INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**MASTER OF SCIENCE (CHEMISTRY)**
SEMESTER	**1**
COURSE TITLE	**ANALYTICAL CHEMISTRY-I**
COURSE CODE	**02CY1404**
COURSE CREDITS	**6**

Course Outcomes: After completion of this course, student will be able to:

1. To understand the basics principle and statistics of analytical chemistry.
2. To develop knowledge pertaining to the appropriate selection of instruments for the successful analysis of complex mixtures.
3. To develop and utilise various physico-chemical and Radiation scattering methods of analysis.
4. To extend skill for development and application of various analytical techniques
5. To extend skills for resolving various analysis issue.
6. To construct scientific planning for developing, conducting, reviewing and reporting the experiments

Pre-requisite of course: Before learning analytical chemistry, student should aware about basic principles and theories of analytical chemistry, instrumental methods of analysis and other UG level chemistry

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
5	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Basics of Analytical chemistry** Introduction, The role of analytical chemistry, Classification of analytical methods based on their physical property measurement (classical and instrumental), Difference between classical Analytical methods and instrumental Analytical methods., Advantages and disadvantages of classical and instrumental methods, Key factors for the selection of Analytical methods, Statistics in Analysis, Types of errors Accuracy, Precision, Mean or average, Mean deviation or average deviation., Standard deviation, Variance, Coefficient of variance, Spread or range, Confidence interval and limit, Rejection of result or Q-Test, Confidence interval tests of significance or Student T-Test, Chi-square test, F-test, Minimisation of errors, Significant figure and computation statistical evaluation of data, Computation rules-method for reporting analytical data, Numerical.	15
2	**Radiation scattering methods and its applications** Introduction, Reflection, Refraction, Scattering, Transmission, Electromagnetic radiation, Refractive index, Principle and Instrumentation of Turbidimetry and Nephelometry., Choice between Turbidimetry and Nephelometry analysis, Factor affecting to measurement of turbidimetry and Nephelometry. Turbidimetric titration. Application and advantages of scattering method.	15
3	**Colorimetry, Amperometry, Polarimetry and Karl Fischer** Introduction, Plane polarized light, Optical activity, Specific rotation, Optical rotation, Circularly polarized light, Reference electrode, Indicator electrode, Amperometry, Amperometric titration, Equivalence point., Principle and theory of Karl Fischer technique, Principle and theory of colorimety and Polarimetry, Advantages and applications of Colorimetry, Amperometry, Polarimetry and Karl Fischer.	15
4	**Flame Photometry and Atomic Absorption Spectroscopy** Introduction, Principle and theory of Flame photometry and AAS, Instrumentation of Flame Photometery and AAS, Types of burners used in Flame Photometry and AAS., Important characteristics and requirements of Flame, Factor affecting and Interferences in Flame photometry and AAS, Limitations, advantages and application of Flame photometry and AAS.	15
Total Hours		**60**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiments** Experiment 1, Experiment 2, Experiment 3, Experiment 4, Experiment 5, Experiment 6, Experiment 7, Experiment 8	
Total Hours		

References:

1. Introduction to instrumental analysis, Introduction to instrumental analysis, R.D.Broun, McGraw Hill , 1987
2. Instrumental methods of chemical analysis , Instrumental methods of chemical analysis , H. willard, L.Merrit, J.A. Dean and F.A. Settle, CBS , 1986
3. Fundamentals of analytical chemistry , Fundamentals of analytical chemistry , D.A.Skoog, Saunders College Pub., Fort Worth, 1996
4. Cyclic Voltammetry and frontiers of electrochemistry , Cyclic Voltammetry and frontiers of electrochemistry , N.Noel and K.I. Vasu , IBH, New delhi , 1990
5. Instrumental methods of chemical analysis, Instrumental methods of chemical analysis, Sharma BK, Goel Publishing House , 2004

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
5. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
6. All students in the laboratory must wear safety goggles and lab coats during lab session.

Supplementary Resources:

1. http://www.nptel.ac.in/courses/104103069/#
2. http://ocw.mit.edu/courses/chemistry/
3. http://vlab.amrita.edu/index.php?sub=2
4. http://www.vlab.co.in/ba_labs_all.php?id=9