

Programme Specific Outcome and Course outcome for FYUGP 2024-25

DEPARTMENT OF CHEMISTRY	
Programme Specific Outcome of B.Sc./ B.Sc. (Honours)/ B.Sc (Honours) with Research	
Programme Specific Outcome	<ol style="list-style-type: none">1. Students will have broad and balanced knowledge in chemistry in addition to understanding of key chemical concepts, principles, and theories.2. Students will acquire expertise over solving both theoretical and applied chemistry problems.3. Students will have knowledge, ability, and skill to undertake further studies in chemistry or in related multidisciplinary areas that can be helpful for higher studies. In addition, a chemistry graduate as envisioned in this framework would be sufficiently competent in the field to undertake further discipline-specific studies, as well as to begin domain-related employment.4. Cognitive development of students in a holistic manner, that provides the latest subject matter (both theoretical as well as practical), in such a way that foster their core competency and discovery learning.5. Mould a responsible citizen who is aware of most basic domain independent knowledge, including critical thinking and communication.6. Enable the graduates to compete in national/international and state level competitive examinations, such as IIT-JAM, CUCET, UPSC Civil Services Examination etc.

Course Outcomes of B.Sc./ B.Sc. (Honours)/ B.Sc (Honours) with Research			
Subject: CHEMISTRY			
Semester	Course Category	Paper Code and Course Name	Outcomes
1st	Major/Minor	CHE0100104 Chemistry I (Theory)	<p>On successful completion, students would have clear understanding of the concepts related to atomic and molecular structure, chemical bonding, periodic properties.</p> <p>Students will also be able to identify different classes of organic compounds, describe their reactivity and explain/analyze their chemical and stereo chemical aspects.</p> <p>In gaseous state unit students will learn the kinetic theory of gases, ideal gas and real gases. In liquid state unit, the students are expected to learn the qualitative treatment of the structure of liquid along with the physical properties of liquid, viz, vapour pressure, surface tension and viscosity.</p>
		Laboratory course I	<p>Students will be able to work in a chemical laboratory following standard safety protocols.</p> <p>Students will also have hands on experience of standard solution preparation in different concentration units.</p>
	MDC (Multi Disciplinary Course)	Natural and Physical Sciences (Introduction to Natural and Physical Sciences) (MDC0100103)	<p>On successful completion, students will gain a foundational understanding of key concepts in natural and physical sciences, enabling them to comprehend the basic principles that govern the natural world. students would have clear understanding of</p>

			the concepts related to atomic and molecular structure, chemical bonding, chemical formulas and chemical equations. Students will be able to know Laws of nature, different properties of matters.
2 nd	Major/Minor	Chemistry II (Theory)	Students will be able to understand and apply the concepts of chemical bonding, coordination chemistry, acid and bases and the reactive intermediates. Moreover, students are expected to learn laws of thermodynamics, thermochemistry, thermodynamic functions, relations between thermodynamic properties, Gibbs Helmholtz equation, Maxwell relations etc. Students will be able to understand the chemical systems from thermodynamic point of view.
		Laboratory Course II	Students will acquire preliminary training on quantitative analysis, synthesis of coordination compounds, qualitative analysis of organic compounds and measurement of a few basic thermodynamic parameters.
	MDC (Multi Disciplinary Course)	Natural and Physical Sciences (Natural and Physical Sciences in Everyday Life) (MDC0200103)	Upon successfully completing the course, students will understand the role and importance of biomolecules. Students will also learn about the composition, properties and uses of everyday substances such as foods, beverages, germicides, pesticides and their impact on health and environment. Students will be able to recognize the connections between chemistry, environmental science and how these disciplines interact in everyday life.
3 rd	Major/Minor		Upon successfully completing the course, students will gain substantial knowledge of acids and bases, along with a comprehensive understanding of bonding in coordination compounds. They will also become well-versed in the principles of redox chemistry, solutions, and their various properties. Additionally, students will develop the ability to describe and classify organic compounds based on

