of s and p block elements including noble gases and their compounds in detail. <b>CO-5:</b> To learn in detail about the first and second laws of Chemical Thermodynamics and the related terms; to get idea about thermo-chemistry and thermodynamic relationships and system of variable compositions.
	<b>UMJCHT302</b>	<b>CO-1:</b> To learn the fundamentals of acid/base reactions, redox reactions and precipitation reactions. <b>CO-2:</b> To learn the chemical reactions and strategies to balance them. <b>CO-3:</b> To learn the fundamentals of acid/base chemistry, including pH calculations, buffer behavior, and acid/base titrations. <b>CO-4:</b> Student could able to know the basics of chromatographic techniques and their applications. Student could able acquire some basic knowledge of Chromatographic techniques and its applications.
	<b>UMDCHT304</b>	<b>CO-1:</b> To learn the chemical basis for biological phenomena and cellular structure. <b>CO-2:</b> To learn the how physiological conditions (esp. the chemistry of water) influence the structures and reactivities of biomolecules. <b>CO-3:</b> To learn the chemical properties of amino acids, cofactors, and sugar. <b>CO-4:</b> To learn the basic principles of protein and polysaccharide structure. <b>CO-5:</b> To learn the enzyme kinetics and their application to the elucidation of catalytic mechanisms.
		<b>CO-1:</b> Students will be able to compare the methods of preservation of animal

	<b>USECHT305</b>	<p>food.</p> <p><b>CO-2:</b> Students will be able to comprehend the reason for food spoilage.</p> <p><b>CO-3:</b> Students will be able to comprehend the principles of preventing contamination and the removal of microorganisms methods used for food safety</p> <p><b>CO-4:</b> Students will be able to comprehend the principles of microbial growth inhibition used in food safety</p> <p><b>CO-5:</b> Students will be able to understand the chemistry and applications of cosmetics.</p>
<b>SEM-IV</b>	<b>UMJCHT401</b>	<p><b>CO-1:</b> To understand different phases of a solution.</p> <p><b>CO-2:</b> To know about conductance and its various types.</p> <p><b>CO-3:</b> To understand the effect of temperature pressure and concentration at the equilibrium.</p>
	<b>UMJCHT402</b>	<p><b>CO-1:</b> To understand the reactivity of various types of functional groups in organic chemistry.</p> <p><b>CO-2:</b> To study the reaction pattern of various degrees of alcohols and other functional group reagents.</p> <p><b>CO-3:</b> To study the different forms of carbohydrates and their classification.</p>
	<b>UMJCHT403</b> & <b>UMiCHT405</b>	<p><b>CO-1:</b> Helps to understand about the structures, stability, colour, magnetism and Orgel diagram of the co-ordination compounds on the basis of modern concepts of chemical bonding.</p> <p><b>CO-2:</b> To study the chemical and physical properties of d and f Block elements and their compounds.</p> <p><b>CO-3:</b> To learn the reaction kinetics and mechanisms of inorganic reactions.</p> <p><b>CO-4:</b> To study experimentally how to synthesize inorganic complexes and determine the <math>\lambda_{\max}</math> values of inorganic complexes.</p> <p><b>CO-5:</b> To calculate the 10Dq value by spectrophotometric method.</p>
	<b>UMJCHT404</b>	<p><b>CO-1:</b> To understand the effect of electromagnetic radiations on molecules.</p> <p><b>CO-1:</b> To understand the degree of freedom of various types of molecules.</p> <p><b>CO-1:</b> To understand the difference between absorption and emission spectra.</p> <p><b>CO-1:</b> To understand the role of radioactive isotopes on humans.</p>