

Branch Name:	B.Sc. Chemistry
Program Code:	SC103
Course Name:	ANALYTICAL CHEMISTRY II
Course Code:	2SC1030604
Pre-requisite Course:	Basic fundamental analytical chemistry

Course Objectives:

1. To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique, use of reagents and reactions in laboratory, synthesis and study of materials, the exploration of their properties and development of ways to use the mineral life.
2. To redesign the courses the special emphasis on local requirements, environment, to link the courses with requirements of the industries and research.
3. The primary goal of this course is to make students aware of how chemical processes can be designed, developed and run in a sustainable way.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	-	3	70	30	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	Proton NMR Spectroscopy Introduction, principle of NMR spectroscopy, Equivalent & None equivalent Proton, Shielding & Dishelding, Chemical Shift & Molecular Structure Spin-Spin Splitting & Coupling constant Application of NMR. Interpretation of organic molecules i.e Examples, Toluene, Benzoic acid, Ethanol, Acetone, Ethyl bromide, Methoxy benzene, benzyl alcohol, etc	15	33
2	Gas Chromatography principle, theory, Instrumentation, types of columns, detector types and applications in pharmaceutical analysis. Comparison with other chromatography (HPLC). Advanced applications.	15	34
3	IR Spectroscopy Introduction, principle of IR spectroscopy, Modes of vibration (AB ₂ Type molecule) instrumentation, sampling technique, selection rules, types of bonds, absorption of common functional groups. Finger print region, Effect of IR in geometrical Isomer, Types of H-Bonding, Factors affecting frequencies, applications. Hooke's law,. Application of IR. Comparison with FTIR. Interpretation of organic molecules.	15	33

Reference Books:

- 1) Applications of spectroscopic techniques in Organic Chemistry: P.S. Kalsi, New Age International; 6th Edition..
- 2) Elementary Organic Spectroscopy; Principles And Chemical Applications: Y. R. Sharma, S. Chand & Co Pvt Ltd.
- 3) Fundamentals of Molecular Spectroscopy: C. M. Banwell and E. McCash, Tata McGraw Hill, 4th Edition. F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann,
- 4) Spectroscopic Method in Organic Chemistry: Dudley Williams, Ian Fleming McGraw-Hill Education; 6th Edition.
- 5) Elementary Organic Spectroscopy; Principles And Chemical Applications: Y. R. Sharma, S. Chand & Co Pvt Ltd.
- 6) Fundamentals of Molecular Spectroscopy: C. M. Banwell and E. McCash, Tata McGraw Hill, 4th Edition.
- 7) Modern Raman Spectroscopy: A Practical Approach; Ewen Smith, Geoffrey Dent., Wiley; 1st Edition
- 8) Instrumental Methods of analysis: (CBS) H.H . Willard, L.L. Mirrit, J.A. Dean
- 9) Solvent extraction in Analytical Chemistry: G.H. Morrison, F. Frieiser, John Wiley & Sons, NY

List of Open Source Software/learning website:

- 1 <https://www.slideshare.net/solairajananant/nmr-spectroscopy-13887430>
2. <https://www.vanderbilt.edu/AnS/Chemistry/Rizzo/chem220a/Ch13slides.pdf>
3. https://www.utdallas.edu/~scortes/ochem/OChem_Lab1/recit_notes/ir_presentation.pdf
4. <https://www.slideshare.net/shaisejacob/gas-chromatography-ppt>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understanding the fundamentals spectral Analysis	2 Understanding
CLO2	Interpretation of spectral analysis	3- Applying
CLO3	Understanding various separation techniques And their application	2 Understanding 3- Applying
CLO4	Application of various spectral Analysis	3- Applying
CLO5	Design the molecular structure based on spectroscopy	6 Design
CLO6	Understanding of GC and HPLC comparison	2 Understanding 4. Analyze

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes(POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CLO1	H	L	L	L	L	H	L	L	L
CLO2	L	M	L	H	M	L	H	L	H
CLO3	L	H	L	H	M	L	M	L	L
CLO4	L	L	L	H	M	L	H	H	M
CLO5	L	L	L	M	M	L	M	M	L
CLO6	L	M	L	M	H	L	H	L	L

H:High, M:Medium, L:Low