

<b>Name of Faculty</b>	:	Faculty of Science
<b>Name of Program</b>	:	Bachelor of Science
<b>Course Code</b>	:	2BSC02
<b>Course Title</b>	:	Analytical Chemistry-I
<b>Type of Course</b>	:	Professional Core
<b>Year of Introduction</b>	:	2023-24

<b>Prerequisite</b>	:	Need a solid foundation in chemistry fundamentals as well as practical skill in student.
<b>Course Objective</b>	:	The key skills and knowledge that students should aim to acquire by completing each unit of the Analytical Chemistry course. They encompass a range of theoretical, practical, and analytical skills necessary for effective analysis and measurement in various contexts.
<b>Course Outcomes</b>	:	At the end of this course, students will be able to:
	CO1	To remember role of analytical chemistry in scientific approach and various industries.
	CO2	To understand gravimetric and volumetric analysis methods.
	CO3	Develop skills in chromatographic methods.
	CO4	To analyze samples by applying basic instrumental techniques.
	CO5	To understand the principles behind advanced analytical techniques.

#### Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
L	T	P		Theory Marks		Practical Marks		Total Marks
			C	SEE	CIA	SEE	CIA	
3	0	2	4	50	25	50	25	150

*Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P - Practical, C - Credit, SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

#### Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping WithCOs
1	<b>Introduction to Analytical Chemistry</b> Overview of analytical chemistry and its significance in various fields. Classification of analytical methods: qualitative and	12	26.66%	CO1

	quantitative analysis. Basic concepts of accuracy, precision, sensitivity, and selectivity. Introduction to common laboratory equipment and safety protocols			
2	<b>Basic Analytical Techniques</b> Gravimetric analysis: principles, techniques, and applications. Volumetric analysis: acid-base, redox, and complexometric titrations. Precipitation reactions and their role in quantitative analysis. Introduction to titration curves and indicators.	10	22.22%	CO2
3	<b>Instrumental Analysis</b> Spectroscopic methods: UV-Vis, IR, and atomic absorption spectroscopy. Chromatographic methods: gas chromatography and liquid chromatography. Introduction to electroanalytical methods: potentiometry and conductometry. Principles of data analysis and calibration in instrumental methods.	11	24.44%	CO3
4	<b>Analytical Applications and Quality Control</b> Applications of analytical chemistry in real-world scenarios: environmental, pharmaceutical, and food analysis. Introduction to quality control and validation of analytical methods. Introduction to modern analytical techniques: mass spectrometry, NMR. Hands-on experience in the laboratory with basic instrumental techniques.	12	26.66%	CO4 CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
<b>Weightage</b>	<b>20</b>	<b>40</b>	<b>20</b>	<b>20</b>	-	-

*NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.*

**Suggested List of Experiments / Tutorials**

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given) (a) Identify and separate the components of a given mixture of 2 amino acids by paper chromatography	02 x 06 = 12
	(b) Identify and separate the sugars present in the given mixture by paper chromatography.	
	i. glycine + aspartic acid	
	ii. glutamic acid + tyrosine	
	iii. glycine + glutamic acid	
	iv. glycine + tyrosine	
5	Estimation of Sodium carbonate and sodium hydrogen carbonate present in mixture by acid.	02
3	Estimation of Cu <sup>2+</sup> in iodometrically using Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	02
4	Estimation of oxalic acid to titrate acid KMnO <sub>4</sub>	02
5	Prepare standard solution of given acid.	02 x 03 = 06
	i. Hydrochloric Acid	
	ii. Benzoic acid	
6	Standardization of unknown acid by NaOH	02 x 03 = 06
	i. Hydrochloric acid	
	ii. Benzoic acid	
	iii. Oxalic acid	

**Major Equipment/Instruments and Software Required**

Sr. No.	Name of Major Equipment / Instruments and Software
1	Test tubes
2	test tube stand
3	Beakers
4	Funnel
5	chromatographic paper or TLC
6	Glass rod
7	Burette
8	Pipette
9	Burette stand
10	

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**Suggested Learning Websites**

Sr. No.	Name of Website
1	<a href="https://nptel.ac.in/courses/104104066">https://nptel.ac.in/courses/104104066</a>

**Reference Books**

Sr. No.	Name of Reference Books
1	Fundamentals of Analytical Chemistry" by Douglas A. Skoog, Donald M. West, F. James Holler, and Stanley R. Crouch
2	Quantitative Chemical Analysis" by Daniel C. Harris
3	Principles of Instrumental Analysis" by Douglas A. Skoog, F. James Holler, and Stanley R. Crouch
4	Analytical Chemistry: A Modern Approach to Analytical Science" by David Harvey
5	Introduction to Analytical Chemistry" by James S. Fritz and George H. Schenk
6	Practical chemistry (for B.Sc. I, II and III year students) - O P Pandey, D. N. Bajpai and S. Giri (S Chand and company Ltd.)
7	Analytical Chemistry - G. D. Christian (6th Edition).