University of Kerala

Discipline	CHEMISTRY				
Course Code	**UK3DSECHE202**				
Course Title	**ANALYTICAL CHEMISTRY -I**				
Type of Course	**DSE**				
Semester	3				
Academic Level	200 - 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-		4
Pre-requisites	1. General Chemistry 2. Equilibrium Principles				
Course Summary	This course provides students with the knowledge and skills necessary to understand the principles and practices of analytical chemistry, including the scope, function, and analytical perspective of the field. Students will learn about various analytical techniques, methods for sample preparation and analysis.				

Detailed Syllabus:

Module	Unit	Content	Hrs
		ANALYTICAL CHEMISTRY -I	
I	**INTRODUCTION TO ANALYTICAL CHEMISTRY**		**9**
	1	Scope, function, The Analytical Perspective, Analytical Problems and their solutions, Trends in Analytical Methods and Procedures, Introduction to the terms used in analytical chemistry	3
	2	Qualitative and Quantitative Analysis, Sampling	2
	3	The analytical process: Steps in the analytical process	1
	4	Validation of a method, Use of literature, Analyze Versus Determine	3
II	**BASIC TOOLS OF ANALYTICAL CHEMISTRY**		**9**
	5	The Laboratory Notebook, Laboratory Basic Equipments & Measurements: Volumetric Glassware (Volumetric flasks, Pipets, Syringe pipets, Burets & Use of volumetric Glassware,) The Analytical Balance	2
	6	Units for Expressing Concentration**:** Molarity and Formality, Normality, Molality, Weight, Volume, and Weight-to-Volume Ratios, Converting Between Concentration Units, p-Functions	3
	7	Stoichiometric calculations, Selection of glassware, Preparation of	2

		standard acid & base solutions	
	8	Other apparatus: Desiccators, furnaces & ovens, hoods, wash bottles, Centrifuges & filters, Filter papers	2
III	**LANGUAGE OF ANALYTICAL CHEMISTRY**		**9**
	9	Analysis, Determination, Measurement, Techniques, Methods, Procedures and Protocols, Classifying Analytical Techniques, Use of Literature	2
	10	Selecting an Analytical Method: Accuracy, Precision, Sensitivity, Selectivity, Robustness and Ruggedness, Scale of Operation, Equipment, Time, and Cost, Making the Final Choice	2
	11	Developing the Procedure & Standardizing Analytical Methods: Compensating for Interferences, Calibration and Standardization, Sampling, Validation, Analytical signals, Calibrating the signals, and Sensitivity determination.	2
	12	Being Safe in the Laboratory, Safety culture and Your role in it, Medical Emergencies, Fire, Proper Conduct/Behaviour in lab Personal Protective Equipment: Hair & Apparel for Laboratory, Eye protection, Gloves, Laboratory Protocols: Safe Handling of Chemicals & Equipment, Proper House Keeping, Proper Hygiene, Disposal of Chemicals, Electrical Safety, Fire Safety. Chemical Hazard symbols	3
IV	**CHEMICAL EQUILIBRIUM AND SEMIMICRO QUALITATIVE INORGANIC ANALYSIS**		**18**
	13	Reversible Reactions and Chemical Equilibria, Thermodynamics and Equilibrium Chemistry, Le-Chatelier's Principle, the law of mass action, Factors affecting chemical reactions in solutions	4
	14	Solubility product, Common Ion Effect, Fractional precipitation, Effect of acids, temperature and solvent on the solubility of a precipitate	4
	15	Introduction to semimicro qualitative inorganic analysis, The study of reactions of cations (**Pb^{2+}**, Al^{3+}, Mn^{2+}, Zn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, Mg^{2+}, NH_4^+) and anions (CO_3^{2-}, CN^-, Cl^-, Br^-, I^-, F^-, NO_3^-, SO_4^{2-}, PO_4^{3-}, CH_3COO^-, $(COO)_2^{2-}$) on the semi-micro scale	3
	16	Preliminary tests, systematic analysis and Confirmatory tests for anions on the semi micro scale, Modifications of separation procedures in the presence of interfering anions	3
	17	Preparation of solution for cation testing, separation and identification of cations into groups (I, II A, II B, III A, III B, IV & V) on the semi micro scale (Intergroup Separation)	4
V	**OPEN ENDED MODULE: Learning through problem-solving, seminars, open discussions, assignment discussions, Quizzes, Open book exams etc.**		**15**
	18	Select an analytical method used in a specific industry (e.g., pharmaceuticals, environmental monitoring). Discuss the process of validation and standardization for this method, including the use of literature, compensating for interferences, and calibration techniques.	
	19	Identify, categorize, and describe the uses of apparatus and equipment commonly found in an analytical chemistry laboratory. Provide detailed	