

Semester	2
Programme	CHEMISTRY
Course	MULTIDISCIPLINARY (INTRODUCTION TO CHEMISTRY)
Paper Code	M1CH230211P
Credits	3 (PRACTICAL: 3)
Hours/week	3 (PRACTICAL: 3)
Category: Core/MDC/SEC/VEC	MDC
Theory/Practical/Composite	PRACTICAL
Number of Modules	3
Syllabus	Introduction to Chemistry 1. Flame Test for Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cu^{2+}. 2. Wet Test for acid radicals: Cl^-, SO_4^{2-}, PO_4^{3-}, SCN^-, $[Fe(CN)_6]^{4-}$, CrO_4^{2-}, S^{2-}, $S_2O_3^{2-}$. 3. Special test for Basic Radical: (a) $NaBiO_3$ test for Mn^{2+}. (b) DMG test for Ni^{2+}, (c) Test for Fe^{3+}, (d) Test for Cu^{2+}, (e) Test for Co^{2+}. 4. Identification of organic functional groups (Dye test, Back-dye test, Mulliken Barker's test etc.) 5. Synthesis of "Oil of Wintergreen". 6. Synthesis of hydrazones having antimicrobial activity.
Course Overview	Practical: A practical-only course designed to introduce students to essential qualitative analysis and fundamental synthetic techniques in a chemistry laboratory. • Inorganic Qualitative Analysis: Focuses on identifying specific metal ions via characteristic flame tests (Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cu^{2+}). It also covers systematic wet tests for acid radicals (such as Cl^-, SO_4^{2-}, PO_4^{3-}, SCN^-) and specific spot tests for basic radicals, including the $NaBiO_3$ test for Mn^{2+} and the DMG test for Ni^{2+}. • Organic Qualitative Analysis: Trains students to identify organic functional groups using classic diagnostic methods like the Dye test, Back-dye test, and Mulliken Barker's test. • Organic Synthesis: Introduces bench-level synthetic chemistry, directing students to prepare functional molecules like "Oil of Wintergreen" and biologically active hydrazone derivatives with antimicrobial properties.
Course Outcomes	CO1 [Flame Tests]: Execute high-temperature flame tests to identify specific metal ions (Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cu^{2+}) based on their characteristic emission colors. CO2 [Anion Analysis]: Perform systematic wet chemical analysis to detect various acid radicals (Cl^-, SO_4^{2-}, PO_4^{3-}, SCN^-, $[Fe(CN)_6]^{4-}$, CrO_4^{2-}, S^{2-}, $S_2O_3^{2-}$) in aqueous solutions. CO3 [Cation Confirmation]: Conduct specific confirmatory spot tests for transition metal basic radicals, including the $NaBiO_3$ test for Mn^{2+}, the DMG test for Ni^{2+}, and confirmatory tests for Fe^{3+}, Cu^{2+}, and Co^{2+}.

	CO4 [Organic Functional Groups]: Identify unknown organic functional groups using distinct diagnostic chemical assays such as the Dye test, Back-dye test, and Mulliken-Barker's test. CO5 [Ester Synthesis]: Synthesize specific ester-based organic compounds, focusing on the safe preparation, isolation, and odor-based identification of "Oil of Wintergreen". CO6 [Antimicrobial Synthesis]: Prepare biologically relevant organic molecules by synthesizing hydrazone derivatives known for their antimicrobial activity. CO7 [Safety & Documentation]: Demonstrate rigorous laboratory safety practices, including the correct handling of concentrated reagents, and the precise documentation of all empirical observations.		
Program Outcomes	PO1: Fundamental Knowledge: Demonstrate a comprehensive understanding of core concepts in chemistry, including organic, inorganic, physical, analytical, and biochemistry. PO2: Laboratory Skills: Acquire hands-on experience in laboratory techniques and instrumentation, applying safety protocols and proper methodologies to conduct experiments and analyse results. PO3: Problem Solving: Develop critical thinking and problem-solving skills by applying chemical principles to real-world scenarios, including the ability to design experiments and interpret data. PO4: Research Competency: Engage in independent and collaborative research projects, employing scientific methods to formulate hypotheses, conduct experiments, and communicate findings effectively. PO5: Interdisciplinary Applications: Understand the interdisciplinary nature of chemistry, exploring its applications in fields such as medicine, environmental science, materials science, and nanotechnology. PO6: Communication Skills: Effectively communicate scientific information, both verbally and in written form, to diverse audiences, demonstrating the ability to present complex ideas clearly and concisely. PO7: Ethics and Sustainability: Recognize the ethical implications and responsibilities of scientific research and practice in chemistry, emphasizing the importance of sustainability and environmental stewardship in chemical practices.		
CO #	Core Curriculum Domain	Bloom's Taxonomy (K-Level)	Mapped POs
CO1	Flame Test Identification	K3 (Apply)	PO1, PO2
CO2	Inorganic Radical (Anion) Analysis	K4 (Analyze)	PO1, PO3
CO3	Specific Cation Assays	K4 (Analyze)	PO1, PO4
CO4	Organic Functional Group Tests	K4 (Analyze)	PO1, PO3
CO5	Organic Synthesis (Oil of Wintergreen)	K3 (Apply), K6 (Create)	PO2, PO5
CO6	Organic Synthesis (Hydrazones)	K3 (Apply), K6 (Create)	PO2, PO5

CO7	Lab Safety & Empirical Documentation	K3 (Apply)	PO6, PO7
Reading/Reference Lists	1. Svehla, G., Vogel's Textbook of Macro and Semimicro Qualitative Inorganic Analysis, Longman 2. Nad, A. K., Mahapatro, B., Ghosal, A., An Advanced Course in Practical Chemistry, NCBA		
Evaluation	Internal: 38; Attendance: 2		