			<p>their functional groups and reactivity patterns.</p> <p>Furthermore, engaging in experiments related to acid/base and redox titrations will allow students to hone their skills in quantitative analysis. They will gain practical experience that reinforces their theoretical knowledge. The course also includes qualitative analysis of organic compounds with common functional groups, providing students with insights into these functional groups and their reactivities.</p>
	<p>MDC (Multi Disciplinary Course)</p>	<p>Laboratory Course III</p>	<p>Physical chemistry experiments are another critical component of the curriculum. Through these experiments, students will be introduced to the measurement of physical properties and the kinetics of chemical reactions. This hands-on experience will be instrumental in solidifying their understanding of physical chemistry concepts and techniques.</p>
		<p>Natural and Physical Sciences (Applications and Prospects of Natural and Physical Sciences) (MDC0300103)</p>	<p>Upon successfully completing the course, students will gain knowledge about solar light and radiation, including the principles behind their applications in technologies. Students will also learn about various microscopic and spectroscopic techniques. Moreover, students will explore different types of sensors and detectors and students will also understand the principles of telescopes, including their role in astronomy and how they contribute to our knowledge of space and celestial objects.</p>
<p>4th</p>	<p>Major</p>	<p>Inorganic chemistry I</p>	<p>Upon successfully completing the course, students will gain the ability to assign point groups to molecules, which will deepen their understanding of molecular symmetry and its significance in chemistry. They will also be able to explain the bonding in coordination compounds in detail, and describe their various properties using the concept of Crystal Field Stabilization Energy (CFSE). This knowledge will enable them</p>

			<p>to predict the reactivity of these compounds effectively.</p> <p>Moreover, students will obtain a comprehensive overview of metallurgical processes, enhancing their understanding of how metals are extracted and processed. They will also delve into nuclear chemistry, learning about the principles and applications of nuclear reactions and processes.</p> <p>The course will provide an in-depth study of the chemistry of d and f block elements, highlighting their unique properties and important roles in various chemical contexts. Students will learn to apply fundamental concepts such as solubility products, common ion effects, and pH in the analysis of ions. This will allow them to approach the analysis of chemical solutions with a solid theoretical foundation.</p>
		Lab	<p>Students will appreciate the significance of clever reaction design. They will understand how thoughtful planning and execution of reactions can make it possible to identify the components within complex mixtures. This aspect of the course will develop their analytical skills and deepen their appreciation for the intricacies of chemical analysis.</p>
		Organic Chemistry I	<p>Upon successful completion of the course, students will be able to explain and correlate the structure and reactivity of oxygen- and nitrogen-containing organic molecules, with particular relevance to bioorganic chemistry. They will develop a deep understanding of how these molecules behave and interact in biological systems, enhancing their ability to connect molecular structure to function and reactivity. This knowledge will be crucial for their studies and future work in bioorganic chemistry and related fields.</p>

		<p style="text-align: center;">Lab</p>	<p>Upon successful completion of the course, students will be able to perform simple organic transformations and purifications, adhering to conventional green chemistry pathways. They will acquire the skills necessary to carry out these procedures in an environmentally friendly manner, emphasizing sustainability and the reduction of hazardous waste. This competency will prepare them for modern chemical practices that prioritize ecological responsibility.</p>
		<p style="text-align: center;">Theoretical Chemistry</p>	<p>Upon successful completion of the course, students will understand the fundamentals of atomic structure and its relation to quantum mechanics. They will be able to formulate the basic structural properties of atoms using mathematical theories. This knowledge will enable them to grasp the underlying principles of atomic behaviour and quantum phenomena, equipping them with a solid foundation in theoretical and applied aspects of atomic structure.</p>
		<p style="text-align: center;">Lab</p>	<p>Upon successful completion of the course, students will be able to plot and program equations related to simple chemical systems using computer programming languages such as BASIC, FORTRAN, and Python. They will apply these skills to calculate various physical properties, enhancing their ability to perform computational analysis and modelling in chemistry. This proficiency will equip them with valuable tools for solving complex chemical problems through computational methods.</p>
		<p style="text-align: center;">Magnetic Resonance Spectroscopy and Analytical techniques.</p>	<p>Upon successful completion of the course, students will gain a thorough understanding of spectroscopy, including the use of spectroscopic, chromatographic, electroanalytical, and diffraction techniques. They will learn about the principles and applications of these methods, enabling them to analyze and interpret various types of chemical data. This knowledge will prepare them to apply these techniques in practical and research settings, broadening their analytical capabilities in chemistry.</p>

		Lab	Upon successful completion of the course, students will acquire knowledge of contemporary methods and instruments used for the identification and separation of chemical compounds. They will learn about advanced techniques such as spectroscopy, chromatography, mass spectrometry, and nuclear magnetic resonance (NMR), among others. Through practical applications and theoretical studies, students will understand the principles behind these methods and how they contribute to the accurate identification and separation of chemical substances. This knowledge will equip them to handle complex analytical challenges in both academic and professional environments effectively.